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American progressive education and the schooling of poor children: A brief history of a philosophy in practice

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Abstract

This paper provides a historical analysis of the past century of progressive education, within the general socio-political context of schooling within the US. The purpose of this review is to create a social, historical and philosophical context for understanding the current narrative of progressive education that exists in educational policy discussions today. Major scholarly works related to progressive education are situated within the political climate of the times of their publication. Over the course of this discussion an argument is presented that shows how progressive education has been related to the education and emancipation of disadvantaged children at different points according to the societal emphasis of the time. The final section of the paper proposes a radical form of emancipatory teaching that requires a wide range of abilities among teachers and is matched to elements of the moments in history when progressive education was most effective for poor children.

Keywords: Inexpert raters, generalizability theory, variability of ratings, writing assessment.

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Introduction

The beginnings of progressive education

The phrase “Progressive Education” conjures images of children exploring freely, calling their teachers by their first names and sitting in circles to express their feelings. The children in these images are generally expected to be affluent and White, drawn from AS Neill’s (1960) “Summerhill School”, a Waldorf school in a wealthy suburb or somewhere utopian in the Netherlands. The idea that progressivism is synonymous with ease may be the reason that it is often perceived as a privilege of the luxury class, yet another way that wealthy people and their children’s lives are just better, more enriched, more free. However, the roots of progressive ideology paint a more multi-faceted picture.

The first proponent of progressive education, philosopher Jean Jaques Rousseau (1783) described a child-centered, nature-based education as a method for educating the children of wealthy families whom he tutored; private tutoring for the wealthy being the only form of education at the time. A century later Maria Montessori (1897) pioneered a more structured version of progressive education as a cure all for the most deeply impoverished children of Southern Italy. The “Montessori method” that she developed enabled children considered mentally deficient to progress in their cognitive capacities until they were on par with or ahead of typically developing children from affluent families. Her approach instilled self-regulation in children who lived among the chaos of the crowded, over-stimulating slums (1967). She designed an individualized curriculum where hands-on experimentation with objects and materials within specific work centers allowed each child to focus, persist and develop skills in motor development, problem solving and emotional regulation. Today Montessori’s methods have been adapted in many ways to early childhood and elementary classrooms, but the “learning centers” that are a staple of every progressive classroom originated with her methods.

Rousseau and Montessori both believed that their approach to education would lead to a more enlightened, authentic and peaceful society. However, the details of their methods centered initially on what they each perceived as the needs of their students based on social class. In the case of “Emile”, Rousseau argued against the corruption of materialism and the superficiality of the rich while Montessori sought to protect her students from the ravages of poverty such as stress and disorganized thinking. At the core of each approach was a focus on the individualized needs, strengths and interests of the child. Both writers described the teacher as a nurturing guide. In Rousseau’s “Emile”, the teacher supported the child’s natural inclinations through the endless opportunities of the natural world. Montessori’s teacher provided a carefully planned environment designed to correspond precisely to each child’s developmental needs and natural inclinations. Therefore, while the social context of these forbearers of progressive education centered on opposite economic classes, the methods and philosophy they espoused were similar.

The glaring differences between what is assumed through American educational discourse to be an appropriate method of instruction for wealthy as opposed to poor children today (Kohn, 2011) and where progressive approaches fit into our current narrative about educating disadvantaged children can only be understood through an analysis of the field’s philosophical and pedagogical roots.

Dewey and the early 20th century

In American cities compulsory public education was introduced just prior to the 20th century as a way to assimilate the rapid influx of immigrants and to inculcate the children of the working class into the life and values of factory work (Katz, 1976). Education was seen as the means through which to prepare the future workforce and this soon gave rise to debate on the best way to educate future citizens. John Dewey challenged the idea that schooling for the masses had the sole purpose of training future factory workers. Instead he saw schools as the birthplace of a more functional, more egalitarian democracy. Stemming from his broader political philosophy of pragmatism, he argued for the idea that learning can only occur when connected to the learners’ goals and interests. He described

the learning process as exploration into topics that were funded with personal meaning. In his depiction of an ideal classroom in “The Child and the Curriculum” (1997), the teacher acts as facilitator, providing rich experiences that would naturally lead to the emergence of particular areas of interest for each child. He believed that this type of education would encourage and allow for equal participation and investment in the classroom community, thereby laying the foundation for a truly democratic society. Dewey’s (1916) educational philosophy was directly tied to his vision of an ideal society. He argued that only an inspired, personally engaged citizenry would allow for a true democracy. In his other philosophical writing Dewey (1938) applied the importance of experience and meaning to appreciating art, the nature of emotion and other philosophical topics.

Dewey’s lab school put his pedagogical prescriptions into practice. The Deweyan version of progressive education was highly individualized, with teachers serving as facilitators aiming to provide meaningful experiences to students that would transform into a broad array of knowledge and conceptual development through in-depth discovery and experimentation (Bruce & Eryaman, 2015). In the decades following his initial influence the Deweyan approach gave rise to the child-study movement. In order to understand children’s interests, the logic went, educators must watch them and record the details and subtleties of their behavior. During the early to middle 20th century, teachers, academics and concerned citizens, mostly women, who were disturbed by the effects of poverty on children, joined the child study movement as a way of documenting the need for social investment in poor families (Hall, 1903). Papers on young children’s play, their use of materials and their social and emotional expression proliferated. The most insightful “child watchers” blended the boundaries between education and psychological study (Senn, 1975). Many early descriptions of children’s behavior were incorporated into formal psychological study and gave rise to what would become the field of developmental psychology (Anderson, 1956).

Dewey’s progressive education model had wide reaching influence, inspiring play-based curriculums in small schools throughout America. Unit blocks were first developed at the City and Country school in New York City. In addition the Bank Street school of Education was founded for training teachers in progressive methods of early childhood and elementary education. These centers of progressive education focused primarily on the individual child and were less concerned with social issues. The free school/open classroom movements in Europe and the US throughout the early 20th century brought institutions of education where the child experiencing the freedom of a progressive education was almost exclusively middle class and by extension White.

Progressivism and the move towards equity

Within the civil rights movement of the 1960’s the potential freedom offered by progressive education did not escape the attention of the decade’s social activists. Many Black and White civil rights activists recognized the promise of progressive education for addressing racism and increasing social equity. George Dennison (1969), Jonathan Kozol (1967) and Ned O’Gorman (1970) wrote as White teachers turned social critic. Engaging with small, free schools in impoverished urban areas they made use of Deweyan style pedagogy to connect with children living in extreme poverty. Their teaching and writing exposed the gap between traditional schooling and what was meaningful to the lives of their students. Meanwhile many Black intellectuals were concerned by a majority of Black children being educated by White teachers (Rickford, 2011). Prior to desegregation Black schools in the south employed Black teachers who often saw their jobs as a way to nurture and uplift their race (hooks, 1994). These teachers were driven to develop the best in their Black students. The leaders of the Black power movement argued that the White teachers of the inner city saw only deficits in their Black students and discouraged them from reaching their potential (Rickford, 2016). As an answer to this issue, small Afro-centric schools were founded and propagated alongside small, free schools in the inner cities, especially in major cities like New York, Philadelphia, Boston and Oakland. Separate from, yet consistent with the mission of other grassroots efforts at progressive schooling they focused on meeting each child where they were and supporting their development as individuals (Rickford, 2016; Giddings, 2001). Highly educated Black teachers came with a fervent mission from universities and artists’ studios to staff these Afro-centric small schools. Along with nurturing students’ natural interests and gifts they sought to help children develop racial and ethnic pride. This was achieved

through a curriculum in which all Eurocentric biases, standard in traditional schools, were removed. Instead the curriculum focused on African and Afro-American history, using arts and culture from African and Afro-American society as an entry point for student engagement and learning. As a follow-up to these initial small-scale efforts cities in states with large African American populations such as Atlanta, Philadelphia, Oakland and New York saw the establishment of large scale afro-centric curriculum integrated into entire school districts in the late 70s and early 80s (Giddings, 2001).

Outside of the US, a progressive pedagogy that combined freedom and empowerment for marginalized populations was developed by Paulo Friere, a Brazilian teacher turned educational theorizer. In his book "Pedagogy of the Oppressed" Freire (1968) drew on his experiences with children living in Brazilian slums to expose how standard models of education ensured a perpetual under-class. Opposite to Dewey's ideal society, Freire's analysis of the banking system that characterized education served to silence poor children and inculcate them into maintaining the role of complacent workers within an unjust system (Eryaman, 2008). According to Freire's analysis children's minds were treated as repositories for information deposited by the teacher. Meanwhile, critical thinking and creativity remained the sole purview of the ruling class. bell hooks, an African American writer and teacher raised in Southern schools prior to desegregation studied with Freire and brought the concept of social transformation through a pedagogy of freedom to the context of African American and Latino American children. "Teaching to Transgress" (hooks, 1994), blended the Deweyan ideology of education as free exploration with Freire's and the Afrocentric movement's emphasis on the classroom as a site for the challenging of social hierarchies based in classism, racism and sexism.

With this intellectual back-drop the education movement throughout the 70's was consistent with the larger grassroots rebellion against all social "standards" and traditions. Small "free" schools each with their own political and/or philosophical emphasis were founded. In New York, East Harlem saw the founding of the E. Harlem Block Schools (Far West Lab 1971), a cluster of progressive, developmentally and culturally responsive day cares supported by socially active poor Latina mothers. In Central Harlem, Ned O'Gorman opened "The Children's Storefront" in 1965, a tuition free independent school that blended Montessori methods with an emphasis on the arts (O'Gorman, 1970). O'Gorman brought in teachers of color who integrated a social justice and racial pride dimension into the curriculum. In 1974 Deborah Meier, a progressive educator who had seen the positive impact of progressive methods on middle class children, opened a small public school named Central Park East (CPE) in East Harlem with the mission of serving the neighborhood's impoverished children through a Deweyan style progressive curriculum. With the support of the Coalition of Essential Schools and the local superintendent, Central Park East 2, River East and a middle and high school were all opened nearby by Meier with the same mission less than a decade later according to a New York times article of August 22nd, 1992. These schools offered an individualized curriculum, child study and egalitarian collaboration and decision making power among school staff, administration and parents (Meier, 1995). The Ella Baker School opened independently on the Upper East Side following a similar model and borrowing teachers and curriculum from the CPE schools. The Lower East Side neighborhood of Manhattan, home to many waves of immigration, first from Europe and later from Spanish speaking Central and South America, saw the development of cultural centers such as ABC No Rio and Charas El Bohio. These centers existed to provide ethnic pride, artistic and educational enrichment to the various immigrant communities of the neighborhood.

The 1960s was a fertile time for progressive education in America. Educational theorists, such as those cited above blended a focus on freedom and empowerment, using the assumptions of progressive ideology to critique social hierarchies and to redefine schooling as a site for both meaningful pedagogy and social transformation towards a more egalitarian society (Eryaman & Riedler, 2009). The existence of small, free and culturally responsive schools provided real-life examples of lofty progressive social ideals. However this period of experimentation with schools as sites for the creation of a better society was short lived.

Back to basics and progressive backlash

In 1983, the U.S. Department of Education released the “Nation at Risk” report which disclosed startling data that America’s children were falling far behind the rest of the industrialized world, particularly in math and science. The Reagan administration and the new American conservative movement considered the report to be a dire warning about the United States’ political and economic future. This led to three decades of “Back to Basics,” reforms, standards based curricula, and high stakes testing of public school students under the guise of ensuring accountability. “A Nation at Risk” also slammed shut the doors of free, small schools throughout the country and replaced them with schools focused unflinchingly on the basic skills of reading, writing and arithmetic, especially for the poor children of the inner cities. Despite the continued call for accountability measures and high stakes testing, the achievement gap between rich and poor and Black and White only widened (Ravitch 1989).

Within the curriculum and instruction departments of graduate schools of education, such as Bank Street School of Education, New York University and Teacher’s College, Columbia, professors refused to abandon the best practices of progressive education they had been expounding to new teachers over the previous decades. Collaborations with the international English speaking world provided new insights on approaches to literacy while even more radical progressive approaches to classroom structure and organization were found throughout Western Europe (Goodman, 1981; 1986). In a backlash to the “Back to Basics” movement these progressive educators proposed the “Whole Language” approach to literacy instruction. In direct opposition to a skills-based phonics curriculum, whole language theorists argued that children had a natural capacity for literacy in the same way they did spoken language. They believed that a print rich environment and significant exposure to high quality children’s books would lead to children becoming literate naturally.

Lucy Calkins, an original scholar of the whole language approach, developed her writing workshop approach to literacy instruction out of Teacher’s College, Columbia University (Calkins, 1983). The main research based literacy intervention at the heart of the whole language methodology was missing from the version that was later promoted in the city’s public schools. This intervention, termed “Miscue Analysis” involved careful note-taking of student’s decoding strategies. Analysis of the mistakes that emergent readers made was used to provide insights into strategies and misconceptions that could guide instruction (Goodman, 1981). This aspect of the approach that would likely have made it a more widely effective teaching method was left out in wider educational policy discussions.

The “Whole Language” approach spurred intense debate. The basic skills movement comprised of education policy makers and traditional educators was horrified that a curriculum for literacy was being adopted in schools of education that would provide even less direct instruction than before. The progressive academics saw the last battle for progressive education as centered on the nature of literacy instruction (Eryaman & Bruce, 2015). While policy makers and academics argued about how to best teach literacy in published papers and conference presentations, the low literacy rates among impoverished children remained stagnant. In their zeal for progressive philosophy the predominantly White academics forgot about the equity aspect of education and the importance of tying pedagogy to the individual needs, interests and prior knowledge of each child. Lisa Delpit (1988) emerged at the heart of this debate with the article: “The Silenced Dialogue: Power and Pedagogy in Educating Other People’s Children.” Her writing exposed the race and class bias inherent in much of the way progressive methods were being taught in schools of education and implemented by White teachers with predominantly non-White low income children.

According to Delpit (1995), within a typical progressive pedagogy White middle class teachers gave little directions, expecting children to figure things out on their own. She argued that the problem for poor students of color was that their classroom and the unstated values of their teachers reflected a White middle class social context that was usually foreign to them. Without direction the children were lost, and rather than adapting to their needs, teachers gave these students labels of deficiency. Delpit advocated for culturally responsive teaching that recognized signs of children’s

ability that were culturally relevant to them, alongside explicit teaching of the ways of the middle class. This included everything from language and communication patterns to middle class cultural values, as well as direct instruction in any key academic areas that children had not absorbed from their home lives. Delpit was not against progressive methods of education, but argued for teaching that was tailored to the unique needs of every single child. This approach was closer to original progressive pedagogy than an approach that assumed all children entered school from the same cultural framework as that of their teacher. Although she did support explicit teaching of certain necessary skills, she also argued for creative approaches that would engage children through their natural interests. She proposed integrating the arts into instruction, developing in-depth and critical thinking, as well as empowering poor children to challenge hegemonies in every aspect of the school and curriculum.

As with the former misconceptions of whole language instruction, Delpit's arguments were largely misunderstood and became reduced to the idea that progressive education is only for children of the White middle class. Poor children of color were assumed to need only teacher directed instruction in basic skills to catch-up to their White more affluent peers. This narrative fit well with that of education policy makers and the larger public discourse that stemmed from the "Nation at Risk" report and continued into the decades following. Given that data collected during this time on the achievement gap highlighted the limited proficiency of poor children it was the poor and working class children who threatened to bring down the nation's economy. Progressivism was blamed for the achievement gap by policy makers and soon the general discourse on education echoed this condemnation.

Within this social context, Head Start, a national anti-poverty early childhood education program founded in the 1970s was threatened with extinction by congress if it didn't develop academic standards (Lee, Brooks-Gunn, Schnur and Liaw, 1990). The early childhood education movement supporting Head Start was comprised of a broad coalition of educators, policy makers and researchers (see citation above for example). This group combined knowledge of young children's psychology and progressive teaching practices with a commitment to social equity and the amelioration of poverty among children and families. The combination of well researched principles and well articulated practices enabled the early childhood movement to resist the most significant changes to Head Start and to effectively defend its existence. Today the best Head Start centers remain the rare educational institutions to embody a combination of progressive pedagogy, cultural responsiveness and empowerment of poor communities (Lee, 2011).

Today's narrative of progressive education and the schooling of poor children in the most segregated school system in the US

Today's elementary and middle/ high schools in high poverty neighborhoods and rapidly gentrifying ones have not received the support provided to Head Start. New York City has the most socio-economically and racially segregated schools in the country. While the majority of its public schools that serve affluent populations implement some or many aspects of progressive education, almost no progressive schools in high poverty neighborhoods exist according to an Inside Schools report of February 13th of 2013. Interestingly, an adaptation of some core tenets of the whole language approach captured by Lucy Calkins have been incorporated into the curriculum of many school districts through what is known as the Teachers College reading writing project. However, straying from the original purpose of a process based approach to analyzing children's literacy development, the current incarnation of the "reading/ writing project" is comprised of pre-packaged curriculum that focus on specific genres of literature introduced by the teacher in mini-lessons for whole class instruction.

Central Park East 1 and 2 schools in East Harlem are still standing and still true to their initial philosophy and pedagogy. However, enrollment in these schools has drawn families from all over Manhattan. They no-longer serve a predominantly low-income population. Although remaining more racially diverse than most New York City schools, CPE 1 no longer qualifies as a Title 1 school because less than 60% of their population lives below the federal poverty line according to the

website “Inside schools.org”. The off-shoot schools such as “River East” and the CPE middle/high-school were unable to withstand the pressures of the “back to basics” turn and reverted to traditional methods. In the 1990’s the Children’s Storefront School saw the forced resignation of Ned O’Gorman, their head master and founder. About a decade later the schools’ name changed to “The Storefront Academy” and the school became centered on heavy discipline and traditional instruction.

In place of the small, free schools of the 1960s and 70’s, large schools with zero tolerance discipline policies and teacher directed, skill based curriculum now dominate in low income, Black and Latino neighborhoods within New York and in similar cities. These large network charter schools have been lauded for their ability to close the achievement gap among poor Black and Latino children with intensive drilling in basic skills and extra hours devoted to study. Although reports of dishonest and even abusive practices at these schools have frequently surfaced (see Ravitch [2016] for a review), parents and policy makers continue to embrace what has been called the new “education reform movement” embodied by this brand of charter schools.

Consistent with praise for highly structured traditional curriculum that addresses the educational needs of poor children, today’s narrative of progressive education reflects the notion that such a form of education is only for the privileged. The idea is that affluent children can afford to learn less in school because their parents will pay for tutors and extra enrichment. Even families at the city’s progressive schools have mentioned feeling pressure to “supplement” academics as mentioned in a New York Times Article of May 18, 2016. In May 2017, after escalated tactics against parents fighting for the progressive version of the school garnered much media attention, the principal was removed and the school is awaiting new leadership. Yet according to data from the department of education, the poor children in the segregated traditional schools have performed no better with skills based approaches. Deprived of recess, physical education and the arts, elementary schools in both traditional public and public charter schools report high degrees of suspension, expulsion and special education referrals. Elementary schools in poor neighborhoods with high incidences of violence have been designated as “Persistently Dangerous” by local departments of education as reported by the Huffington Post in August 2014. According to local department of education public data proficiency levels in math and reading now range in single digits for schools with poverty levels of 85% and above throughout New York. Taken together these results say nothing about the efficacy of progressive education for poor children, but they do make a clear case against the efficacy of teacher centered, skills-only methods of instruction for this population.

New York City’s middle class families are moving into high poverty neighborhoods and looking at the schools and asking why they are so segregated and ineffective (Hannah-Jones, 2016). Activist parents from a variety of backgrounds have begun to draw attention to the extreme racial and economic segregation of their local public schools. In neighborhoods like Harlem and Bedford Stuyvesant, brownstone buying professionals are using their social capital to question the current state of education according to a piece in DNA info Education in October 2015. CPE 1, after frequent administrative turn-over is engaged in a war between their new principal, who believes low income children need a more traditional pedagogy and the progressive educators who founded the school as described in a New York Times article of May 18, 2016. CPE 1 parents remain divided between whether the school’s emphasis should be on its original progressive pedagogy or the original mission to serve a predominantly low- income population of students equitably.

In the midst of this, a misunderstanding of Lisa Delpit’s writing on education (cited above) was circulated among the parents and staff of CPE 1 and mentioned in the New York times article (cited above) as support for the idea that progressive education doesn’t work for children of color or for those from poor families. Delpit’s (2013) book: “Multiplication is for White People: Raising Expectations for Other People’s Children” aims to clarify some of these misunderstandings. In it she explains that her critique was never of progressive methods per se, but rather of biased assumptions that guided classroom instruction and made it virtually impossible for poor children of color to succeed in school. She argues against narrowing the curriculum for poor children and for a version of progressive education that is focused on empowerment, critical thinking and challenges to the status

quo. This version of progressive education as emancipation of poor children is reminiscent of Freire, hooks and the Afro-centric schools movement.

As policy makers look back on the failures of the back to basics movement (Carnoy and Rothstein, 2013) education is once again poised for a new approach. Many of the issues plaguing American education have not shifted since the forced de-segregation of public schools. The achievement gap between poor children and everyone else has only widened. Today's inner city schools are more racially and socio-economically isolated than ever before. Now, not only are these schools lacking in academic proficiency but are frequently sites of violence, even among children as young as kindergarten age.

A new group of Black intellectuals has arisen in today's educational climate. They are again critical of the way that American schools marginalize children of color. Ta-na-hesi Coates (2015) describes his schooling as inherently alienating, while Christopher Emdin (2016) argues for an emancipatory, democratic, culturally responsive pedagogy in which teachers cede authority to students in order to prioritize an emotional and cultural connection with them.

As in the past academics and educational policy are not completely aligned. Schools of education continue to teach cultural responsiveness and critical pedagogy but the realities of the K-12 classrooms often seem far away from the intellectual discussions of teacher training course-work (Polankow-Suransky, Thomases & Demoss, 2016; Riedler & Eryaman, 2016). The public discourse around education tends to center on the most controversial and familiar debates, dealing more with political policy than details of curriculum and instruction. How then do we make way for an approach to education that was given little time to thrive to determine if it might work for poor children after all?

To date, the assumptions about the best way to educate poor children derived from the "Nation at Risk" report have influenced the schooling of that population for the past 3 decades with little effect (Graham, 2013). In contrast the progressive education movement combined with an emphasis on emancipation, social and racial equity was allowed to flourish for only a little over a decade in practice and only through disconnected pockets of grass-roots efforts, lacking systemic support.

The way ahead

To address these issues educators and social activists must first change the narrative about progressive education. Perhaps as described in the writing of the American educators of the 70's (described above), it can and will work for *all* children, but only by tailoring methods and curriculum to the needs and interests of individual children regardless of their income or ethnic background. This requires getting to know each child, not from a culturally biased norm, but from their own social and cultural context as a starting point. As Delpit argues, it is necessary to first learn the meaning of each child's language and culturally valued skill set, to then use that information as an entry point into the curriculum. As hooks recommends, teachers should view teaching as transformative, revolutionary and empowering. As Dewey cautions, learning can only happen when the material being learned is funded with personal meaning. As Montessori prescribes, the classroom environment must be carefully planned to allow for the development of every child's unique traits. Teachers and administrators must connect the practice of teaching to the philosophy and psychology of learning and reject over-simplifications. Only then can progressive education be tested for its efficacy in educating poor children.

It is hard to imagine a way to bring systemic support for large scale implementation of progressive curriculum and methods given that by nature, the type of emancipatory progressive education just described is impossible to "bring to scale". By definition the precise methods and even curriculum topics must be allowed to emerge at the intersection of student-teacher-class relationships in response to the dynamic interplay of child-teacher-school culture. The only way to provide systemic support for this version of progressive education is to support, recruit and retain teachers

who are capable of and committed to doing far more than the traditional job description requires. An emancipatory progressive educator is first and foremost in the dual role of philosopher and psychologist. They must embrace and enact the abstract philosophical principles described above, in particular concepts such as: “emergence”, “inter-sectionality”, “ambiguity” and “authenticity”. At the same time they must practice the tradition of child study, but not only as a way to become expert in each child’s unique strengths, needs and ways of being in the world, but also as a way to notice cultural trends and patterns among the class as a whole and among each of their students’ individual family backgrounds. The teacher must use phenomenological methods to critique their own assumptions on a daily basis as well as to discover the meanings of children’s behavior, and then to understand the relationship between those behaviors and the larger cultural and historical contexts of their lives. All of this is required for only the initial stage of teaching, to create unique entry points for each child into the curriculum.

The building of curriculum; weaving knowledge and skills into naturally meaningful experiences for a wide diversity of children is the reason that the emancipatory, progressive teacher must also be an artist. The creativity required to develop such a curriculum is vast. The teacher must be able to think visually, musically and through stories to engage the varied learning *and* cultural styles of each student. The teacher must use the artist’s mind to imagine all the possible breadth and depth to which the curriculum can be stretched, the sub-topics explored, and connections between them made. To ensure effectiveness the teacher must constantly assess, collect and analyze data from the classroom with the rigor of a scientist. Therefore, the emancipatory progressive teacher must also have a scientist’s mind. They must be continually engaging in the scientific process of inquiry in regards to their methods and curriculum. As they observe the impact of their interventions and planned environments on their students they must constantly tweak, adjust and in some cases abandon entirely their planned instruction. They must plan assessments that are continuous and also aggregated and they must clearly and concisely report their findings on each individual child as well as the entire class to a diverse audience at multiple points in the year. Finally, to excel as a philosopher, psychologist, artist or scientist, one must be passionate, committed and connected to the greater purpose of the work. For teachers, that greater purpose is the creation of a more equitable society. Progressive, emancipatory teachers must be fully committed to that cause before they ever enter a classroom.

Therefore, to support a system of emancipatory progressive education, policy makers and educational administrators must prepare, recruit, retain and highly resource teachers whose minds are flexible enough, whose brilliance is wide reaching enough that they can do the job of philosopher, psychologist, artist and scientist all at once, each day, every day for the entirety of their careers. If this sounds preposterous and impossible to implement, it is worthwhile to note that those countries who we trail in educational outcomes, the ones that spurred the Nation at Risk report, and the back to basics movement, have already done it. While the US was scrambling to drill skills into poor children to outpace countries in Asia and Western Europe, places like Finland, Singapore and S. Korea were committing in ever stronger ways to an educational system of emancipatory progressive practices led by teachers that fit the above description as described by a New York Times article of March 16th 2011. The fact that most indicators show those societies to be models of equity according to an article in The Atlantic of March 17th 2014 just might be the by-product of progressive education that Dewey predicted in his ideal society.

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Comparison of Science-Technology-Society Approach and Textbook Oriented Instruction on Students' Abilities to Apply Science Concepts

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Abstract

It is important for students to learn concepts and using them for solving problems and further learning. Within this respect, the purpose of this study is to investigate students' abilities to apply science concepts that they have learned from Science-Technology-Society based approach or textbook oriented instruction. Current study is based on quantitative research methodology. The participants of the study are 609 students. Science classes were designed based on STS approach curriculum for 301 students, which is called as experimental group and textbook oriented instruction was followed with 308 students as a control group. The students were from sixth grade to ninth grade (age 12-15). The Iowa Assessment Handbook for the Chautauqua Program was used to collect data. The mean differences, standard divisions and t-values were calculated and used to assess pre- and post-test results. The results indicate that students, who experienced STS based curriculum through one full semester, are able to apply basic science concepts to new situations meaningfully better than students who exposed to textbook oriented instruction.

Keywords: Science-Technology-Society, textbooks oriented instruction, middle school students, science concepts

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Introduction

One of the central goals of science education is to enable individuals to be educated as scientifically literate people with an understanding of the nature of science and technology and their interconnectedness with the society (American Association for the Advancement of Science (AAAS), 1993; Ministry of National Education, 2013; National Research Council (NRC), 1996; Yalvac, Tekkaya, Cakiroglu, & Kahyaoglu, 2007). National Research Council (1996) explains scientific literacy as enabling people to use scientific principles and processes in making personal decisions and to participate in discussions of scientific issues that affect society (p. ix). In other words, scientific literacy improves many skills that people use in daily life such as being able to solve socio-scientific problems creatively, thinking critically, working cooperatively in teams and using technology effectively (Mbajorgu & Ali, 2003).

There is a consensus among science educators that scientific literacy is a beneficial and useful concept which must be achieved. In the study by Laugksch (2000), it was investigated that why scientific literacy is so crucial. The benefits of it were categorized into two sections, which are macro and micro views. Whereas the macro view is introduced as the effects of scientific literacy on community, science and society, the micro view is defined as impacts of it on individuals. The first common view of macro effects of scientific literacy is about its impact on the economy of a nation. The economic productivity of a society is related to the scientific and technological skills of people. Only nations whose citizens possess an appropriate level of scientific literacy might be able to use science and technology in order to develop new high-technology products for contributing economic well-being of their nation. Another claim suggests that people with higher scientific literacy in the community enable science to be supported by most of people in that society. Public support for science is important since science, technology and society are interconnected with each other and developments in each of these depend on support among themselves. The more the public understands about the objectives, processes and capabilities of science, the less likely the public will be to acquire unrealistic and unrealizable expectations of science (Laugksch, 2000, p. 85). The other effect of scientific literate people is on science policymaking process with their qualified decision-making. Scientific literacy enables individuals to make better decisions than made in the absence of such an ability, that's why successful science policies will be developed and supported in such a community. The last argument is the relation between science and culture. The isolation of science from culture of a society may cause people to understand science improperly and this process might finish with individuals' negative feelings and attitudes toward science. In order to deal with this kind of a situation, scientific literacy of public can be supported since it might counteract such a perceived bad image of science among people generally.

However, achieving scientific literacy is not an easy task and requires time. Teaching more scientific facts or increasing the number of laboratory and hands-on activities in science classes are not enough to increase students' scientific literacy (Glynn & Muth, 1994). The NRC (1996) and AAAS (1993) advocate that teaching and learning of science must be more than a simple transmittal of scientific facts, figures and processes. Science instruction should be multi dimensional. It should involve conceptual understanding and their applications in real life contexts, gaining skills like science process skills and also should emphasize nature science. The importance of being able to understand, comprehend and explain the fundamental scientific concepts in a meaningful way is the heart of science literacy (Glynn & Muth, 1994). In this respect, teachers have crucial roles because they are firstly responsible for developing their students' such kind of skills. Teachers should be educated about how they can help their students to have such abilities. For this reason, several professional development programs were developed, one of them is the Iowa Chautauqua Program. The Chautauqua Program was supported by a National Science Foundation (NSF) grant to the National Science Teacher Association (NSTA), which was developed in 1983 to study a teacher education model for stimulating reform in science classrooms. The program began in Iowa with 30 teachers enrolled in the program at one center and up to 230 teachers enrolled in five centers across the State during 1980s and 1990s. Over 4,000 teachers were enrolled over the past three decades.

The Iowa Chautauqua program identified six important domains for developing instructional goals and assessing successes in meeting them. The first one is Concept Domain which is related with content knowledge and conceptual understanding. The second domain is Process Domain which is mainly related with science process skills. The third domain is Application Domain, in which students should apply the concepts and process that they gained in new contexts. The next domain is Creativity Domain that usually focuses on students' self-explanations and views, students initiated questions and their qualities. Another domain is Attitude Domain. In this one, it is aimed that developing more positive attitudes toward science, scientists and science teachers and science related careers. The last domain is World-View Domain which is related with schools' roles in order to assist students to understand the nature of science and practice the basic components such as questioning, explaining, and testing objects and events in the natural world (Enger & Yager 2001, 2009; Yager & Akcay, 2007).

In this study, instructional goals about Application Domain of the program were investigated. In this domain, it is crucial to determine in which extent students can transfer, use and apply effectively that they have learned in new contexts, especially in daily life events. Understanding the concepts or processes superficially is not enough in this domain, so students must show applications by applying the concepts into concrete and new situations. Problem solving or learning a new material based on the knowledge gained through previous courses are some examples of application domain at schools. Indeed, the Application Domain may be assumed as the most important one because it shows that students may use their knowledge to solve new problems and may apply the concepts in new contexts. This proves that if a student understands the concepts deeply, then s/he achieves these applications. Within this respect, some dimensions of the Application Domain can be summarized as using critical thinking skills, solving problems in daily life or in technological devices or technological problems through using conceptual understanding and skills, making meaningful decisions about personal health, nutrition and life style based on scientific concepts rather than on hearsay or emotions and understanding the relation between science, technology and society. Because the applications of science have impacts on developments in technology, it seems inappropriate to separate 'pure' or 'academic' science from technology. That's why; science and technology are interconnected and together has an effect on society.

1. Science -Technology - Society Approach

The National Science Teachers Association defines Science-Technology-Society (STS) as the teaching and learning of science and technology in the context of human experiences (NSTA, 1991). Mbajorgu and Ali (2003) summarize the purposes of STS approach based on the studies in the literature (e.g. Bingle & Gasket, 1994; Fourez, 1995) as developing decision-making and problem solving skills of pupils in order to deal with socio-scientific issues, which they encounter. In STS perspective, teachers try to develop their students' ability to understand the events around them in a scientific perspective, its reflections on technological dimensions and the relation of these within society (Aikenhead, 1997). The central goal of STS education is to promote the development of an informed and responsible citizenry that is a requirement for human adaptation to the highly industrialized social life (Yalvac et al., 2007, p. 332). Aikenhead (1986) advocates that STS programs involve social issues related to scientific community's itself (e.g. history and nature of science, epistemology), other social topics which are not directly related to scientific community (e.g. socio-scientific issues) and science content knowledge (e.g. physics, chemistry and biology). These three aspects can be integrated with each other in different ways and in different degrees by science teachers in science classrooms (Mbajorgu & Ali, 2003). Yager (1993) explains STS teaching as beginning with real world issues and concerns that are relevant to personal lives of students. Students focus on to analyze and to solve the problems by exploration of possible solutions. Students may work in groups or individually through the process in order to make meaningful decisions with the help of science and technology.

The STS effort is based on the constructivist learning theory (Brooks & Brooks, 1999; Yager, 1991) that emphasizes prior knowledge of students and their own previous interpretations of nature.

Constructivist teaching requires a learner-oriented environment where the teacher acts as a guide and co-learner. Due to the fact that STS uses the constructivist perspective for learning, students initiate questions, participate in discussions and research actions and practice decision making through social interactions (Yager, 1996, 2000). STS is also a major focus in other areas of the curriculum, especially the social studies, mathematics and the applied fields.

In related literature, there are many studies about STS approach. For example, Mbajorgu and Ali (2003) investigated the relations between STS approach, scientific literacy and achievement. In another study done by Tsai (2000), he designed a research to examine the impacts of STS approach on high school students' cognitive outcomes. Similar study was done McClure and Bell (1990) in order to understand STS approach instruction on cognitive structure of pre-service teachers. Also there are studies which investigate the correlation between STS approach and constructivism such as Cho (2002) and Tsai (1999).

2. Aim of Research

There are several studies in literature which investigate the effects of STS teaching approach on students learning in some domains, change in students' beliefs about attitudes toward science (Akçay, Yager, Iskander & Turgut, 2010; Amirshokohi, 2016; Vazquez-Alonso, Garcia-Carmona, Manassero-Mas, & Benassar-Roig, 2013), students' learning outcomes and successes (Akçay & Akçay, 2015; Akçay & Yager, 2010). The difference between current study and the others is that it is aimed to investigate students' abilities to apply science concepts learned through STS based or textbook oriented instructions in different contexts. The goal is to examine if there is any effect of the STS approach on using scientific knowledge in different situations. Another goal is to determine if there are any significant differences between STS and textbook oriented instructions with respect to students' genders, grade levels and successes in science classes.

Method

The study is based on quantitative research methodology which is used to explain phenomena, attitudes, opinions and behaviors or other defined variables by collecting numerical data that are analyzed using statistically based methods (Aliaga & Gunderson, 2000). Owing to the fact that questionnaires enable to reach large number of participants, they are one of the fundamental data collection instruments in this kind of research method.

1. Participants

A total of 609 students were participants of the study. 301 of students were in the experimental group in which the STS approach was used and the other 308 students were in a textbook oriented group as a control group. Table 1 shows the descriptive information about the participants of study. Participants are from six different public schools from Midwest part of the USA. The classes were assigned as experimental or control groups randomly. The teachers of the groups were their own teachers.

Table 1. *Descriptive information about participants*

Grade	Experimental Group		Control Group		Female		Male	
6	77	25,6%	81	26,3%	80	26%	78	25,8%
7	77	25,6%	76	24,7%	79	25,7%	74	24,5%
8	76	25,2%	75	24,3%	75	24,4%	76	25,1%
9	71	23,6%	76	24,7%	73	23,7%	74	24,5%
Total	301	49,5%	308	50,5%	307	50,4%	302	49,6%

2. Instruments

The part of application domain in assessing student understanding in science was used to collect data, which was developed by Enger and Yager (2009). The instruments involve student response sheets and teacher tabulation sheets. Directions about using the instruments were provided

for teachers as they construct instruments suitable for the Application Domain. The study lasted for 9 weeks.

A quasi-experimental design was used in the study. Students in the experimental group followed STS approach and in control group, textbook-oriented approach was used. Table 2 indicates the differences between STS approach and textbook oriented science teaching program in terms of the Application Domain. The same student response sheet and teacher evaluation form were used for pre- and post-tests. While the pre-tests were given at the beginning of study, post-test were given at the end of the study.

Table 2. *Contrast between STS approach and textbook oriented programs in terms of application domain*

STS Approach	Textbook Oriented Approach
Students try to solve problems that are relevant to their daily lives	Teacher does not try to connect the topic with daily life
Students become involved in resolving social issues and see science as a way of fulfilling their responsibilities as citizens	Students feel no responsibility for resolving current societal problems
Students seek out information and use it in order to solve the problems	Students can recite information/concepts
Students are able to follow the developments in technology and able to see the relation between scientific concepts and technological progression.	Students cannot relate the science they study to any current technology
Teaching does not only take place at school but also supported with informal learning environments like science centers and science museums.	Learning is contained in a classroom for a series of periods over the school year
Students in science class wonder about what the future might be like.	Science class focuses on what has been previously known
Students are prompted to enjoy and gain experience through learning process.	There is little concern for the use of information beyond the classroom and performance on tests

3. Data Analysis

The data has been analyzed quantitatively by means and standard divisions. SPSS package program was used to analyze the data. The differences of mean values were tested by using dependent t-tests. The mean differences, standard divisions and t-values were calculated and used to assess pre-tests and post-tests results.

Results

Table 3 indicates comparisons of the differences for application of concepts and principles between students who were in the STS classrooms and those in textbook-oriented classrooms. According to the findings, there are no significant differences between STS oriented classes and textbook oriented classes on the pre-test scores except for the six grade students' pre-test result. Meaningful differences were found between the two teaching approaches on the post-test scores for applications of concepts from grade six to grade nine. Students in the STS classes showed significantly greater growth in terms of application of concepts. The data also indicates that students' abilities for application of science concepts are better in STS classrooms when compared to textbook-oriented classrooms.

Table 3. Comparisons between STS and textbook-oriented students on their ability to apply science concepts

Grade	Application	STS			Textbook-Oriented			t	p
		n	Mean	SD	n	Mean	SD		
6	Pre-test	77	1.69	.8	81	1.35	.8	6.64	.01*
	Post-test	77	5.89	2.7	81	2.23	1.0	133.22	.00*
7	Pre-test	77	2.12	.9	76	1.80	1.2	3.40	.06
	Post-test	77	6.23	2.3	76	2.56	1.3	148.84	.00*
8	Pre-test	76	2.03	1.0	75	1.97	1.1	4.21	.07
	Post-test	76	5.70	2.6	75	2.70	1.5	78.26	.00*
9	Pre-test	71	1.65	.7	76	1.66	.8	7.09	.08
	Post-test	71	5.25	2.2	76	2.32	1.0	111.00	.00*

Male students were compared based on before and after instruction involving application concepts with respect to the STS and textbook-oriented approaches. Table 4 indicates comparisons of the pre- and post-test average scores. No significant differences were found on the pre-test scores for the two groups except for six grade students. Male students showed significant differences between the two teaching approaches on the post-test scores for application of concepts from sixth grade through ninth grade. Male students at classes in which taught with an STS approach were able to apply more science concepts and principles when compared to students at classes where a textbook-oriented approach was used.

Table 4. Comparisons between male STS students and their textbook-oriented counterparts and their ability to apply science concepts

Grade	Application	STS (Males)			Textbook-Oriented (Males)			t	p
		n	Mean	SD	n	Mean	SD		
6	Pre-test	36	1.64	1.0	42	1.21	.8	4.20	.04*
	Post-test	36	5.97	2.8	42	2.10	1.0	70.84	.00*
7	Pre-test	37	2.03	1.0	37	1.68	1.2	1.98	.17
	Post-test	37	5.97	2.4	37	2.43	1.3	64.21	.00*
8	Pre-test	39	1.97	1.1	37	1.51	1.1	3.38	.07
	Post-test	39	5.38	2.6	37	2.46	1.5	35.52	.00*
9	Pre-test	35	1.60	.8	39	1.28	1.0	2.47	.12
	Post-test	35	5.03	2.0	39	2.08	1.1	61.63	.00*

Similarly, female students were compared based on before and after instruction of application concepts with respect to the STS and textbook-oriented approaches. Table 5 indicates comparisons of the pre- and post-test average scores. No significant differences were found on pre-test scores for the two groups regarding application concepts. Meaningful differences were found between the two teaching approaches on the post-test scores for application concepts across six grade through ninth grade. Female students in classes taught with an STS approach were able to apply scientific concepts in new situations when compared to students who were taught with a textbook-oriented approach.

Table 5. Comparisons between female STS students and their textbook-oriented counterparts and their ability to apply science concepts

Grade	Application	STS (Female)			Textbook-Oriented (Female)			t	p
		n	Mean	SD	n	Mean	SD		
6	Pre-test	41	1.73	.7	39	1.49	.8	2.13	.15
	Post-test	41	5.83	2.6	39	2.39	1.0	60.64	.00*

7	Pre-test	40	2.20	.8	39	1.92	1.2	1.47	.23
	Post-test	40	6.48	2.2	39	2.72	1.3	85.21	.00*
8	Pre-test	37	2.08	.9	38	1.82	1.2	1.17	.28
	Post-test	37	6.03	2.5	38	2.90	1.5	44.09	.00*
9	Pre-test	36	1.69	.7	37	1.43	.7	2.56	.11
	Post-test	36	5.47	2.3	37	2.57	.9	50.13	.00*

Table 6 indicates comparisons of pre- and post-test average scores for high achieving students concerning application of concepts in STS oriented classes and textbook oriented classes. High achieving students were defined as students who earned grades either of A or B in their coursework in both classes. There were no significant differences on pre-test scores involving all the groups except six grade. Significant differences were also found between the two teaching approaches on the post-test scores for application of concepts across six grade through ninth grade. High achieving students in classes taught with an STS approach could apply more science concepts when compared to students in classes taught with a textbook-oriented approach.

Table 6. Comparisons between the STS high achieving students and their textbook oriented counterparts involving their ability to apply science concepts

Grade	Application	STS			Textbook-Oriented			t	p
		n	Mean	SD	n	Mean	SD		
6	Pre-test	33	2.36	.5	31	1.97	.6	9.35	.00*
	Post-test	33	8.48	1.8	31	3.07	.7	234.60	.00*
7	Pre-test	32	2.72	.7	31	2.55	1.1	.56	.46
	Post-test	32	8.31	1.5	31	3.58	1.1	209.97	.00*
8	Pre-test	30	2.77	.7	28	2.46	1.0	1.84	.18
	Post-test	30	8.38	1.8	28	3.79	1.4	112.28	.00*
9	Pre-test	27	2.19	.8	33	2.02	1.3	6.11	.06
	Post-test	27	7.56	1.5	33	3.15	.6	242.43	.00*

Average scores for low achieving students were also compared in this study. Table 7 indicates comparisons of pre- and post-test average scores for low achieving students concerning application of concepts in STS oriented classes as well as textbook oriented classes. Students who earned a grade of C or lower in science classes or who were less interested and less motivated in a science classroom were defined as 'low ability'.

Table 7. Comparisons between the STS low achieving students and their textbook-oriented counterparts and their ability to apply science concepts

Grade	Application	STS			Textbook-Oriented			t	p
		n	Mean	SD	n	Mean	SD		
6	Pre-test	44	1.18	.7	50	.96	.7	2.28	.13
	Post-test	44	3.96	1.0	50	1.72	.8	145.31	.00*
7	Pre-test	45	1.69	.8	45	1.29	.9	4.59	.03
	Post-test	45	4.76	1.4	45	1.89	.9	128.37	.00*
8	Pre-test	46	1.54	.9	47	1.19	1.0	3.42	.07
	Post-test	46	3.98	1.1	47	2.02	1.1	76.46	.00*
9	Pre-test	44	1.32	.6	43	1.24	1.2	4.11	.06
	Post-test	44	3.84	1.1	43	1.67	.8	118.32	.00*

No significant differences were found on pre-test scores between the two low achieving groups. However, significant differences were found between the two teaching approaches on the post-test scores concerning application of concepts across six grade through ninth grade. Low ability

students in classes taught with an STS approach were able to apply more science concepts and principles when compared to students in classes taught with a textbook-oriented approach.

Discussion

The comparisons of STS approach and textbook-oriented instruction for using scientific knowledge on solving problems and conceptual understanding were investigated in current study. Furthermore, in order to understand the effects of the STS approach in detail, analyzes were done with respect to students' genders, grade levels and successes.

The results from this study indicate that students, who experienced STS strategies in science classes from six grade to ninth grade through one full semester, are more successful about applying basic science concepts to new situations meaningfully better than students who were taught by a textbook-oriented approach. In another study done by Yager and Akcay (2008), fifty two middle school students were compared with respect to two different teaching approaches, one of which is STS and the other one is textbook based instruction. Students who exposed to STS approach learned basic concepts and applied science concepts in new situations better than the students who studies science in a more traditional way. Yager, Choi, Yager and Akcay (2009) also designed a study to investigate the impacts of STS approach in six domains, which are concept, process, application, creativity, attitude and wordview. According to the findings of study, no difference in results at any grade level in the concept domain was reached. On the other hand, significant differences were found in the other five domains. Using scientific knowledge in different contexts is also one of the important characteristics of a scientifically literate person since it requires an individual to apply scientific knowledge in life related problems (Bybee & McCrae, 2011). It is an indispensable fact that society creates needs and scientists seek to identify, prioritize and generate solutions for those needs (Sadler & Zeidler, 2005, p. 72). Applying science concepts to real-world problems helps students to gain deeper understanding of content and fosters critical thinking skills needed by them to become productive members of society (Jones, 2012, p. 69).

STS strategies involve student ideas and include consideration of multiple points of views, collaborative inquiry and problem solving. All these promote instruction in a constructivist atmosphere for learning and teaching that of science learning and experiences in the lives of students. There are many instructional advantages for placing students in situations where they must share information cooperatively, present their perspective of issues being studied and achieve group solutions regarding the issues (Eryaman & Genc, 2010). The implications of these processes affect both science teaching and learning by students. It is also interesting that most of students' confidence for solving personal, local and global problems were developed. In related literature, there are also studies which have similar conclusions. For instance, Chantaranim and Yuenyong (2014) concluded their study that students' analytical thinking skills were developed by STS approach. In another study done with 101 tenth grade students by Tsai (2000), he found that cognitive structure outcomes of STS oriented students outperformed than the students in traditional group.

This study does not provide comparative data for male and female students. Gender difference was investigated separately and it was concluded that when both male and female students learn science by using STS approach, they use much more process and creativity skills and more able to apply science concepts in new situations.

It was also observed that students even low achieving ones in STS group extended science beyond the classroom and school; they were more involved with their studies and continued to learn more. It was reached that STS approach is also beneficial for low achieving students in science classes as evidenced by this study.

Conclusion and Suggestions

STS is a reform effort that includes student interests, ideas, problem identification and problem resolutions. This study also supported that when students exposed to be more active and faced with daily life related issues more through learning process, they become more successful. The most impressive conclusion of current study is students can use the information and skills on their own in new situations. This suggests that student involvement with real world problems should be encouraged much more by different strategies as STS approach.

Based on the results of this study, there are mainly two groups for whom suggestions can be made, one of which is in-service science teachers. They should use STS strategies in their science classes, such as, associating a problem with daily life, promoting inquiry science teaching strategies for students, enabling students to study collaboratively, emphasizing the relations between science and technology and the effects of these on society. Such efforts will enable them to de-emphasize such methods which only require following directions and getting results that verify what the book and teacher reported that would happen. For these reasons, in-service teachers should be prompted to attend professional development programs like Iowa Chautauqua Program. The other group is teacher educators and curriculum developers who prepare individuals to be science teachers for future careers. They should teach students how they can take advantage of the STS approach in their classes. In teaching practice courses, they should enable their students to use STS based instruction and evaluate them to become better teachers. Teacher education programs should consist of courses which involve theoretical and practical foundations of the STS approach.

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An Educational Technology Tool That Developed in The Natural Flow of Life Among Students: WhatsApp

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Abstract

This study was carried out to identify the benefits and drawbacks of using mobile social network application WhatsApp in the education of Secondary Education students. In this research, survey model was used and open-ended question form to 145 students together with semi-structured interview technique to 6 students were employed and answer to the same research question was sought by using data of different nature. The data were analysed by content analysis and phenomenologic analysis methods and some of the screenshots of students' posts are given as they are when necessary, which made possible the inspection, comparison and verification of each data one another. The benefits and drawbacks of using WhatsApp for educational purposes, which students normally use for communication purposes, are listed under the subheadings of technique, education and academic. Results indicate that WhatsApp has the potential to provide a natural and unstructured learning environment. Accordingly, by taking the benefits and drawbacks of WhatsApp and the like into account, it is advised to support their educational use.

Keywords: WhatsApp, Instant messaging, Mobile Communication Platforms, Social Networks, Technology Integration in Education.

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Introduction

Digital technologies which can be seen almost in all the activities of young people, have enabled the real and virtual lives to be lived together at the same time due to the increase in the access to the internet. Internet technologies, with the increase in their frequency of use, time and areas, have started to shape the way people produce content and share together with the communication and interaction patterns dynamically. Social networks which are widely used by the young people have become a second living space along with virtual reality. Social networks which are defined as softwares which ease the interaction among individuals and groups and offer different options for social feedback and support social relations (Boyd, 2003), have become a part of users' everyday routines (Dunne, Lawlor, & Rowley, 2010; Papacharissi, & Mendelson, 2011). Different from the other web sites which bring the people who have common interests together, it centers on 'person' (Boyd, & Ellison, 2007).

Proliferation of social networks which center on individuals and reflect the social structure in real life, has made the development of mobile applications necessary which enable the users to access these networks anytime and anywhere. Web-based social networks (Facebook, Twitter etc.) have become more popular through applications which are based on web and compatible with mobile devices. By the help of mobile social network applications, users can use social services, which are already available on computers, anywhere and anytime to interact and share. This has led the use of mobile technologies, mobile phones in particular to change. With the increase in the number of messaging applications (WhatsApp, BBM Line, etc.) developed for mobile phones and their increased popularity, different aspects of this change have started to be approached.

In parallel with the developments in internet technologies and the popularity of new generation mobile phones and social networks, internet based mobile messaging applications which were initially restricted to text messages, has gained an important role with the use of audio and video (multimedia). Recent researches suggest that messaging has become popular and primary communication preference (Lenhart et al., 2010). New mobile messaging technologies have supported text based messaging more than face to face meeting and thus making the users more informed about their family members, social and everyday matters, have changed the interaction among people uncommonly (Harrison, & Gilmore, 2012; Sultan, 2014). Though there are many similar applications that contributed to this change, WhatsApp application in particular, has been one of the most preferred mobile based messaging applications (see also, SimilarWeb, 2016; Statista, 2016). This technology by which users can send image, audio, video, voicemail, text message, location and talk to each other over mobile or WIFI internet connection, has started to be used widely after the developments in mobile technologies. WhatsApp, which Fischer (2013) defined as 'a simple social network', though was initially used for messaging via phone book, later has become an important communication tool that helps people access information quickly, especially by creating groups. Herein, it seems possible to define technically WhatsApp application with its multi-platform feature, multimedia support, support interaction among individuals and groups as mobile based social network.

No sooner social networks became inevitable in our daily lives than they started to appear in education. Accordingly, along with the effects of social networks on individuals, their use and effects in education have also been examined by the researchers. It is noted that the studies examining the use of social networks in education centered upon commonly used Facebook and Twitter. It is determined that each of these tools have the *potential to provide cooperation* (Arteaga Sánchez, Cortijo, & Javed, 2014; Fewkes, & McCabe, 2012; Irwin et al., 2012; Muñoz, & Towner, 2011; Shih, 2011; Wang et al., 2012), *augment social interaction* (Barczyk, & Duncan, 2013; Lim, & Richardson, 2016; Madge et al., 2009; Wang, et al., 2012), *interest and motivation* (Mills, 2011; Mitchell, 2012; Wu, & Hsu, 2011; Ziegler, 2007), *sense of belonging and dependence* (Junco, 2012; Junco, Heiberger, & Loken, 2011), *success* (Cain, & Policastri, 2011; Isacson, & Gretzel, 2011; Sánchez, Cortijo, & Javed, 2014), *learner-instructor interaction* (Muñoz, & Towner, 2011; Piriyaasilpa, 2011; Wang et al., 2012), *support learning everytime and everywhere* (Chu, 2014; Fewkes, & McCabe, 2012; Wang et al.,

2012; Yang et al., 2011), *peer support* (Christofides, Muise, & Desmarais, 2009; Goodband et al., 2012; Ross et al., 2009; Selwyn, 2009), *feedback* (Goodband et al., 2012; Selwyn, 2009), *material and information sharing* (Bosch 2009; Bouhnik, & Deshen, 2014). However, there are also negative effects revealed by studies like; *privacy and security anxiety* (Cain, & Policastri, 2011; Muñoz, & Towner, 2011; Young, & Quan-Haase, 2009), *distractibility* (Madge et al., 2009; Madhusudhan, 2012), *exceed the limits in relations and slang language use* (Muñoz, & Towner, 2011; Mahdi, & El-Naim, 2012), *adversely affected academic life by different reasons (addiction, insomnia, immobility)* (Andreassen, 2012; Dewald et al., 2010; Lee, 2015; Lemola et al., 2015; Li et al., 2014). However, these unfavorable results cannot deny the reality that social networks have taken an important place both in our lives and education.

It is important to develop new and effective learning environments for learning to take place effectively in terms of quality and quantity. However, many studies suggest that adaptation of current, popular digital environments into learning environments contributes to formal and informal learning. Supporting learner-centered approach in education by their human-centered nature, social networks can be used without additional training in the natural flow of life. Furthermore, the educational usage of commonly used mobile technologies and social networks such as; *Facebook* and *Twitter* have been tested by many researchers, and this has necessitated the use of these technologies and the software used with these technologies by the large masses and the adaptation of the softwares into learning environments.

The swift introduction of smartphones into markets has led WhatsApp to be widely popular among various student groups as a communication platform. Being a new phenomenon, the studies examining its impact on interpersonal interaction and teaching and learning processes are limited. However, the presence of some evidence suggesting that these applications have a great impact on the social development of young people makes it necessary to determine the expectations and impacts towards the academic developments. This study herein aims to determine the benefits and drawbacks of using WhatsApp which is considered within the teaching and learning process and has the necessary qualities to cover the learning concepts over mobile and social Networks.

Method

In this section, there are explanations on the research model, study group, data collection and data analysis of the study.

Research model

The study was designed in the form of survey model to determine the benefits and drawbacks of the use of WhatsApp in teaching and learning process of secondary education. Survey models are approaches that aim to describe past or present phenomena as they are (Karasar, 2008). Answer to the same research question was sought by employing data of different nature under the control of several researchers hereby aiming to increase the validity, reliability, consistency and intelligibility of the research. Furthermore, some of the data which could reflect findings in general were given as they are to increase the credibility. (Morse et al. 2002; Wolcot, 1990)

Study group

The study group of the research consists of 72 female (49.7%), 73 male (50.3%), total 145 students who are between the ages of 15-17 and study at 6 different schools. When forming the study group, purposive sampling technique in qualitative research was used to get in-depth information in line with a certain aim, on people, event or situation that form the subject of the study (Maxwell, 1996). Thus, this research was conducted with students using WhatsApp group that is formed just for the purpose of communication or education within the classroom. The distribution of gender, age and school of types which were determined by taking the statistics of formal education in Turkey (MEB, 2015) into consideration are given in Table 1.

Table 1. *School types, gender and age distribution*

Age	School types (High school)						Gender				Total	
	Anatolian		Science		Vocational		Female		Male		f	%
	f	%	f	%	f	%	f	%	f	%		
15	5	50.0	2	20.0	3	30.0	6	60.0	4	40.0	10	6.9
16	61(3)	50.4	24(1)	19.8	36(1)	29.8	62(3)	51.2	59(2)	48.8	121(5)	83.4
17	5	35.7	1	7.1	8(1)	57.1	4	28.6	10(1)	71.4	14(1)	9.7
Toplam	71(3)	49.0	27(1)	18.6	47(2)	32.4	72(3)	49.7	73(3)	50.3	145(6)	100

Note: (X), information on students who had semi-structured interview.

After the first phase of data collection, in order to elaborate on the research and increase its reliability, semi-structured interviews were made with 6 students, 3 girls and 3 boys, who were randomly selected in the study group.

Data Collection

During the qualitative data collection, by employing different data collection techniques, the inspection, comparison and verification of different data one another were made possible while answering the same research question (Patton, 1990). Hence, the possibility of systematic error was minimised (Maxwell, 1996). Marshall and Rossman (2006) divides the qualitative data collection types as basic data collection methods and supportive data collection methods. In this study, ‘open-ended question form’ as main data collection method and ‘phenomenological interview’ technique as supportive data collection method were used. The data collection tools used in the study were finalised by expert views and interviews.

During the data collection, first the students were informed about the expectations and the aim of the study. Also, school management and parents were informed that the data related to the study could be used within the research ethics without revealing the identities of the participants and their written consent was obtained. Then, the students were asked;

What can be the positive contributions of using WhatsApp in education?

What can be the negative aspects of using WhatsApp in education?

research questions were given to students in written form under the supervision of researchers in the classroom to help them give answers freely and elaborate on them.

After the first data collection phase and completion of the data analysis, phenomenological interview with 6 students, which constitutes semi-structured interview aspect of the study, were made. The interviews which were made face to face and at different times and places were recorded after obtaining the consent of the students and were written out and analysed. Here, rather than forming new categories, verification of the categories determined after the analysis of the data gathered by open-ended question form. Furthermore, it was aimed to reveal how the participants perceived, conceptualized and evaluated the events and tried to conceive the meaning they attributed to external reality (Greasley, & Ashworth, 2007).

Data Analysis

During the first phase of the two-phased data collection of the study, the data obtained from open-ended question form was analysed by content analysis, and the data from semi-structured interview by phenomenological analysis. Content analysis means, objective, systematic and digital analysis of the variables in the text (Wimmer, & Dominick, 2003). During the analysis of the answers given by the participants to the open-ended questions, *categorical analysis* and *frequency analysis* were utilised. In the categorical analysis, the following steps were followed; (1) coding of the data, (2) formation of the categories, (3) organisation of the categories, (4) definition and interpretation of the findings (Corbin, & Strauss, 2007). Frequency analysis revealed the qualitative frequency of the units, density and importance of a particular item (Ryan, & Bernard 2000; Tavşancıl, & Aslan, 2001). In order to show the frequency of participants’ views, frequency (f) and percentages are given

comparatively. Hence, by digitilisation of the qualitative data, data reliability increased, the biasness decreased and the comparison of the data was enabled (Yıldırım, & Şimşek, 2008). After the data collection, they were analysed by two researchers and the consistency of the categories were measured by Cohen's Kappa Coefficient which shows the reliability between the coders. The results showed a percentage of 0.89 which meant coding consistency is enough with "almost perfect agreement" (Landis, & Koch, 1977)

After the analysis of the data gained from the replies given to the open-ended questions, semi-structured interview form was used in the second phase of the research. The notes obtained by the interviews which lasted at least one hour and were made in line with the questions in the open-ended question form were analysed by using phenomenological analysis which is one of the qualitative data analysis types. By using phenomenological analysis, the researcher tried to comprehend the ideas and feelings of the participants based on what they said (Smith, & Eatough, 2007). Moreover, the participants' consistency in their perception and recognition of the replies that they gave to the open-ended questions and to the questions asked during the interview were analysed. Hence, the data and the results of the analysis were given to the participants to control, and findings were confirmed. The research was finalised after taking suggestions of an expert, who is experienced in qualitative studies, in order to examine the analysis and results and also determine if the comments made by the researcher reflected the truth and, if yes, to what extent it reflected.

Findings and Interpretations

Findings have been shaped by the analysis of the replies given by the participants to the open-ended questions and semi-structured interview form and they are given under the headings. The data of the research are summed up under two main headings; 'the benefits' and 'drawbacks' of using WhatsApp in education. Under these main headings, categories are detailed in the subheadings. Besides, the students' own statements (written data: 'SW', interview data: 'SI') and some screenshots of the students' conversations in the groups, which they formed, are given.

Benefits

The benefits of the use of WhatsApp groups in education are listed as technical, educational and academic benefits.

Technical benefits: The technical benefits which were identified by the analysis of the replies given by the students for the use of WhatsApp in education are given in Table 2, with their descriptions in categories.

Table 2. *Technical benefits of using WhatsApp in education*

Technical benefits	<i>f</i>	%
Ease of use	136	93.8
Free of charge	130	89.7
Easy accessibility	119	82.1
Fast communication	101	69.7
Reliable communication	91	62.8

Ease of use: It is seen as the major technical benefit of WhatsApp and its being used easily without any training is often emphasized. One of the students, who has been using WhatsApp for two years, (SW102-SI3) said "It is easy to use and I can get help from my friends since everybody uses it." besides its ease of use, the student also mentions about the support s/he can get. SW13 emphasizes the ease of use of its web based application also by stating "Using a single buton, you can send music or photos... at home I can send whatever I want by getting connected to WebWhatsApp."

Free of charge: One of the reasons why it is very popular among students is that no fee is demanded. One of the students (SW33-SI1) stated explicitly "...at first people told that it would be

'paid' and this worried me. Its being free of charge is important for me... and if it were paid, I might not use it", which shows that its being free is an important benefit. Furthermore, that it can be used freely where there is WIFI or mobile line (except the connection fee, if any) is seen as another benefit, and this was stated by SW59, *"free communication wherever there is internet"* emphasizing its effectiveness in communication.

Easy accessibility: This means its availability without any technical requirements except the smartphone and the internet connection. The application is supported by all mobile operating systems and can be installed and used everywhere if there is internet connection. Regarding its easy accessibility, SW17, stated *"...after downloading from the page..., and installing it, you can connect everywhere there is internet...whenever I want I can use it both at home and at school without being have to pay"* underlining its benefit of both being free and easy accessible.

Fast communication: It is viewed as an important benefit by students when compared to other social networks. As SW113 *"when I share something on WhatsApp, my friends can get it very quickly. I can see who got and read the message immediately."* besides its benefit of being fast, its control feature is also seen as important. As stated by SW72 *"we had Facebook group before and messages were limited. However, WhatsApp is faster, I can reach instantly."* it can be preferable since it provides fast communication and hence, overtowers other social networks.

Reliable communication: It is another benefit of WhatsApp which is compared to other social Networks as with the benefit of fast communication. SW12 stated *"In our Facebook group which we formed previously, often my friends' accounts were hijacked. I have never faced such a thing in our WhatsApp group."* referring to the security problems s/he encountered in other social networks. However, as can be understood from another student's words (SW88-SI2) *"though I don't fully trust social networks, WhatsApp is more reliable."* SW48 *"it is more reliable when compared with the other social networks I use but, after all, it needs internet to operate."* although there is a common idea that WhatsApp is safer than other social networks, there is still some concern. On the other hand, SW61 said *"I feel confident that WhatsApp uses my phone directory and I can keep in touch with the people in my phone directory. There is no risk of fake accounts or I haven't faced."*, underlining that WhatsApp is safer than other social networks.

Educational benefits: Educational benefits are identified by the analysis of the replies to the use of WhatsApp in education given by the students involved in the study are given in Table 3 with their descriptions in categories.

Table 3. *The educational benefits of WhatsApp*

Educational benefits	f	%
Contribution to student-student communication	133	91.7
Peer support	107	73.8
Creating sense of belonging	81	55.9
Naturality and comfort in self- expression	77	53.1

Contribution to student-student communication: It emerged as one of the most important educational benefits of WhatsApp. Besides its contribution to interpersonal communication, it also contributes to the communication by its capacity to bring group members or individuals together toward a particular aim. SW16: *"I can keep in touch with my classmates all the time as if we were in the classroom. And SW99 "... We can continue our communication outside the classroom."* with these statements, students express WhatsApp's contribution to their communication.

Peer support: Students' process of education includes cooperation and WhatsApp's support to this process is viewed as an important point by students. SW55 *"I can get help from my friends*

whenever I need a document or information or have a problem.” these expressions show WhatsApp’s positive contribution to peer support. Though peer support involves being informed instantly about the assignments, tasks and related posts, it isn’t for course content.

Creating sense of belonging: It is also noted that WhatsApp application contributes to sense of belonging positively after the pedagogical interaction period besides its contribution to communication among students. SW139 *“it is sort of the whole class is in my pocket”* and another student (SW51-SI4) *“WhatsApp makes us feel at school... when we come to school the other day we feel as if we hadn’t left school and missed anything.”* these expressions show that members of the group go beyond the physical borders and in this way, the continuity of the communication in the group and sense of belonging enabled. However, SW9 *“...s/he left school but wanted to stay in the WhatsApp group.”* and SW39 *“We formed the group, some friends didn’t have smartphones and they bought smartphones merely to join the group.”* these words are the indicators of students’ effort to join or stay in the group and the formation of sense of belonging.

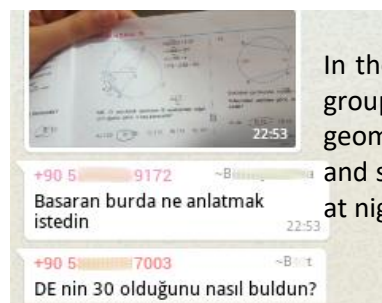
Naturality and comfort in self-expression: It is viewed as one of the benefits which WhatsApp offers to support face to face communication and eliminate the problems in education process. For example, SW59 said *“Although some friends don’t speak much in the classroom, they speak in WhatsApp freely.”* another student (SW33-SI1), on the other hand, said *“some friends can’t speak when they are in the classroom but they can when they use WhatsApp.”*, *“... what s/he says or asks cannot be understood when face to face ... s/he tells better when s/he writes...”* moreover, it is also clear that students stress naturality and ease in expression. This shows that WhatsApp application has become a different communication channel and the problems that can be encountered in face to face communication can be eliminated by this application.

Academic benefits: The benefits related to the students’ academic activities and processes are given in Table 4, with their descriptions in categories.

Table 4. Academic benefits of WhatsApp in education

Academic benefits	<i>f</i>	%
Learning anytime, anywhere	121	83.4
Sharing the materials and resources	113	77.9
Academic support	103	71.0
Organising academic activities	96	66.2
Learning unwittingly	63	43.4

Learning everytime everywhere: That the students can ask questions about unlearned topics at school, share problems instantly and get replies, are often repeated benefits of WhatsApp. *“With the help of WhatsApp, when I have a question I don’t have to wait until morning and often I take its photo and send it (SW112-SI6)”* and many other students state that the application eliminates the time and space limitations. Also, the capability of the application that enables students to communicate irrespective of time or a particular network, also enables them to get help and support apart from posts for academic purposes.



In the example, one of the students in the group wanted help from his/her friend for a geometry problem that s/he couldn’t solve and sent the photo of the problem at 22:53 at night.

Figure 1. WhatsApp screenshot: Academic support required late at night.

Sharing the materials and resources: It is evaluated together with its multimedia support, easy and quick sharing ability and it is often stated by students as an important benefit in messages for academic purposes. SW19 underlines its ease of use “*just by one touch, you can send documents related to courses.*” together with its benefit to share. SW133 also, states its ease of use and pace along with resource and material sharing, “*it is easy to share the photo of a book or the address of a document on the internet quickly.*” It is also noted that participants often compare the benefit of resource and material sharing with other social networks. The comparison of WhatsApp with other social networks can be summed by SW1’s words “*We have a Facebook group but WhatsApp is both faster and easier in sharing documents related to our courses, ... it is easy to track the posts.*”

Academic support: WhatsApp has a major benefit in sustaining the cooperation and problem solving processes of students towards courses and their content in and outside the school. As can be seen from SW72 “*...the sun side of the picture is when I can’t answer a question and need help, I send it to my friends.*” and SW41 “*... I try to give answers as much as I can.*” academic support, different from peer support, is more related to course and course content. Generally, it includes academic interactions among students on difficult questions or ambiguous topics.

Organising academic activities: Students state that this is possible by using WhatsApp, and by forming mathematics, physics and similar academic groups, it is possible to send purposeful messages. As can be understood from students’ statements; “*My friends taught me the topics that I didn’t understand in class by using WhatsApp*” (SW12) and “*... I could get prepared for the literature exam only by the messages from my friends without using any book*” (SW117-SI5), WhatsApp offers an ideal environment to organise an academic activity. It is noted that academic activities can continue outside the class and also learning can take place purposefully or unwittingly during these academic activities.

Learning unwittingly: This the case which is often referred together with the other benefits of the application and emerges apparently when students follow the process purposefully or unwittingly, “*I could learn the topics which I couldn’t before* (SW11)”, “*... It was enough to glance at the posts* (SW6)”, “*... I revised for the exam even without noticing* (SW1)” this situation which is tried to be phrased by students with similar expressions, though not noticed during the process, is realized when information is needed. For example, SI3 “*... there were questions that I had no idea in the ... exam. Suddenly I remembered a discussion in our WhatsApp group. Though I hadn’t attended the discussion, I remembered the messages and I could answer the question, if not all.*” as can be inferred from this example, learning takes place without active participation of the students unwittingly, just by following the process.

When the data of the study related to the benefits of WhatsApp are examined in general, it is seen that they are interrelated and even complementary of each other. For example, the technical benefits of WhatsApp are closely related with its educational and academic benefits. Likewise, there are also similar relations among the categories. For example, sharing the resources and materials which are included in the category of academic benefits, doesn’t seem much meaningful in cases when there are time and space limitations or without peer support. It has been proven that WhatsApp meets students’ numerous communication needs. As can be seen in Figure 2, a student who demands peer support to answer a question, should be available every time and everywhere, enable resource and material sharing. In this context, a natural informal learning environment comes out when all the benefits of the application are taken together.

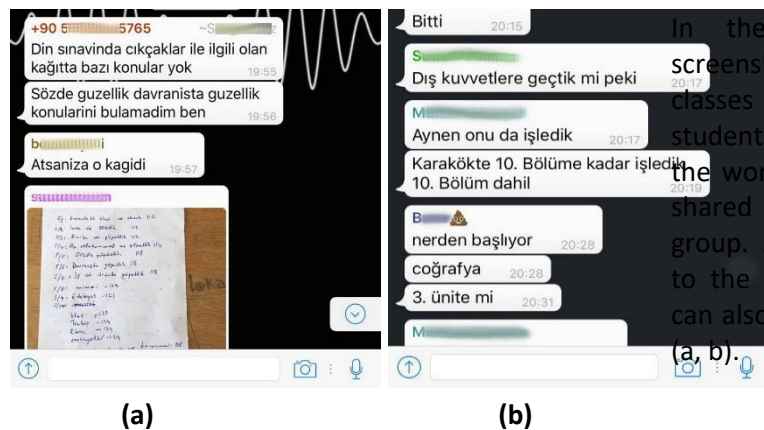


Figure 2. WhatsApp message samples before an exam

Drawbacks

The drawbacks of using WhatsApp groups, formed by the students, in education are listed under four headings; technical, educational, academic, social.

Technical drawbacks: The drawbacks identified after the analysis of the answers given by the students to the use of WhatsApp in education are given in Table 5, with their descriptions in categories.

Table 5. Technical drawbacks of using WhatsApp in education

Technical drawbacks	f	%
Battery life	112	77.2
Memory capacity	91	62.8
Problem of mobile internet quota	23	15.9
Faulty smartphones	18	12.4

Battery life: Though it is not directly related to the application, it is one of the problems that affect its use. Besides the necessity of the application to be connected to the internet all the time, depending on the intensity of the notifications, the battery life of the mobile device is also effective. SW37: “The battery of my smartphone goes dead quickly because of WhatsApp... when it is silenced and I want to check it, I see hundreds of messages and half battery life.” as can be understood from these statements, battery life indirectly affects the use of the application.

Memory capacity: It is one of the problems that can be indirectly associated with the application. Memory may get full particularly by the pictures, audio, and other media sent by the users. SW70: “...sometimes pictures which are redundant fill up my phone memory.” most students have found a solution to this problem which is to ‘delete’ them as stated in SW123’s words “... I delete the pictures after some time.” however, students report that they have problems when the course materials are deleted, because they can’t get them back.

Problem of mobile internet quota: Students see it as problem particularly when there is no available WIFI. While students say that they can easily use the application when there is free internet connection or without any restrictions to the internet, they see it as a problem when they have to pay for it or use their mobile phone line. SW90: “when at home or school, it’s OK, but when I’m out, I use up my mobile internet quota. When I use it up I can’t use the application and I get lots of messages successively when I go on to the internet again.” which shows that communication with the group is adversely affected if there is a problem with the internet.

Faulty smartphones: In such cases student may remain away from the group and not be involved in the process. SW78: ‘My phone is out of order and I couldn’t follow what happened in the

group.’ and SW131: “*Because of... I had a problem with the screen of my phone and I had to be away from my classmates, I couldn’t follow anything they did and I got bored.*” both expressed the problems they encountered when their phones didn’t work and their boredom. Though may not be a big problem for the group in general, it creates individual problems, “*when I had a problem with my phone, I had communication problems with my classmates as well, and I couldn’t get the lecture notes before the exams. I had some questions, so I had to make a phone call and ask.* (SW88-SI2)” tells that such problems may lead to problems in educational and academic processes.

Educational drawbacks: The educational drawbacks of using WhatsApp in education are given in Table.6 with their descriptions in categories.

Table 6. *The educational drawbacks of using WhatsApp in education*

Educational drawbacks	f	%
Difficulty in editing the posts	72	49.7
Using & sharing improper language	70	48.3
Leaving the WhatsApp group	17	11.7

Difficulty in editing the posts: It is often because of inability of the application to edit the pictures sent. To overcome this, SW77 said “*to answer the question, I save the picture, edit it by using another application and send it back.*” SW131, “*since it is difficult to edit pictures, I send my replies in text.*” However, K80: “*if it were possible to edit the pictures that I received, I could give answers faster*” meaning that inability to edit the received posts directly could lead to time loss.

Using & sharing improper language: Along with use of slang language in the group, improper posts (pictures, videos etc.), unsuitable timings of the messages are seen as major problems for students. A female student SW9: “*sometimes boys forget us in the group... and we remind them.*” tells about improper posts and her attitude towards these. SW129, on the other hand, “*we formed ... group for communication in class and for our courses but some of our friends let themselves go. Especially when there are football matches, there are often posts between students supporting different teams. Even they sometimes use slang words and I keep silent*” tells her attitude towards the use of group out of purpose.

Leaving the WhatsApp group: This could be because of technical reasons, disagreement or without any reasons. “*Mobile phone malfunction, mobile internet quota finish or because of the behaviours of some of our friends in the group, some friends leave the group. Though they return to the group later, this sometimes ruins the rapport in the group. This may go on at school as well.*” SW15 implies that there could be students leaving the group because of various reasons. Students report that this situation, which is perceived as a problem, also affects the real life as in the virtual environment.

Academic drawbacks: Academic drawbacks of using WhatsApp in the education of students are given in Table. 7’de, with their descriptions in categories.

Table 7. *Academic drawbacks of WhatsApp application in education*

Academic drawbacks	f	%
Shift in perception	65	44.8
Taking the easy way out	34	23.4
Deletion of the messages	23	15.9

Shift in perception: It means student’s distractions especially when they are studying or they have things to do and concentrating on WhatsApp chats. SW133 “*Sometimes, especially at the night before the exams, they send too many messages. And sometimes I quit studying and join the chats*”, SW83 “*When I have to study my lessons, I often mute it. Because every notification distracts me.*” by

which they meant there can be shift in perceptions when there are concentration problems. When there is technical background necessary to send WhatsApp messages, the benefit of no time and space limitation, could turn into drawback especially when studying lesson, late at night or during the lesson at school when messages start to come. Also, when there is abundance of unnecessary messages and the notifications are on, there can be concentration problems. In this case generally students create solutions like muting the group and checking it later on.

Taking the easy way out: It refers to rather than creating his/her own solutions, waiting for the other group members to find solutions without spending any effort. SW18: "...they don't take notes in the class, instead they want their photos." and SW111: "... there are people who don't try to find an answer but send the question directly to the group instead and don't do anything." with these expressions, students state that they have friends who take the easy way out, without spending any effort, which leads students to wait for ready solutions.

Deletion of the messages: It is viewed as a problem especially by students who want to reach the course materials later. This is told by SW33: "...when a picture is deleted, it can't be reached again." SW82 "Sometimes I have to delete the photos I share when the memory of my phone gets full." tells his/her reason for deleting messages and this is also reflected in academic process.

Discussion, Result and Suggestions

This study was carried out to identify the benefits and drawbacks of using WhatsApp, one of the instant messaging applications, in the education of secondary education students between the ages of 15-17. Employing open-ended question form together with semi-structured interview techniques enabled the inspection, comparison and verification of each different data one another. Categorical analysis and frequency analysis were utilised in the research whose data were analysed by content analysis and phenomenological analysis. Accordingly, the results and suggestions are given below.

In the recent years, social networks have started to become a part of education in the natural flow of daily life without any training and guidance. Especially, WhatsApp which has an important place in the lives of young people and has the features to be accepted as social network, has become an educational technology form of the daily communication. Yet, it is early to predict how it will influence the education process. However, it seems possible to estimate it by the researches conducted on other social networks (Facebook, Twitter, etc.). Within this framework, the benefits and drawbacks of using WhatsApp groups in education that the students themselves formed to communicate, are listed under 3 headings; technical, educational and academic.

Benefits

Technical benefits of WhatsApp towards education are identified as; ease of use, cost-free, easy accessibility, fast communication and safety. It is seen as an important factor that the application can be used without any training. Besides its ease of use, its being cost-free and easy accessibility are listed among the factors which increase the 'will' to use it. Also, that it can be used in smartphones without demanding any kind of fee, makes it easy to adopt. Another technical benefit of WhatsApp is its speed and reliability. Speed, which is evaluated by students often by making comparisons with the other social networks, though seems related with the internet connection and the device used, enables the messages to be tracked easily. The fact that the application works over mobile phone line, diminishes the risk of using fake accounts and it is safer when compared to other social networks. When technical benefits are evaluated in general, their ease of use, accessibility, speed and reliability are major factors in the adoption and use of the application. These benefits which are identified in the researches of WhatsApp (Bounnik, & Deshen, 2014; Church, & De Oliveira, 2013; Johnston et al., 2015) are also viewed important in the studies (Mazman, & Usluel, 2010; Arteaga Sánchez, Cortijo, & Javed, 2014) which are towards the acceptance of social networks and use in education.

The benefits of using WhatsApp in education are identified as; contribution to student-student communication, peer support, creating sense of belonging, naturality and comfort in self-expression.

By the help of its feature to bring together a particular group or individuals towards a particular aim, a natural and comfortable communication was formed and this enabled students to support each other during their education process. Also, students stressed the naturality and comfort of the application in the interaction process. It was observed that WhatsApp contributes to the peer support which involves awareness of the assignments and tasks or the messages for the solutions of the problems encountered, and the sense of belonging by mutual interactions. The replies given by the students, efforts to join or not to leave the group, both show that it affects the continuity and thereby, sense of belonging of the group positively. Apart from these educational benefits, it was also noted that WhatsApp is effective also in self-expressions of the students, providing a natural and comfortable environment. Hence, via the application, face to face communication and elimination of the problems in education are supported. Rather than the course content, sense of belonging and the support by the interaction among students which are benefits of the application towards educational processes, come into prominence. This situation was also pointed out in Bouhnik and Deshen's (2014) studies, appeared in the educational benefits of WhatsApp. Johnston and et al. stated that the contribution of the application to communication in the group and the support was very high. However, it is stated that the interdependence in and outside the classroom for the success of the students (Kuh, 2009) and collaboration and interaction in the increase of interdependence are important (Bouta, Retails, & Paraskeva, 2012). As a result, it is apparent that WhatsApp provides the basis for the factors that will develop dependance and sense of belonging.

Academic benefits of WhatsApp in education are identified as; learning anytime, anywhere, sharing the materials and resources, academic support, organising academic activities, learning unwittingly. It was established that by using the application, they could post the problems that they faced instantly and that the application supported learning anywhere and anytime without any interruption in the academic process. The data gained through the study indicate that the application eliminates the time and space limitations in education, and that in addition to the academic messages, it provides students with help and support. Another academic benefit of the application is that by its multimedia support, it lets the students share resources and materials for academic purposes. This also makes it easier to provide academic support by academic messages. In students' problem solving and cooperation processes in relation to courses and their contents, it was determined that WhatsApp has an important role in ensuring the sustainability in and outside the school and that it also contributed positively to the students' getting academic support. It is seen that academic support process continue not only in class groups but in the groups formed for an exam or a particular course outside the class as well. During all this interaction process, some of the students told that they could learn, though not in interaction but in the process unwittingly. In his research on social networks, Leonardi (2014), reported that learning could take place also by observing other people's communication and studies. Researches indicate that social networks support, helping each other on course material, cooperation and content sharing (Rosen, 2010), and provide an unstructured learning environment (Cain, & Policastri, 2011; Grosseck et al., 2011; Lampe et al., Madge et al., 2009; Towner, & Munoz, 2011). By the help of these benefits supported by the researches made on the application (Bouhnik, & Deshen, 2014; Church & de Oliveira, 2013; Nguyen, & Fussell, 2016), it is seen that WhatsApp can be used as part of learning every time everywhere and collaborative learning.

Drawbacks

The technical drawbacks of WhatsApp in the education process are identified as; battery life, memory capacity, problem of mobile internet quota, faulty smartphones. These drawbacks are often associated with smartphones with WhatsApp and internet connection rather than the application itself. However, it was also noted that these technical drawbacks could influence the use of the application and thereby its effectiveness in education negatively. For the application to be useable, it needs internet connection and depending on the message traffic, battery life may vary. Along with the battery life, the message traffic and especially the media (photo, video etc.) cause the memory capacity to get full. To overcome this, students often delete the messages but the related messages become unreachable then. Students can reach the message easily when there is internet, however when it is paid or over mobile line, they could be away from the group. It is also noted that when the students have to pay for the internet or have a faulty smartphone, they could be away from the group

and not be involved in the process. In this case, there can be problems in educational and academic processes because the students can't follow and be away from them. At this point, it is clear that together with the features of the mobile device, access to the internet is also important in the effective use of the application. Especially in the studies related to the use of mobile device in education, it is often reported that these problems could inhibit the students from using the mobile applications effectively (Akarasriworn, 2011; Ke, & Kwak, 2013; Oberg, & Daniels, 2013).

The educational drawbacks of using WhatsApp in education are identified as; difficulty in editing the posts, using & sharing improper language, leaving the WhatsApp group. Since the students share their questions by using their photos and want to get replies in the same way, the inability of the application to edit the posts directly is viewed as a drawback. Though students try to overcome it by using alternative methods, they report that it causes them to lose time. Use of slang language, improper posts (picture, video, etc.) and untimely messages are viewed as serious problems by the students. This might cause negative reactions of the group members or even they might leave the group. Students tell that this sometimes could effect their real lives negatively as well. When the educational drawbacks are observed, the ones other than 'the difficulty in editing the posts' are related to the interaction within the group. Disagreements are inevitable in virtual environments as in the face to face communication because of the human factor involved. Bouhnik and Deshen (2014) also reported similar problems in WhatsApp groups in which the teachers are also involved. Social networks being the first, use of slang language and improper posts which are often encountered in communication in virtual environments are perceived as problems in other social networks that are formed for educational purposes as well. It is possible that these problems could lead to exceeding of the professional borders in relations in educational settings (Muñoz, & Towner, 2011), misunderstandings (Zaidieh, 2012) and hence disagreements (Akarasriworn, 2011).

Academic drawbacks of using WhatsApp in the education of students are identified as; shift in perception, taking the easy way out, deletion of the messages. Shift in perception is defined as student's distractions especially when they are studying or they have things to do and concentrating on WhatsApp chats. In this case students often find solutions like silencing the group. Students often report that they receive a lot of messages especially during the exam periods and since they get the idea that the messages could be important, they want to follow them and thereby have problems in concentrating on the tasks or the exams. So they silence the group and glance at all the posts. Another problem that the students criticised or made self-criticism is taking the easy way out. It means rather than creating his/her own solutions, waiting for the other group members to find solutions without spending any effort. This leads the students to wait for the other students find solutions instead of finding their own solutions first. Another drawback which the students perceive during the academic use of the application is 'deletion of the messages'. It is often viewed as a big issue especially by the students who cannot follow the group for some reasons and want to access the course material later. The deletion of the media in the messages is particularly because of the memory limits of the smartphones. When the sender deletes the message or the media in the message, it becomes impossible for the others who want to access the message later. However, in the researches conducted on the use of other social networks and mobil devices, it is also reported that students may get distracted and the time for their studies may get negatively effected depending on the use (Kusnekoff, Munz, & Titsworth, 2015; McCoy, 2013, 2016). Bouhnik and Deshen (2014) also state in their study on the use of WhatsApp that these problems may occur and in order to prevent shift in perception, students resort to silencing the group. They also add that the students demand the solutions from their teachers instead of trying themselves and this is perceived as a problem by the teachers.

The influence of this technology which has found a place in education as well, has increased with the merging of internet and mobile technologies (Wang et al., 2013). By the help of technologies which enable asynchronous and synchronous communication, the format of the interaction has changed as well and the reflections of this change have soon started to appear in education (Eryaman, 2006; 2007). That the asynchronous and synchronous interactions via different communication tools have vital importance in students' education process (Drange, Sutherland, & Irons, 2015), contribute positively to their hapiness and learning outputs and let them have positive experiences are cited in

the researches (Friesen & Kuskis, 2013). It is well known that one of the major component that increases the quality of the education in an online environment is interaction. On the other hand, it is suggested that the social networks, when designed according to the principles of science and information, could yield to revolutionary changes in the field of education (Zaidieh, 2012). At this point, it is believed that it will be useful to use WhatsApp in education, which lets asynchronous and synchronous communication used in mobile technologies, has the features that can be regarded as social network and used by the masses. Though there are benefits and drawbacks identified in the study or their frequency may vary depending on the purpose it is used, the groups that students themselves formed, can operate like informal collaborative environment.

The suggestions made according to the results are below:

- By taking into consideration its benefits and drawbacks, the use of WhatsApp and the like in education as subsidiary technology should be supported.
- The use of WhatsApp in education process purposefully is important and at this point the possible problems should be minimised by sensible guidance.
- From the fact that WhatsApp is acclaimed by great masses, similar researches with groups including the teachers should be made.
- This study which was conducted with Secondary school 10th grade students at the ages of 15-17, should be conducted with other grades, and ages as well.

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Becoming a mathematics teacher: the role of professional identity

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Abstract

Teachers' pedagogical practice and choices for their actions could not only be explained by their knowledge, beliefs or attitudes (Rodgers & Scott, 2008). Identity also has a crucial role in learning to teach. The aim of this study is to investigate contextual nature of preservice mathematics teachers' professional identities. For this aim, a case study was designed. Participants are three preservice mathematics teachers in a state university in Turkey. The data was collected through semi-structured interviews. Pre-interviews were conducted in the beginning of the data collection process. Participants were asked questions about why they chose teaching as a profession. During the following ten weeks, preservice teachers participated in activities such as teaching in real classroom settings, interviewing pupils, mathematics teachers and school administrators. Following these activities, post-interviews were conducted. Qualitative content analysis was used to analyze the data. The findings revealed that preservice teachers' identities were not stable throughout different contexts.

Keywords: Identity, preservice mathematics teachers, teacher education, sociology of education

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Introduction

Teachers' pedagogical practice and choices for their actions could not only be explained by their knowledge, beliefs or attitudes (Rodgers & Scott, 2008; Eryaman, 2007; 2008). Identity also has an important role in learning to teach. Especially, initial phases of the profession are crucial for identity formation as suggested by various studies in the field of teacher education in general and mathematics teacher education in particular (Walshaw, 2004).

The notion of identity is the concern of disciplines such as psychology, sociology and education. It is mostly confused with the notions of character and personality which, to some extent, are naturally given (Sfard & Prusak, 2005). In sociology literature, while character is taught to be formed of signified individual attributes which are permanent, identity is socially constructed and subjective (Gale, 2000; Stevenson, 2006). In other words, it is constructed through interaction with people. Sociology and psychology disciplines explore identity in relation to the notion of self (Mead, 1934). Stets and Burke (2003) claim that self comprises of different parts each of which reveals itself as a different identity in a different context e.g. self as a friend and self as a teacher. Furthermore, identity is concerned with "fine judgments about contextual factors" (Coldron & Smith, 1999, p.716). Therefore, identity is contextual and situational (Borgatta & Montgomery, 2000).

The notion of professional identity has been the focus of attention of many studies in teacher education research in general (Beijaard, Meijer & Verloop 2004; Peressini, Borko, Romagnano, Knuth & Willis, 2004; Cook, 2009; Johnston, 2015; Riedler & Eryaman, 2016) and mathematics teacher education in particular (Goos, 2005; Ma & Singer-Gabella 2011; Hossain, Mendick, & Adler, 2013; Akkoç, Yeşildere-İmre & Balkanlıoğlu, 2014; van Putten, Stols & Howie, 2014). Since initial phases of the profession are crucial for identity formation, research studies especially focused on preservice teachers' or beginning teachers' identities (Flores & Day, 2006; Eryaman & Riedler, 2009; Sutherland, Howard & Markauskaite, 2010). For example, Johnston (2015) investigated the problematic nature of their admission to the school community. He found that preservice teachers could start to build an identity as a teacher in field experience courses if they were allowed to voice opinions and join in on decisions.

Peressini, Borko, Romagnano, Knuth and Willis (2004) bring a situative perspective to learning to teach which emphasizes the role of multiple contexts in teacher preparation. They investigate novice teachers' participation in a variety of activities in two different contexts: university and public school setting. They focus on the development of participants in three domains of professional knowledge: mathematics, mathematics-specific pedagogy and professional identity. One of the participants of this case study developed two different conceptions of the fundamental notion of proof. Authors suggested not considering this finding as confusing since it indicates the preservice teacher's ability to play different roles (student in her coursework, teacher in her field placements) and respond to different sets of norms and expectations. Considering the contextual nature of identity, differences should be treated as coherent and sensible and as an indication of novice teachers' evolving professional identities.

Another study on contextual nature of professional identity focuses on technology-related identity of a mathematics teacher. This case study reports on how a teacher teach with technology and how his approach changed across different school contexts (Goos, 2005). Findings indicated that technology-related identity was influenced from personal and contextual factors.

On the other hand, some of the studies emphasize the importance of reflection for identity formation. For example, Cattley (2007) found links between reflective writing and identity formation. Making use of preservice teachers' biographies is also important in the process of identity formation (Beijaard, Meijer & Verloop, 2004).

Theoretical Framework of the Study

As suggested by the related literature, identity formation is crucial in the first years of teaching. Therefore “teacher training programs should address the difficulties of the embodiment of a teacher identity” (Alsup, 2006, p. 92). In parallel to these concerns, the aim of this study is to investigate nature of preservice mathematics teachers’ professional identities. In teacher education research, one of the basic assumptions concerning identity is its contextual nature. Rodgers and Scott (2008) assert that “identity is dependent upon and formed within multiple contexts which bring social, cultural, political, and historical forces to bear upon that formation” (p. 733). Clandinin and Huber (2005) define context as “the landscapes past and present in which [a teacher] lives and works” (p. 4). For a teacher, context could be family, past experiences as a student, school, teacher education program or religious groups (Rodgers and Scott, 2008; Bruce & Eryaman, 2015). According to Britzman (1993) there is a set of norms in each community and members are expected to fit in with these norms which are determined by those in authority. If teachers are not aware of norms within a context, then they cannot find their voices and are subject to contextual forces. Therefore, as context changes, norms and the way in which teachers form their identities might change. In other words, identity is contextual.

Preservice teachers are faced with various contextual factors such as teacher education programs and reform-based national curriculums which are promoted by especially university-based teacher training programs. Another context is field experience they have in partnership schools. Research sometimes refer to the former context (university) representing the “theory” and the later (school) as the “practice” and emphasises the tension between theory and practice (Darling-Hammond, 2006; Korthagen & Kessels, 1999; Nolan, 2006). Literature review on teacher beliefs points out inconsistencies between preservice teachers’ beliefs which are sometimes influenced by reform-based teacher education programs in universities and their teaching practices in schools which are more traditional. On the other hand, socio-cultural perspective declines to define such cases as an “inconsistency” but prefers to use the notion of identity to describe learning to teach as a socially constructed activity (De Ruyter & Conroy, 2002). This is especially relevant for preservice teachers since they move from one practicum setting to another and professional identity emerges in each context (Cattley, 2007). Studies on sociocultural perspective in teacher learning are limited, particularly for preservice teacher education (Goos, 2005). Considering the contextual nature of identity, the main research question of this study is “How do contextual factors shape preservice mathematics teachers’ professional identity?” This study will approach professional identity with regard to the way in which preservice teachers see themselves as a mathematics teacher or what kind of a mathematics teacher they want to be (Rodgers & Scott, 2008; Cook, 2009).

Methodology

This qualitative research was part of a larger study that took place with three preservice teachers over a period of fourteen weeks. Aim of this current study is to investigate contextual nature of preservice mathematics teachers’ professional identities. As the interest of case study design is “process rather than outcomes, in context rather than a specific variable (Yin, 2003, s.19)” and as this study aims to explore the contextual nature of professional identity, a multiple case design was chosen for this study.

Setting and participants

This study is situated within a teacher education program in Turkey which promotes reform-based mathematics teaching in response to current reform in national curriculum of mathematics. In order to be accepted to the program, students have to be successful in the university entrance examination. The Turkish university entrance exam system is based on two exams both of which consist of multiple-choice questions. Teacher education programs give priority to those who studies in Anatolian Teacher Training High Schools by providing extra points to their university entrance exam scores because these high schools offer specialized instruction on pedagogy. In order to get higher scores from university entrance exam, some students also prefer to attend university preparation

courses and private lessons after school hours. These courses promote rote learning rather conceptual understanding.

The participants of the study were three preservice teachers enrolled in a four-year teacher training program in a state university in İzmir, Turkey. After graduating from the program, they will be entitled to a diploma for teaching mathematics in elementary schools for students aged between 11 and 14 (Grades 5-8). Preservice teachers were at the third year of their education and they had already taken courses related to mathematics, pedagogy and content-specific pedagogy.

Data Collection

Data was collected during a school practicum course which lasted for fourteen weeks. The course has two components: university and school. Preservice teachers made observations and taught in partnership schools with the guidance of a school-based mentor. In the university component, preservice teachers reflect on their experiences for an hour every week. The university-based mentor of the course who was the second author of this paper guided the discussions. Certain topics were assigned for sessions during a 14-week period (50 minutes per week). In doing so, the purpose was to develop a reflective discussion environment for preservice teachers about these topics. Each week preservice teachers focused on different topics such as "what it means 'being a good teacher' according to students?" or "how school heads define 'a good mathematics teacher'? They spent two hours in schools to explore the topic of the week. Table 1 provides a brief summary of each session both in school and faculty in terms of the themes of the week.

Table 1. *Brief summary of sessions in school practicum course*

Week	Themes of University Component	Themes of School Placement
1	Pre-interviews about being a mathematics teacher	
2	Sharing ideas about preparing a mathematics lesson and teaching mathematics	
3		Teaching mathematics-1
4	Discussion of videos of two experienced mathematics teachers	
5		Interviewing students about "what it means to be a good mathematics teacher?"
6	Discussion of interviews	
7		Interviewing mathematics teachers about "what it means to be a good mathematics teacher?"
8	Discussion of interviews	
9		Interviewing with school head about "what it means to be a good mathematics teacher?"
10	Discussion of interviews	
11	Sharing ideas about preparing a mathematics lesson and teaching mathematics	
12		Teaching mathematics-2
13	Discussion of videos of preservice mathematics teachers	
14	Post-interviews about being a mathematics teacher	

The primary data was obtained from interviews. With each participant, two semi-structured interviews were performed. Each interview lasted about forty minutes. All interviews were recorded using a digital voice recorder and transcribed verbatim. The aim of the first interview was to explore participants' professional identities via asking why they chose teaching as a profession. The second interview focused on contextual dimension of being a mathematics teacher and preservice teachers were asked to reflect on their experiences with their peers, students, teachers and school heads.

Analysis of data

Qualitative content analysis was conducted to analyze the data. A grid (see Table 2 below) was used to write memos about each preservice teacher's professional identity in each context.

Table 2. *Content Analysis of Data*

Name	Context			
	Teacher education program	School	Private tutoring	Personal experiences
Taner	Memos	Memos	Memos	Memos
Davut	Memos	Memos	Memos	Memos
Handan	Memos	Memos	Memos	Memos

Themes were discovered concerning preservice teachers' professional identities as they interact with different people such as pupils, teachers, administrators in schools, and the mentor in the university. A total of eleven themes emerged (two for Taner, five for Davut and four for Handan). Themes were examined in four different contexts. Therefore, two different researchers examined a total of forty-four cases (See Appendix). Forty of them were found to be consistent. Therefore, interrater reliability was calculated as 90%.

Findings

This section reports findings in three sub-sections each of which is devoted to a preservice teacher. Each sub-section starts with the participant's professional choices. Second, the way in which the preservice teacher comes to see himself as a mathematics teacher throughout different contexts will be reported to be able to reveal the dynamics of their identity constructions.

Preservice Teacher Taner

Although Taner was graduated from a Anatolian Teacher Training High School, teaching was not his first choice for a university degree. During the first interview he mentioned that he wanted to be a computer engineer but could not get the required score from the university entrance exam. Therefore, he needed to prepare for the exam for one more year. His second attempt was not successful either, and he chose teaching as a second option.

When this study was conducted he was in his third year in the teacher education program. At the same time he was working part-time in a private teaching institution and were giving lessons to high school students in groups and as individuals to prepare them for the university entrance examination. During an interview he mentioned that he preferred to teach in one of these institutions rather than a state school.

One of the themes emerged from data analysis is "practical mathematics" as expressed by Taner. What he referred to as "practical mathematics" is concerned with "instrumental mathematics" in Skemp's (1976) term. Skemp (1976) distinguishes between relational and instrumental understanding of mathematics. The former is concerned with developing rich connections among mathematical ideas. On the other hand, the latter refers to rules without reasons. Data indicated that Taner's approach to instrumental understanding varied according to the context. For example, in the context of private teaching he privileged instrumental understanding by giving formulas directly:

Because you're appreciated, they say how come you remember this all...if I want to make a difference then I must give shortcuts and formulas which they don't know. That's what I want...First of all, I solve mathematics so that everyone can understand, I find simpler ways so that everybody could say "I can do something". I used to teach my uncle maths. What I see in him is that he first did not have any hope and was joking about himself, did not believe in himself...after two lessons he started to find the correct answers, he gained his confidence...students need to believe that they can do it by solving similar questions...when I become a mathematics teacher in the future I will teach this way by encouraging students. This way, students will see that they can do mathematics and that they can improve.

As can be seen from the excerpt above, Taner believed in the usefulness of an instrumental approach based on his private teaching experience. Furthermore, he mentioned that students preferred him as a mathematics teacher since he used shortcuts and practical methods. On the other hand, other contexts challenged this approach. For example, in the context of his high school experience, he observed his teachers and from these observations he concluded that a teacher should be open to different solutions to mathematical problems. Similarly, in the context of teacher education program, he realized that he needed to improve himself in introducing a concept since instrumental mathematics is not enough on its own. Furthermore, he noticed that everyone had a different learning style:

That's the point I haven't noticed...I used to think that everybody would understand (mathematics) the way I do but there's no such thing. Especially after our work in school...every student learn differently, some of them want to visualise...in the future I will not think of the way I learn. I will consider how students would learn and understand

Another theme emerged from data is concerned with mathematics teaching methods. In the context of private teaching, Taner preferred example-based mathematics teaching where required definitions and properties are given followed by examples and exercises. This approach is adopted by private teaching institutions in preparing students for the university entrance exam with multiple-choice questions. On the other hand, in the context of field experience, he taught a task-based lesson. His teaching approach was similar to the teacher in the video which they discussed in the teaching method course in the teacher education program. His lesson was on the area of a circle and a circular segment. During his lesson, he asked students to generate examples of circles in daily life and how to produce the same circle. He helped students to discover the area of circular segment. In other words, he embraced a task-based lesson for his own teaching.

Preservice Teacher Davut

Davut was also graduated from a Anatolian Teacher Training High School. As he mentioned in an interview, he was determinant to be a teacher: "Either English teacher or mathematics teacher...mathematics was more enjoyable, at least you deal with numbers. But language is not like this. It's so routinized...So I chose maths" (Davut). There were a lot of teachers in his family: father, mother and sister. Although his family encouraged him to choose engineering or medicine as a profession, he did not change his decision since he was very self-assured as a person as he emphasized during an interview. For his future carrier, he plans to be a mathematics teacher in a state school rather than a private teaching institute.

Themes emerged from data revealed contextual nature of Davut's identity. One of them was related to self-confidence. During the interviews, Davut showed different levels of self-confidence depending on the context and the way in which he sees himself as a mathematics teacher. For example, in the context of private teaching, he believed that he would become a very good teacher in one or two-years time. Similarly, based on his observations in school, he realized that knowing the key points and rote learning provide self-confidence for a teacher. On the other hand, in the context of teacher education program, he does not believe that he is ready to be a good mathematics teacher. He explained how mathematics education courses and observations in school made him think so:

I realized that being a teacher is not just giving lessons, for example there are lots of studies on how students learn. It's not straightforward. It's very complicated...it may look easy, teaching students and then expecting them to understand naturally, but it's not the way it is. For example, if you consider exponential numbers, there are a lot of concepts and we examine how students understand these concepts and the structure of their cognition. Mathematics is like this. It's more complicated. OK, children learn but what kinds of difficulties or misconceptions they have. Actually these are theoretical issues. We don't take them seriously. I noticed that while I was doing our coursework...I didn't think very professionally...this showed me that I could leave my student-identity behind, I mean in a positive way. I enjoyed teaching in school.

As can be seen from the excerpt above, Davut's perception of a mathematics teacher has been challenged as he participated in activities of the teacher preparation program. As he mentioned he started to see teaching as a profession which required important knowledge and skills. Therefore, his self-confidence has been reduced in the context of teacher education program due to its higher expectations.

Another theme emerged from data is concerned with different approaches to teaching mathematics. In the context of teacher education program, he thinks that mathematics tasks could not be applied in the classroom due to time constraints and pressures from high stakes testing. On the other hand, in the context of school practice, he thinks that mathematical tasks which were promoted by the teacher education program could be applicable in practice: "I used to think that I don't have enough time to do them. But I'll try to do it as much as possible...after talking to teachers in the school and based on my own experiment" (Davut). He taught a discovery-based lesson on the volume of a cylinder in the partnership school. He started his lesson by giving daily-life examples of a cylinder. He then arranged his students in groups, gave them circles and sticks, then asked them to produce cylinders. As can be derived from the data, Davut changed his beliefs about the applicability of mathematical tasks which were promoted by the teacher education program based on his own practice in the classroom.

Another theme was concerned with misconceptions and students' difficulties in mathematics. In the context of teacher education program, Davut said he learnt a lot about misconceptions in mathematics and he thought that being aware of them was important to be a successful teacher. With this regard, he mentioned that courses on students' difficulties were more beneficial for him. He thinks that mathematics teachers should never give up overcoming students' difficulties. On the other hand, misconceptions in mathematics were not an issue in the context of his school placement.

Another theme was concerned with motivation. Experiences in different contexts reinforce his beliefs about motivation and daily life examples and affected how he conceptualized pedagogy of teaching. He realized that students in school needed daily life examples to motivate them. Similarly, in the context of teacher education program, he observed how the teacher in the video motivated her students and he tried the same thing in his lesson (a discovery-based lesson on cylinder). Reflecting on this experience, he criticized the way teachers in the partnership school did not made use of motivation: "Teachers just bring some cylinder into the classroom and show them to students. I cannot call this as a mathematical activity considering what I've learnt in the university" (Davut).

Last theme is concerned with "respect" which revealed itself differently in different contexts. In the context of teacher education program, he preferred being a respectable teacher to being a successful teacher in high-stakes exams. On the other hand, in the context of school placement, he considered success important. He thought that it was the expectation of both students and head teachers. Therefore, he was confused about how a mathematics teacher is considered as respectful.

Preservice Teacher Handan

Handan decided to be a mathematics teacher when she was in secondary school and that was why she went to an Anatolian Teacher Training High School. She mentioned in an interview that she

used to love her mathematics teacher and observed her during the lessons. Therefore she thought about choosing mathematics teaching as a profession even when she had difficulties in mathematics lessons in secondary and high schools. When this study was conducted she was in her third year and she started to teach part-time in a private teaching institution to prepare students for the university entrance examination.

Various themes emerged from data obtained from interviews with Handan. One of them was concerned with reform-based mathematics curriculum. In the context of teacher education program, she had concerns about the applicability of reform-based mathematics activities. On the other hand, in the context of school placement, she realized that she could use mathematical tasks which were offered in the reform-based mathematics curriculum:

I didn't use to believe that this was applicable in a lesson. It is a good method but I used to think that I cannot catch up with it. But in my own lesson I saw that time was enough. The teacher model in my mind has changed. A good teacher should consider the formal curriculum and should carefully think about everything written there, should not skip anything and teach them students. Well, I started to think about these...I used to have a more traditional teacher model. But now, it's not.

She said that she learnt how to engage students into the activities in her second lesson in the school.

Another theme was the nature of mathematics and its teaching. In the context of her high school experience, she thinks that a mathematics teacher should be practical and quick (instrumental mathematics in Skemp's (1976) terms). On the other hand, in the context of teacher education program, she mentioned that "mathematics is not just about calculations and students should be taught the real meaning of mathematics (Handan)". She mentioned that she wanted to be a teacher who can teach students why they learn mathematics. A teacher should be able to teach in different ways and be creative.

Another theme was "knowledge of curriculum". Handan's experiences in different contexts reinforced the importance of having a grasp of mathematics curriculum. Both in the context of teacher education program and school placement, she noticed that following the mathematics curriculum guided the teacher in addressing the misconceptions and planning her lesson:

After all these processes, the most striking was...if you use the teaching methods which are suggested by the national curriculum, I personally observed this in my school placement, if you use these methods then they guide teachers. It makes teachers' job easy. Because you enter the classroom well prepared. You know what to teach...and you are more careful about students' misconceptions. You have a guide and a well-designed task.

As can be inferred from the excerpt above, the importance of knowledge of curriculum was reinforced as Handan gained experience in different contexts such as classroom observations and university-based courses on students' misconceptions. Her reflections were also in parallel to expectations of head teachers in the partnership school as she mentioned during the interview.

Misconceptions and students' difficulties were another theme on its own as derived from data. Importance of addressing misconceptions and students' difficulties during a lesson was reinforced as Handan participated in university-based courses and partnership school:

We have learnt about students' misconceptions as part of pedagogical content knowledge, but I've realized that I asked higher order questions. It wasn't appropriate considering the levels of students.

As can be seen in the excerpt above, knowledge of students that was emphasized by university-based mentors was also an issue in Handan's lesson in the partnership school.

Discussion and Conclusion

This study aimed at investigating contextual nature of preservice mathematics teachers' professional identities. Three preservice mathematics teachers' identities were explored with regard to how they see themselves as a mathematics teacher and what kind of a mathematics teacher they want to become. Data were analyzed to reveal how contextual factors shaped participants' identities.

In some cases, participants' perceptions of a mathematics teacher were stable throughout different contexts. These cases emerged especially where pedagogical ideas promoted by university-based courses were validated in practice e.g. the way daily-life examples motivates students, the importance of knowledge of mathematical misconceptions and how to address them in a lesson. In this situation, participants' perceptions of a mathematics teacher and pedagogical perspectives were reinforced.

In other cases, participants' identities were not stable. These cases especially emerged from institutional differences. For example, when working part-time in a private teaching institution participants privileged instrumental mathematics in Skemp's terms (1976). On the other hand, they noticed the usefulness of task-based teaching of mathematics not only in the context of university-based teacher preparation program but also in the context of their own teaching practice in the classroom. As Cattley (2007) mentions self-confidence is one of the aspects of professional identity. For one of the participants (Davut), it was an issue which varied across different contexts. Data indicated that he felt less confident in the contexts of teacher education program and school placement while he was confident as a teacher while he was giving private tutoring.

Another finding is concerned with the context of participants' past experiences e.g. their own learning experiences or role model teachers in secondary or high school. Data indicated that emerged themes were not an issue within this context. This finding is contrary to many studies which report the role of past experiences in identity formation (Knowles, 1992).

Although this study indicated differences in perspectives in various contexts, literature suggests that different actions or approaches in different contexts should not be treated as conflicts. They indicate the dynamics of identity construction. Likewise, identity is contextual (Rodgers and Scott, 2008). Contextual factors come together to shape the pedagogical identities of novice teachers (Goos, 2005). Findings regarding different perspectives in different contexts also support the claim that identity is shifting and multiple ("in the making", rather than stable) (Gee, 2001).

This study has some implications particularly for preservice teacher education. Findings emphasized the importance of addressing the difficulties of the embodiment of preservice and novice teachers' identities (Alsup, 2006). They are faced with various contextual factors such as learning experiences before they enter into the teacher preparation program, school placement and the teacher education program itself. As Britzman (1993) argues, contextual forces are normative and teacher education programs should discuss them and develop an awareness of these norms so that preservice teachers could voice opinions and be consciousness of their identities (Rodgers and Scott, 2008).

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Appendix. *Emerged themes across different contexts*

	Teacher Education Program	School	Private Teaching	Past experiences
Taner	<i>Relational understanding</i> is privileged	<i>Relational understanding</i> privileged	<i>Instrumental understanding</i> privileged	Not an issue
	<i>Mathematics teaching methods</i> : Task-based	<i>Mathematics teaching methods</i> : Task-based	<i>Mathematics teaching methods</i> : Example-based	Not an issue
Davut	Low self-confidence	Low self-confidence	High self-confidence	Not an issue
	<i>Mathematics teaching methods</i> : Tasks are not applicable	<i>Mathematics teaching methods</i> : Tasks are applicable	Not an issue	Not an issue
	<i>Knowledge of misconceptions</i> is useful	Not an issue	Not an issue	Not an issue
	<i>Motivation</i> : Daily life examples	<i>Motivation</i> : Daily life examples	Not an issue	Not an issue
	<i>Respect</i> is more important than success	<i>Success</i> (in exams) is more important	Not an issue	Not an issue
Handan	<i>Reform-based curriculum</i> : not applicable	<i>Reform-based curriculum</i> : applicable	Not an issue	Not an issue
	<i>Mathematics teaching</i> : Relational understanding	Not an issue	Not an issue	<i>Mathematics teaching</i> : Instrumental understanding
	<i>Knowledge of curriculum</i> is important	<i>Knowledge of curriculum</i> is important	Not an issue	Not an issue
	<i>Knowledge of misconceptions</i> is important	<i>Knowledge of misconceptions</i> is important	Not an issue	Not an issue

Teachers' Views about Educational Research: A Qualitative Study ⁱ

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Abstract

The purpose of this case study is to examine the views of teachers' about educational research. The present research is designed as a qualitative case study. The group of this study is consisted of teachers (n = 27), working in primary, middle, and high schools in the province of Niğde in Turkey. An extensive literature review was made on educational research and some scales in this regard were examined in detail in order to prepare the research questions in the study. At the end of this extensive literature review, a semi-structured interview form for the study was prepared. For data collection, teachers were visited in their schools by the researchers and asked to participate in the study. The teachers in the study group were interviewed directly by face-to-face in their schools in the autumn semester. The data obtained in the study were analysed by using "descriptive analysis technique". According to findings obtained in the study, totally four themes were acquired as a result of the descriptive analysis technique. The obtained themes were concluded as: need for educational research, importance of educational research, applicability of education research, and contribution of educational research to professional development.

Key words: Educational Research, Views of Teachers, Qualitative Study

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Introduction

Educational research plays an important role in the implementation of the education of countries in a healthy way (İlhan, Şekerci, Sözbilir, & Yıldırım, 2013). Educational research, which holds an important place in the questioning of information, is seen to be significant in education (Küçüköğlu, Taşgın, & Çelik, 2013). The importance of educational research cannot be ignored in the improvement of the quality and development of an education system (Everton, Galton, & Pell, 2002). Therefore, the role of educational research is quite large in the creation of a quality educational system in a country.

Educational research in many different fields of study is carried out by scientists in order to increase the quality of education (Beycioğlu, Özer, & Uğurlu, 2010). Teachers, one of the leading actors in an education system, are expected to practise educational applications in the classroom in light of the results obtained from educational research (Everton, Galton, & Pell, 2000). In other words, it is necessary that teachers must follow up the innovations and monitor the contemporary developments closely through the results of educational research (Drill, Miller, & Behrestock-Sherratt, 2012; Yavuz, 2009). Therefore, teachers must always follow up recent educational research (Zeuli, 1992), and have the role of an educational researcher (Cohen, Manion, & Morrison, 2007; Eryaman & Riedler, 2009, 2010; Saracaoğlu, Varol, & Ercan, 2005; Sarı, 2006). Teachers, like all individuals doing different kinds of jobs, must follow the recent developments in their fields closely and then move the acquired experiences and knowledge to the practice area in order to improve their professional competence (Şahin & Arcagök, 2013). In this regard, teachers are continuously expected to follow up the educational research related with their field area closely, and to implement the results driven from these studies in their classrooms (Drill, Miller, & Behrestock-Sherratt, 2012). However, it is not quite possible to say that teachers seem to benefit from education research adequately (İlhan et al., 2013). Although educational research is seen to increase in quantity (Beycioğlu, Özer, & Uğurlu, 2010; Chang, Chang, & Tseng, 2010; Sözbilir, Kutu, & Yaşar, 2012; Tsai & Wen, 2005), the utilisation rate of these studies remain rather low in terms of educational practices (Biesta, 2007; De Jong, 2004; Drill, Miller, & Behrestock-Sherratt, 2012; Şahin & Arcagök, 2013; Vanderlinde & van Braak, 2010). In this context, the views of teachers who move the acquired results driven from educational research into the practising area, namely classroom, can be said to hold a very important place (Şahin & Arcagök, 2013). In this sense, teachers' views in terms of educational research can be stated to be very crucial for researchers (Beycioğlu, Özer, & Uğurlu, 2010). In studies carried out by focusing on the perceptions and attitudes of teachers on educational research, it is concluded that teachers have negative perceptions towards educational research in general, as well as they think that the results driven from educational research is far beyond from producing solutions to problems encountered in the education system (e.g., Beycioğlu, Özer, & Uğurlu, 2010; Biesta, 2007; Bruce & Eryaman, 2015; Costa, Margues, & Kempa, 2000; Çepni & Küçük, 2002; Drill, Miller, & Behrestock-Sherratt, 2012; Ekiz, 2006; Everton, Galton, & Pell, 2000; Greenwood & Maheadly, 2001; Hemsley-Brown & Sharp, 2003; Öztürk, 2010; Shkedi, 1998; Şahin & Arcagök, 2013; Yavuz, 2009). The results of these studies show that teachers have negative views and attitudes towards educational research. In this respect, while the reasons underlying teachers' negative views and attitudes towards educational research can be discovered in future research, teachers can also be sustained to benefit more from these researches, and reflect the results obtained from these studies upon the application in terms of the creation of a quality teaching and learning process in the classroom.

A review of literature shows that there are many studies examining both in-service teachers' (e.g., Beycioğlu, Özer, & Uğurlu, 2010; Costa, Marques, & Kempa, 2000; Çepni & Küçük, 2002; Drill, Miller, & Behrestock-Sherratt, 2012; Ekiz, 2006; Eryaman, Kocer, Kana, Yagmur Sahin, 2013; Everton, Galton, & Pell, 2000; Isakson & Ellsworth, 1978, 1979; Johnson, 1966; Öztürk, 2010, 2011; Shkedi, 1998; Şahin & Arcagök, 2013; Yavuz, 2009; Yıldırım, İlhan, Şekerci, & Sözbilir, 2014), as well as pre-service teachers' (e.g., Eryaman, 2007; 2008; Küçüköğlu, Taşgın, & Çelik, 2013; Yavuz-Konokman, Tanrıseven, & Karasolak, 2013; Riedler & Eryaman, 2016) views and attitudes towards educational research. However, although it is understood that these studies were mostly carried out by

considering quantitative research methodology, only one study is seen to be carried out by considering qualitative research methodology in terms of examining teachers' views about education research in the literature (see Yılmaz & Kılıçoğlu, 2013). Although the study carried out by Yılmaz and Kılıçoğlu (2013) is seen to adopt qualitative research methodology to examine teachers' views about educational research, it is understood that this study solely focuses on the comparison of graduate and non-graduate teachers' views about educational research. Hence, it can be said that more research is needed by taking qualitative methodology into account in order to examine teachers' views about educational research in detail. In this regard, it may be stated that there is a significant gap in this issue in the relevant literature. While it is seen quite important to examine teachers' views and attitudes towards educational research with quantitative ways, it is thought that their views and attitudes towards educational research can be just reflected in terms of numerical quantity by this way. In this approach, the level of teachers' views and attitudes towards educational research, as well as whether some certain variables (i.e., gender, occupational experience, educational level, etc.) differ in terms of their views and attitudes can well be determined. However, a survey of teachers' views about educational research qualitatively in a more detailed and in-depth manner is thought to be quite important, too. In fact, in a study conducted with qualitative methodology, which teachers' views about educational research are taken into account, feelings, thoughts, perceptions, likes, dislikes, things that teachers find whether right or wrong can be described in a larger format. In this sense, while it is thought that such a research considering the examination of teachers' views about educational research qualitatively, fulfils an important gap in the relevant literature, as well as teachers' views on this issue can be analysed in a more detailed and in-depth manner.

Purpose of Study

The purpose of this case study is to examine the views of teachers' about educational research. This study is expected to provide insights into education decision makers, politicians, and administrators and shed light on future research on this very issue. Besides, this study is believed to contribute to understand "educational research" phenomenon from the viewpoints of teachers better.

Methodology

Research Design

The present research is designed as a qualitative case study. A case study is a "...phenomenon of some sort occurring in a bounded context" (Miles & Huberman, 1994, p. 25). As for Patton (1990), a case study research is "...where one needs to understand some special people, particular problem, or unique situation in great depth" (p. 54). In this study, "semi-structured interview technique", which is included in the interview method of qualitative data collection tools is used. Certain kinds of questions are prepared for use in all interviews in semi-structured interviews. The questions in the semi-structured form are asked to the interviewees in the same order, but this interview technique allows participants to enlarge their views by not limiting their views within some certain questions (Yıldırım & Şimşek, 2008). This technique tries to go in depth in the views of the participants to understand the phenomenon better (Merriam, 2009).

Study Group

The group of this study was consisted of teachers ($n = 27$), working in primary, middle, and high schools in the province of Niğde in the central Anatolia region of Turkey. The study group of the research was selected by "purposeful sampling method" (see Cohen, Manion, & Morrison, 2007; Creswell, 2012; Fraenkel & Wallen, 2009), one of the sampling methods used largely in the literature. In purposeful sampling, "researchers intentionally select individuals and sites to learn or understand the central phenomenon" (Creswell, 2012, p. 206). In this way, "they build up a sample that is satisfactory to their specific needs" (Cohen, Manion, & Morrison, 2007, p. 115). Therefore, the study group was determined by adopting the maximum diversity technique, which allowed choosing teachers who are aware of educational research, as well as have read studies from educational research literature (for the demographics of the teachers, see Table 1).

Table 1. Demographic Information of the Participants (n = 27)

Demographics	Number	Percentage
<i>Gender</i>		
Male	12	44.45
Female	15	55.55
<i>Occupational Experience</i>		
1-5 Years	2	7.41
6-10 Years	10	37.04
11-15 Years	9	33.33
16 and above years	6	22.22
<i>Educational Level</i>		
Undergraduate	23	85.19
Postgraduate	4	14.81
<i>Teaching Level</i>		
Primary School	9	33.33
Middle School	11	40.75
High School	7	25.92
<i>Age</i>		35.7 (SD = 7.75)

Of the participating teachers, 55.55% (n = 15) were females and 44.45% (n = 12) were males in the study. With regard to occupational experience, 7.41% (n = 2) of the teachers had 1-5 years of experience, 37.04% (n = 10) of them had 6-10 years of experience, 33.33% (n = 9) of them had 11-15 years of experience, and lastly 22.22% (n = 6) of them had more than 16 years of occupational experience. Also, it was seen that 85.19% (n = 23) of the teachers had undergraduate level of education and 14.81% (n = 4) of them had postgraduate level of education. Lastly, it was seen that 33.33% (n = 9) of the teachers were teaching at primary school level, whereas 40.75% (n = 11) of them were teaching at middle school level, and 25.92% (n = 7) of them were teaching at high school level. Finally, it was understood that the teachers' average age was 35.7 (SD = 7.75) in the study.

Data Collection Tool

An extensive literature review was made on educational research and some scales in this regard were examined in detail. The items as well as questions in these scales in regard of teachers' views and attitudes towards educational research were examined prior to forming the "semi-structured interview form" used for collecting data for the study (e.g., Beycioğlu, Özer, & Uğurlu, 2010; Çepni & Küçük, 2002; Drill, Miller, & Behrstock-Sherratt, 2012; Ekiz, 2006; Everton, Galton, & Pell, 2000; İlhan et al., 2013; Johnson, 1966; Öztürk, 2010; Shkedi, 1998; Şahin & Arcagök, 2013; Yavuz, 2009; Yavuz-Konokman, Tanrıseven, & Karasolak, 2013; Yılmaz & Kılıçoğlu, 2013). At the end of this extensive literature review, a semi-structured interview form for the study was prepared. The form was asked to be examined by different experts from various fields such as Turkish linguistics, educational measurement and evaluation, and psychological guidance and counselling, etc., and then the form was finalised in accordance with the feedback and suggestions provided by these experts. In order to find the interrater agreement level amongst the experts, Kappa coefficient was calculated. According to Kappa interrater agreement calculated in the study, it was found out that there was a high agreement amongst the experts (Kappa = .952, $p < .001$, 95% CI). As a result of the high agreement rate amongst the experts, the form was decided to be used in the research. A total of four questions and probes were asked to all participating teachers in the study.

Data Collection Procedure

After the approval from the National Directorate of Education Review Board of the Ministry of National Education (MoNE), teachers were visited in their schools by the researchers and asked to participate in the study. The teachers in the study group were interviewed directly by face-to-face in their schools in the autumn semester. Before beginning the interviews, the teachers were ensured that the data collected for the study would not be used for any other purposes except the research, as well as their names would be coded by not giving their real names and surnames in order for the teachers

to answer all the questions sincerely in the interview form. Therefore, the teachers were assured for the anonymity and confidentiality of their responses in the study. The questions were asked in the same order and the teachers' views were not limited to the research questions, thus they were supported to express their views freely. The teachers' all views were taken into account, which they considered important to state for the study in the interviews. The interviews with the teachers lasted for about 25 minutes each. Lastly, the interviews were completed nearly in one month time with the teachers. All the views of the teachers were noted down by the researchers, and then typed down in MS Word to start analysing the data obtained in the study.

Data Analysis

In qualitative research, the data collected are analysed within two distinct ways. These ways are: *i.* descriptive analysis and *ii.* content analysis techniques (Miles & Huberman, 1994). The data obtained in the study were analysed by using "descriptive analysis technique" (see Merriam, 2009; Miles & Huberman, 1994). Basically, in descriptive analysis similar data combined under certain themes and concepts are interpreted by organising them in a way that readers can understand (Patton, 1990). The analysis of the content of the data in a qualitative descriptive study is done through a four-step sequence analysis (Yıldırım & Şimşek, 2008). According to Yıldırım and Şimşek (2008), the descriptive analysis can be done through these sequences: *i.* coding of the data, *ii.* finding and determination of the themes, *iii.* organisation and identification of the data according to codes and themes, and *iv.* interpretation of the findings. In addition, the researchers used notes in order to determine which teachers stated the interview notes. The views of the teachers were given in quotation marks, and then these views were presented in parentheses (i.e., T-22, which represents the teacher 22) to identify the participating teachers in the study.

Validity and Reliability of the Data

In order to ensure the reliability of the data of the study, the researchers coded the written data independently. Then, the coding of the researchers was compared with each other. To determine the reliability between two experts, the formula ($\text{Reliability} = \text{consensus} / [\text{consensus} + \text{dissidence}] \times 100$) generated by Miles and Huberman (1994) was used in the study. At the end of the comparison of the teachers' views, an agreement rate of 93% within the two experts was reached. According to Miles and Huberman (1994), at least 70% of consensus between experts is acceptable as sufficient for reliability. Therefore, the obtained agreement rate between the experts was accepted as sufficient for reliability of the data in the study.

To ensure the validity of the research data, the findings of the study were given directly without commenting on them. In order to sustain the consistency of the concepts that make up the themes were evaluated in consultation with experts from the scope, and the findings were also checked whether they created a meaningful whole in the study. Besides, variation of the data to ensure the verification of the obtained data was provided. On the other hand, the notes taken by the researchers were shown to the teachers, as a way of getting participation confirmation technique. At the same time, the content validity of the interview form, as discussed earlier in "data collection tool" section of the study, was checked by some experts from the field, as well as by three teachers in order to sustain the intelligibility of the questions directed to the participating teachers in the study. Therefore, the semi-structured interview form was piloted on these teachers prior to the application, whether it was operable or not. According to the analysis, it was concluded that the interview form was seen to work well to be used in the study to collect data.

Results

When looked at the responses driven from the questions directed to the participating teachers, it was seen that a total of four themes were identified in the study. The obtained themes were concluded as: *i.* need for educational research, *ii.* importance of educational research, *iii.* applicability of education research, and *iv.* contribution of educational research to professional development. The findings in relation with the themes were examined under these headings below.

Need for Educational Research

The majority of the teachers ($n = 21$) who participated in the study, by drawing attention to the necessity of educational research agreed that studies in regard of education were very important. When the following statements are examined, the necessity for educational research can be seen from the viewpoints of the participating teachers clearly below.

I think that educational research contributes to the development of education positively, when it is done at the right time and for the right purpose (T-1).

Educational research is constantly improving the quality of education and instruction for renewal (T-23).

I think that research in relation with education is done in order to increase the quality of education in a country (T-2).

According to me, it is necessary to conduct educational research (T-22).

As can be seen from the obtained findings above, it is seen that most of the teachers stated positive views for the necessity of educational research in a country. However, a significant group of teachers ($n = 6$) expressed negative views so that educational research is unnecessary to be conducted.

To me, educational research is unnecessary. I mean, what is going on now in progress? Nothing... (T-19).

I think it is not necessary to conduct educational research. It is the same whether it is conducted nor not (T-8).

I think that educational research is unnecessary, especially for our country of course. The research in relation of education is not taken into account so that I consider educational research to be unnecessary in these conditions for our country (T-5).

As can be seen in the views of the teachers above, as some teachers put forward negative views about educational research, they also reported that these researches were not necessary to conduct.

Importance of Educational Research

While the majority of the teachers ($n = 18$) participated in the study noticed the importance of educational research, they agreed that these researches had an important place in education. The teachers, who participated in the study, stated that educational research had a quite great importance in an education system in the following statements below.

Of course, educational research has a very great importance. Because, education and instruction are being planned and regulated in the light of education research in a country (T-7).

According to me, education research is very important. If it is asked to me as why, everything is being done in the light of these researches in an education system (T-21).

I consider that educational research has a great importance in regard of the creation of a better education system, as well as the configuration of a better teaching and learning process in the classroom (T-4).

Considering the views quoted above, it is seen that the participating teachers demonstrated positive views for the importance of education research in an education system. However, while some teachers, who stated positive views in terms of the need for educational research in the first theme of the study were understood not to express ($n = 3$) positive views in the current theme of the study. In the interviews made with these teachers, it is seen that these teachers agreed that educational research was certainly necessary for a better education system, but they expressed that educational research had not an important place in terms of the education system of our country.

As I said, educational research is very necessary. The contemporary world is planning and organising their education systems in the framework of educational research. But, we do not

do such a thing in our country. We see that much educational research is being done, and some valuable findings are being obtained from these researches, but, unfortunately, we see that these researches are ignored in our country (T-14).

Educational research, I believe, is not taken into consideration. So, I think that educational research is very valuable and important in essence, but it is not seen significant in terms of the education system of our country (T-26).

As can be seen, while it is seen that a vast majority of the teachers declared the importance of education research, some teachers were seen to express the importance of educational research in essence, however, they stated that it was not valid in terms of the education system of our country. Although the majority of the teachers who participated in the study thought that educational research was of great importance, some teachers (n = 6) participated in the current study were understood to agree on the unimportance of these researches. It was seen that these teachers, who stated negative views on the importance of educational research, just as some of the teachers whose views were quoted above, stated that educational research was not taken seriously in terms of the education system of our country.

I think that, as I mentioned a little earlier, educational research is not important. Okay, so we see lots of educational research is being done through theses, articles, etc., but these are not significant for me unless they are taken into consideration in the education system (T-5).

I believe that there is no significance of educational research. I consider two edges; what would happen if educational research is carried out or not. I do not see much of a difference between these two edges. So, it is the same whether it is done or not; nothing changes. The same education system still continues in our country (T-8).

Considering the views uttered above, the teachers participated in the study were understood to express positive views in terms of the necessity of educational research, as well as it was seen that they were understood to state negative views in regard of the importance of educational research. Some teachers, who participated in the study, neither accepted the necessity nor the importance of educational research; as a reason of that, they declared that educational research was ignored in regard of the education system of our country.

Applicability of Educational Research

Although the vast majority of the teachers participated in the study expressed that educational research was necessary and important, almost all of these teachers (n = 25) were sceptical about the issue in terms of the applicability of educational research in the education system in our country. When the following statements are examined carefully, this issue can be seen clearly below.

So, right now, educational research is necessary and important. But there is one thing that we forget here! Could it be possible to apply these researches on education and instruction? So, personally, though I think that educational research is important and necessary, I cannot say the same thing for its application aspect on the education system (T-12).

I consider educational research as important, but the same thing cannot be possible in the application of these researches on the education system. We are witnessing that there are lots of educational research, however, we are not able to see the effects of the application of educational research on education itself (T-24).

I believe that educational research is not applicable on the education system in our country. There are many findings in these researches as “we have such a finding like...”, as well as “we have some suggestions as...”. These are okay. If the application of these researches is not possible in our country, there may not be any need for educational research, in regard of the context of our country (T-16).

Now, I feel sorry for educational research carried out in our country. Why? Because, research is being conducted by a thousand kinds of efforts, many findings are found in direction of these researches, but what about the applications as a result of these efforts and research findings? Nothing... For example, there are a lot of findings in relation with teachers, which

state that some things cannot pass beyond the formalities, but similar issues and problems still go on like this (T-9).

Our research is very nice, really... But they need to be put into practice. If they are not put into practice, as a result of it they go down the drain. I have read a lot of educational research so far, but somehow I cannot see the reflections of these researches on the education system itself (T-25).

Considering the views quoted above, the teachers, participated in the study, were seen to be worried about educational research in terms of the application of them in the education system. Although a vast majority of the teachers participated in the study expressed the necessity and importance of educational research, it is understood that they were seen to avoid exhibiting similar positive views in terms of the applicability of these researches on the education system.

Contribution of Educational Research to Professional Development

In this study, even though a vast majority of the participating teachers revealed positive views about educational research, a majority of these teachers (n = 17) were seen to declare that these researches did not contribute a great deal to their professional development.

I do not think that educational research contributes much to my professional development. If you ask as why not, because we are not aware of these researches, really (T-20).

I, personally, think that educational research does not contribute to my professional development. I was graduated from college years ago, but the things are going in the same way as well... Nothing has changed ever since then. Various studies have been made so far, new things have been put forward, but neither have we had any information about them, nor there is anyone informs us about these new developments (T-3).

Educational research does not contribute to my professional development directly. If I say such a finding has been obtained from educational research, neither the school administration nor the related legislations permit us to apply it at school (T-27).

I think that educational research does not contribute much more to my professional development process. If it happens, or in other words if educational research contributes to my professional development, I cannot see this in my professional teaching career. The teaching profession and the school are the same as I started studentship years ago, as well as I began teaching profession. Meanwhile, almost 17-18 years have passed since I started the teaching profession. Nothing has changed so far. Older teachers tell us the same things as the newest ones tell us, too. I do not see much more difference; of course there are some differences as a result of technology and science, between the newest and the oldest teachers in the system. Everything is the same; from the methods to the teacher behaviour forms seen in the classroom (T-8).

As looked at the quoted views above, it is seen that a vast majority of the teachers claimed that educational research did not contribute much more to their professional development. While they were claiming that educational research did not contribute much more to their professional development process, at the same time, they expressed that there was no change in the education system in a positive way, as well as the teaching profession. On the other hand, some teachers (n = 10), who participated in the study, were understood to claim that educational research contributed to them in terms of their professional development.

I think that educational research does contribute to my professional development process so as to keep pace in recent developments and innovations seen in the scope of education (T-23).

Educational research sustains teachers to develop them professionally. I can learn that the hackneyed theories in education may change in time. For example, the Turkish Education System used to adopt behaviourist approaches in education until 2005 or 2006, since then it has been adopting constructivist perspectives, which considers it as a more contemporary approach in the scope of education (T-1).

When educational research is conducted at a sufficient level, and teachers are included in these studies, as I believe, can contribute to the professional development of them (T-6).

As can be seen from the views presented above, although a significant number of the teachers who participated in the study did not think that educational research contributed their professional development, a significant number of teachers were seen to think that educational research contributed or could contribute to their professional development process.

Discussion

The main purpose of this study was to examine teachers' views about educational research. According to the findings obtained in the study, four main themes were detected in terms of the views of the teachers about educational research. The themes detected in the study were as; need for educational research, importance of educational research, applicability of education research, and contribution of education research to professional development.

According to the first finding obtained in the study, a vast majority of the teachers claimed that there was a need for education research. It was understood that the teachers participated in the study were seen to state educational research was in need in order to have a better education system. A relatively small number of teachers expressed that there was no need for educational research; because, it was found out on the basis of the views of the teachers that these researches were taken into account in the education system. Also, these teachers were understood to have no negative views about educational research in essence. However, these teachers were seen to have critical views towards the education system, which does not take education research into consideration. As a result of it, educational research is seen as a need by the teachers. The obtained finding in the study is paralleled to some results obtained in the relevant literature (e.g., Beycioğlu, Özer, & Uğurlu, 2010; Brown & Sharp, 2003; Ekiz, 2006; Everton, Galton, & Pell, 2000, 2002; Yılmaz & Kılıçoğlu, 2013). Therefore, in light of the review of the related literature it is understood that educational research is very crucial in order to build a better as well as a healthy education system in a country.

According to the other finding acquired in the study, a vast majority of the teachers was seen to reach a consensus in regard of the importance of educational research. To these teachers, educational research is both important and valuable. Educational research is seen very important for a better education system, as well as building an effective teaching-learning process in the classroom. Although teachers, who participated in the study, were seen to think that educational research was important for a better education system in essence, they were understood to think that these researches had no important place in the education system of our country. A review of the relevant literature shows that educational research is very important for a better education system (e.g., Everton, Galton, & Pell, 2002; Gore & Giflin, 2004; Hillage, Pearson, Anderson, & Tomkin, 1998). However, it is reported that educational research is not seen as important for the education system of our country (e.g., Beyciolu, Özer, & Uğurlu, 2010; Çepni & Küçük, 2002; Sarı, 2006; Yılmaz & Kılıçoğlu, 2013). At the same time, the international literature also reports that educational research is not seen as important in regard of educational applications (e.g., Bates, 2002; Berliner, 2002; Shkedi, 1998; Vanderlinde & van Braak, 2010); the underlying reason of this is claimed that educational research is more theoretical, rather than more practical. Hence, the views in regard of the importance of educational research are mostly stated as negative in the related literature. However, as Everton, Galton, and Pell (2002) state, such kinds of problems can be diminished by making teachers a part of educational research processes. Therefore, it is thought that as teachers become a part of educational research processes, they are more likely to believe in the importance and value of education research.

Another finding obtained in the study was the applicability of education research. Even though the teachers participated in the study expressed the importance and necessity of educational research for a better education system, almost all of these teachers were seen to think that these researches were not applicable in the education system. While the participating teachers thought educational research was necessary and important in essence, they were understood to advocate that

these researches were not applicable in regard of the education system in our country. The underlying reason of this is shown that educational research is not taken into account by education authorities in the education system of our country. In studies carried out in this direction, it is said that there are serious gaps between theory and practice (e.g., Castle, 1988; Stevens, 2004), thus teachers have negative views about educational research on the application of it in the education system (e.g., Bartlett, 1989; Çepni & Küçük, 2002; Sarı, 2006; Shkedi, 1998; Stevens, 2004; Yılmaz & Kılıçoğlu, 2013). Whereas, Darby (2008) sees teachers in a key role in the implementation of research-based educational practices in school and classroom contexts. Unless teachers see educational research as not applicable in the education system, this must be seriously taken into account. Because, seeing education research not applicable in the education system may affect further educational reforms negatively.

According to the last finding obtained in the study, a vast majority of the teachers participated in the study was seen to believe that educational research contributes to their professional development; also, the majority of teachers were seen to state that education research is far from contributing to their professional development. Whereas, it is expected that education research becomes one of the most important leading factors and a driving force in teachers' professional development processes. When the studies conducted in this direction are reviewed, it is seen that teachers cannot benefit from educational research enough (e.g., Çepni & Küçük, 2002; Ekiz, 2006), and they also think that these researches do not make enough contributions to their professional development as well (e.g., Beycioğlu, Özer, & Uğurlu, 2010; Çepni & Küçük, 2002; Sarı, 2006; Vanderlinde & van Braak, 2010; Yılmaz & Kılıçoğlu, 2013). In order to exceed this problem, teachers must be involved in educational research processes actively (Hamilton, 2005) and improve their professional development by joining in platforms where educational research is carried out (Coulter, 1999). Therefore, the cooperation between school and college must be strengthened and teachers must be sustained to benefit more from these researches.

Conclusions

The results of the study indicated that the teachers participated in the study had positive views about educational research in general. Although a vast majority of the teachers stated positive views about educational research, they were seen to express that educational research was in vain unless those researches were used in the education system of the country. Besides, it was found in the research that nearly all of the teachers had negative views about educational research in terms of its applicability in the education system of the country. Even though most of the teachers had positive views about educational research in regard of its importance and necessity, they were understood not to believe in the applicability of it in the education system. The underlying reason of these believes was understood to derive from authorities in the education system, which was considered not to take educational research into account. Also, though a vast majority of the participating teachers revealed positive views about educational research, a majority of these teachers were seen to declare that these researches did not contribute a great deal to their professional development. The teachers, who participated in the study, were seen not to benefit enough from educational research. These teachers were understood to continue their teaching profession without benefiting from education research.

Suggestions

In the current study, a vast majority of the teachers participated in the study displayed positive views about educational research in terms of its importance and necessity. However, a significant number of teachers in the study demonstrated that educational research was both unimportant and unnecessary. At the same time, a large group of teachers participated in the study expressed that educational research did not contribute much to their professional development process. In this sense, in order to make teachers an active actor in education research they must be directed to education in masters and/or doctorate level at university. Therefore, a strong collaboration between the Ministry of National Education (MoNE) and the Higher Education Council (HEC) should be sustained to educate teachers so as to become teacher-researchers, as well as make teachers a part of education research. On the other hand, although most of the teachers participated in the study thought that educational

research was important and necessary, they were sceptical about the application of these researches in the education system by education authorities. So, it is suggested that the HEC shares findings of educational research with the MoNE, which organises a group of experts in it to implement the necessary changes in the education system, as well as inform teachers and administrators via seminars, booklets, in-service trainings, videoconferencing, etc. Also, the MoNE should invite educational researchers to inform and train the teachers as well as the administrators in light of the recent developments in the scope of education. Especially, it was concluded that the teachers participated in the study had negative views about educational research because of researches were not taken into account in the education system. In this regard, the education system should be revised and then it should be reorganised in the light of educational research. Teachers, administrators, and the school system should be all revised in the light of recent educational research so as to create a more contemporary education system. Therefore, politics of education should be created in collaboration with educational authorities and educational research. Without taking educational research into account, which takes only educational authorities into consideration, a contemporary and better education system seems rather hard to sustain. In order to keep pace in the race with the contemporary world in the scope of education, the education system should be created upon educational research.

Limitations

While this study has yielded valuable insights for the improvement of the views of teachers about education research, it is imperative to note that the study has some limitations. For example, the sample of this study is limited to teachers in a rather small province of Turkey. Hence, a similar study is considered to be useful to be conducted by considering more teachers, to understand the educational research phenomenon better. Another limitation of the study is that the findings were based on self-reported data of teachers' views about educational research. This study has been carried out by using qualitative research methodology. Even though such qualitative data are considered valuable to draw some inferences, it is also seen crucial to collect some quantitative data in order to better understand the general framework of the findings. This is also a limitation in the study that has not been considered during the research. Supporting studies based on quantitative data with qualitative data is considered to be very useful to understand the reality of the results acquired in a study. Therefore, it is suggested to conduct studies by using mixed-methods approaches to better understand the social reality underlying the results in a study.

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Development of Attitudes towards Mathematics Scale (ATMS) using Nigerian Data – Factor Analysis as a Determinant of Attitude Subcategories

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Abstract

This study was aimed at the development of an instrument for measuring students' attitudes towards mathematics. A survey research design was adopted involving 510 students randomly selected. Exploratory factor analysis (EFA) was carried out to determine the number of factors to be retained in the ATMS. The adequacy of the sample was confirmed by means of Bartlett's Sphericity Test (BST), the Kaiser-Meyer-Olkin (KMO) index, and the matrix determinant. The BST was significant at $p < 0.01$ with KMO index of .93 and correlation matrix determinant of 0.00006207. The factors were extracted using principal component analysis and the components were rotated using Varimax with Kaiser Normalization and converged after 10 iterations. The final 30-item ATMS contains four attitude subcategories: perception of difficulty, feelings of anxiety towards mathematics, usefulness of mathematics, mathematics phobia and has a reliability coefficient of .91 with sufficient evidence of content and face validity.

Keywords: Attitudes, Mathematics, Scale, ATMS

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Introduction

The affective domain is essentially critical in the educational development of individuals as it is enshrined in the Bloom's taxonomy of educational goals (Eryaman & Genc, 2010). The emotions and feelings of students before, during and after studying mathematics are of great concern to mathematics educators and have been investigated over the years (Dowker, Bennett, & Smith, 2012; Dursun, 2015; Haladyna, Shaughnessy, & Shaughnessy, 1983; Jenkins & Gering, 2006). The importance of students' attitudes towards mathematics cannot be overemphasized with due consideration for the number of researches related to its measurement or its correlation with students' academic achievements and performance. Despite these, concise instruments with high psychometry properties are still lacking in the literature for measuring students' attitudes towards mathematics. The available instruments are either too old, too lengthy (containing numerous items), un-directional or lacking psychometry properties which posed concerns for researchers. In addition, putting the diverse cultural heritage of Nigerian society with over 400 ethnic groups into consideration coupled with the fact that attitudes towards mathematics are influenced by societal norms (Mata, Monteiro, & Peixoto, 2012) it became paramount to develop an instrument using indigenous data for measuring students' attitudes. This study therefore, stemmed from the measurement of students' attitudes towards mathematics through the development of a concise and directional instrument with high psychometric properties, specifically item total correlation, internal consistency, reliability and validity.

Attitude can be described as "a tendency attributed to the individual and regularly constitutes his/her thoughts, feelings and behaviours related to the psychological incident" (Dursun, 2015). Researchers have made some distinctions between mathematical attitudes and attitudes towards mathematics. According to Palacios, Arias and Arias (2014), mathematical attitudes as to do with the way one utilizes general capacities that are relevant for mathematics (such as mental openness, flexibility when seeking solutions to a problem, reflective thinking), aspects which are all more closely related to cognition than to affect. Attitudes towards mathematics on the other hand, refer to the valuation, the appraisal, and the enjoyment of mathematics which underline the affective domain more than the cognitive one. There have been diverse views among researchers in relation to attitudes of students towards mathematics. Some studies had been reported on the relationship between attitudes, achievements and performance (Chagwiza, Mutambara, Tatira, & Nyaumwe, 2013; Michelli, 2013) while others have been reported on its measurement (AbdulMajeed, Darmawan, & Lynch, 2013; Afari, 2013). This article was directed at contributing to the discussion on the development of instruments for measuring students' attitudes towards mathematics.

Students' attitudes towards mathematics have been correlated with mathematics achievements and performance and found to be an important predictive factor of achievement in mathematics (Chagwiza et al., 2013). Attitudes of students towards mathematics could be positive or negative which are constant unchangeable beliefs acquired due to the experiences of the students (Sirmaci, 2010). Sirmaci (2010) investigated the correlation between attitudes and learning styles of 190 ninth year high school students in Erzurum, Turkey and found that there was a significant positive relationship between students' attitudes towards mathematics and their learning styles. Some other researchers have investigated teachers' and students' attitudes and their combined effects on academic performance of students. Their findings revealed that teachers' positive attitudes radiated confidence in students which made them develop positive attitudes towards the learning of Mathematics (Kalder & Lesik, 2011; Mensah, Okyere, & Kuranchie, 2013; Standslause, Maito, & Ochiel, 2013). Attitudes towards mathematics have also been investigated from gender perspectives. Adebule and Aborisade (2014) reported an empirical study on the gender comparison of 600 secondary school students' attitudes towards mathematics and found that attitudes did not depend on gender. This was in support of the findings of Mohamed and Waheed (2011) that had earlier reported no significant gender difference in the attitudes towards mathematics of secondary school students. Evidences abound in the literature on the impacts of attitudes on students' academic performance in mathematics. Therefore, development of a well-structured instrument for measuring these attitudes will go a long way in understanding the underlying constructs of students' attitudes.

Several attempts have been made by mathematics educators and educational psychologists alike to develop measuring instruments of students' attitudes towards mathematics at all levels. The historical mathematics attitude instrument of Alken in 1974 and Fennema-Sherman mathematics attitudes scales developed by Fennema and Sherman in 1976 have been described as the pioneers and most popular instruments for measuring students' attitudes towards mathematics in the literature (Palacios et al., 2014). The 40-item opinionnaire of Alken was made of 12 items on enjoyment of mathematics, 11 items on value of mathematics and 17 items on interests, achievement, and other biographical information. The instrument was administered on 190 subjects including 100 women and 90 men, the collected data was analysed and a correlation coefficient of $r = 0.95$ was computed on the final 11-item enjoyment of mathematics subscale after deleting one item. The final 10-item value of mathematics subscale also had a correlation coefficient of $r = 0.85$ after deleting one item (Alken, 1974). The Fennema-Sherman mathematics attitudes scales on the other, was developed initially to include nine domain-specific subscales which are; attitude towards success in mathematics, mathematics as a male domain, mother/father scales, teacher scale, confidence in learning mathematics, mathematics anxiety, motivation in mathematics and usefulness of mathematics. The final scale consisted of four subscales: a confidence scale, a usefulness scale, a scale that measures mathematics as a male domain and a teacher perception scale. Each of these scales consists of 12 items. Six of them measure a positive attitude and six measure a negative attitude (Fennema & Sherman, 1976). These two historic instruments have received wide acceptance among researchers but have also been criticised for being too old, lengthy and overdue for modifications especially with regards to their psychometry properties (Chamberlin, 2010).

More recently, mathematics educators have reported developed instruments for measuring students' attitudes towards mathematics. Tapia and Marsh (2004) reported a 40 – item attitudes towards mathematics inventory (ATMI) using a total sample of 545 high school students that cut across all levels. Their initial attitudes scale was made up six factors upon application of a maximum likelihood factor analysis with a Varimax rotation the final retained factors were self-confidence, value of mathematics, enjoyment of mathematics and motivation. The instrument had a reliability coefficient alpha of 0.97 and was recommended for investigating attitudes of students towards mathematics. Several adaptations of this instrument have been reported over the years contrary to the view of Chamberlin (2010) who submitted that the instrument had not been given much attention by educators despite its high psychometry properties. For example, a validation and confirmatory factor analysis (CFA) of the ATMI was reported by AbdulMajeed, Darmawan, and Lynch (2013) involving 699 year 7 and 8 students in South Australia. Their CFA of the ATMI also gave four-factor solution of the 40-item inventory with high internal consistency and validity. In the same year, ATMI was also translated to Arabic by Afari and validated. His study involved 269 middle school students in United Arab Emirate and his CFA also yielded four-factor solution with high psychometry properties which corroborated his later study (Khine & Afari, 2014) on the same instrument. All these and many other unpublished studies are indications of wide utilizations of the ATMI among researchers.

The contribution of Tahar, Ismail, Zamani and Adnan (2010) cannot be overlooked in the development of attitudes towards mathematics scales. Their study involved 746 respondents in their first year diploma course. Exploratory factor analysis yielded five-factor solution on the final 21-item questionnaire: interest in mathematics, anxiety towards mathematics, self-efficacy, extrinsic motivation and students' self-concept. A Cronbach's alpha coefficient of .888 was also reported. Two years later, a more robust psychometric procedure validated instrument using a sample of 4,807 students of non-university students was developed by Palacios et al. The 39 – item instrument was centered around five factors: liking-enjoyment of mathematics, anxiety towards mathematics, perception of difficulty, perceived utility, and mathematical self-concept. The instrument is available in two languages Spanish and English and a contrasted evidence of validity and reliability were presented in the article. Evidence abound in the literature on the development of instrument for measuring students' attitudes towards mathematics.

However, an extensive search of the literature revealed that most of the developed instruments are either too old, lengthy or lack some psychometry properties. Besides, no of these instruments had been developed using indigenous data from this part of the world. Perhaps, some have been developed but are nowhere to be found on the internet. Researchers in this country have been dependent on adoption and adaption of foreign instruments to measure students' attitudes in their educational researches, for example see (Adebule & Aborisade, 2014). It is therefore pertinent to develop an instrument using indigenous data generated from our students and sophisticated statistics to determine the subcategories that constitute students attitudes towards mathematics. This study was aimed at filling this gap and thereby contributing to knowledge in the affective domain of mathematics as a step towards educational development of the country.

Method

Item Development

The development of items for the attitudes towards mathematics scale (ATMS) required drawing from the reviewed literature in Section 1. The initial ATMS contains 52 items including two biodata items (I) gender, (II) age in years, and 50 items on attitudes of students towards mathematics. The ATMS items on attitudes have seven subcategories: usefulness of mathematics, feelings of anxiety and mathematics phobia, liking-enjoyment of mathematics, motivation and confidence, teacher's attitude as perceived by the students, perception of difficulty and subject perceived as a male domain. The distribution of the items into these subcategories are shown in Table 1. Five point Likert – scale format was used in which respondents have to choose by ticking from SA – Strongly Agree (5), A – Agree (4), N – Neither agree nor disagree (3), D – Disagree (2) and SD – Strongly Disagree (1) and 23 items were reversed coded. The respondents were urged to complete the inventory with utmost sincerity. The content and face validity of ATMS was done by three senior lecturers in the department of science education, Ahmadu Bello university and they gave satisfactory comments and recommendations for modifications of some items.

Table 1. *Attitude Subcategory Item Distribution*

SN	Attitude subscale	Item number	Total
1	Usefulness of Mathematics	1, 8, 15, 22, 29, 36 and 43	7
2	Feelings of Anxiety and mathematics Phobia	2, 9, 16, 23, 30, 37, 44, 47, 49 and 50	10
3	Liking-Enjoyment of Mathematics	3, 10, 17, 24, 31, 38, 45 and 48	8
4	Motivation and Confidence	4, 11, 18, 25, 32 and 39	6
5	Teacher's Attitude as perceived by the students	5, 12, 19, 26, 33 and 40	6
6	Perception of difficulty	6, 13, 20, 27, 34, 41 and 46	7
7	Subject perceived as a male domain	7, 14, 21, 28, 35 and 42	6
			50

Research Design

Keeping in mind, the adaptability of the proposed design with respect to the type of study, variables under consideration, size of respondents and phenomenon to be studied, one-shot survey design was selected as an appropriate research design. According to Jansen (2010) one-shot survey involves only one empirical cycle (research question—data collection—analysis—report) in parallel to the typical case of a statistical survey. The factors (students' attitudes towards mathematics) were studied in their natural form without the researcher manipulating any of the variables. The researcher simply collected the data using the ATMS and analyzed it to provide an objective description of the phenomenon.

Participant

The sample for this study involved 510 senior secondary school II students of Sabon – Gari local government area of Kaduna state Nigeria drawn from the target population of senior secondary schools students. Five government public secondary schools in the local government were randomly selected out of eleven public schools in the area. One of the sampled schools was only girls while the remaining four schools were co-educational. These students consisted of 228 (45%) males and 279 (55%) females with an average of 17 years ranging from 12 to 25 years. Three students did not indicate their gender and so were excluded in calculating the percentage by gender.

Procedure

The ATMS was administered initially to 530 secondary school II students with the help of five research assistants. The exercise took 2 days as permissions were sought from the school principals the first day before distribution of the questionnaires the second day. The subjects completed the questionnaires before the first period in the morning and took 15 minutes to complete. Twenty questionnaires were not included in the analysis as a result of improper filling – out. The remaining 510 were analysis using statistic package for social sciences (SPSS) version 20.0 though with some missing values. The missing values of course could not affect the results as SPSS software was designed to exclude missing values in the analysis.

Results and Discussion

Evidence of reliability

In other to estimate internal consistency of the scores, Cronbach's alpha coefficient was computed. Cronbach's alpha coefficient for scores on the 50-item ATMS was .84, indicating a moderate degree of internal consistency for group analyses. Besides, only 14 out of the 50 items had item-to-total correlations above .50, the highest being .547 while the inter-item total correlations ranging from -.319 to .547. This suggested that quite a number of the items contributed less to the total scale. Hence, a necessity for item deletion. The mean and standard deviation of the total score were 159.32 and 22.36 respectively. Table 2 summarizes the 50 – item scale descriptive statistics and reliability.

Table 2. 50 – Item Scale Statistics and Reliability

	N of Items	Mean	Variance	Std. Deviation	Cronbach's Alpha
Item	50	3.186	.300	.55	
Scale	50	159.32	499.79	22.36	0.84

An iterative item deletion process was carried out in order to increase the value of the Cronbach's alpha. Items were deleted based on their item-to-total correlation and effect on the alpha value if deleted. We were left with no option but to delete twenty items one at a time starting with the one with the lowest item-to-total correlation. After deleting these twenty items, Cronbach's alpha reached a value of .91.

The revised inventory had a mean of 86.09, a standard deviation of 22.29. Most of the 30 items had item-to-total correlation above .50, with the highest being .63. This suggested that all items contributed significantly to total scale. The test items were homogeneous, which is interpreted to mean that they tend to measure a common trait. Table 3 summarizes the 30 – item and scale descriptive statistics and reliability.

Table 3. 30 - Item and Scale Statistics

	N of Items	Mean	Variance	Std. Deviation	Cronbach's Alpha
Item	30	2.87	.122	.35	
Scale	30	86.09	496.32	22.28	0.91

Exploratory Factor Analysis

Exploratory factor analysis (EFA) was carried out to determine the number of factors to be retained in the ATMS subcategories. Prior to the conduct of the EFA the adequacy of the input data was confirmed by means of Bartlett's sphericity test, the Kaiser-Meyer-Olkin (KMO) index, and the matrix determinant. The test was significant at $p < 0.01$ with KMO index of .93 and correlation matrix determinant of 0.00006207 which is greater than the necessary value of 0.00001 (Table 4). Hence, the data were adequate for the EFA and multicollinearity is not a problem for this data.

Table 4. *KMO and Bartlett's Test*

	Approx. Chi-Square	df	Sig.
Bartlett's Test of Sphericity	3498.728	435	.000
KMO index			.93
Matrix determinant			0.00006207

Further, principal component analysis (PCA) method was used in extracting the factors to be retained. A total of six factors were identified with factor 1 explaining 29.89% of the total variance and factor 6 explaining only 3.53% of the total variance. Table 5 described the eigenvalues associated with linear component before extraction, after extraction and after rotation of the six extracted factors.

Table 5. *Total Variance Explained*

Comp.	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Var.	Cum. %	Total	% of Var.	Cumulative %	Total	% of Var.	Cum. %
1	8.968	29.892	29.892	8.968	29.892	29.892	3.836	12.785	12.785
2	1.566	5.220	35.112	1.566	5.220	35.112	3.391	11.304	24.090
3	1.333	4.443	39.555	1.333	4.443	39.555	2.645	8.815	32.905
4	1.191	3.969	43.524	1.191	3.969	43.524	2.387	7.956	40.861
5	1.084	3.615	47.139	1.084	3.615	47.139	1.767	5.890	46.751
6	1.059	3.531	50.670	1.059	3.531	50.670	1.176	3.919	50.670
7	.991	3.303	53.973						
8	.944	3.147	57.121						
9	.914	3.048	60.168						
10	.892	2.973	63.141						
11	.859	2.863	66.003						
12	.795	2.650	68.654						
13	.786	2.619	71.273						
14	.728	2.426	73.699						
15	.690	2.301	76.000						
16	.670	2.232	78.232						
17	.627	2.092	80.324						
18	.602	2.007	82.331						
19	.583	1.945	84.276						
20	.537	1.790	86.066						
21	.511	1.702	87.768						
22	.474	1.580	89.347						
23	.469	1.562	90.909						
24	.444	1.480	92.389						
25	.433	1.444	93.834						
26	.417	1.391	95.225						
27	.390	1.300	96.525						
28	.365	1.218	97.743						
29	.343	1.142	98.885						
30	.334	1.115	100.000						

Extraction Method: Principal Component Analysis.

In order to improve the interpretability of the extracted factors both Varimax and Promax rotations were performed. The results were compared and found to have no significant difference. Therefore, Varimax rotation which converged after 10 iterations with Kaiser Normalization was reported in Table 6. The communalities of each item were also included and small coefficients less than 0.3 were surprised for convenience reading.

Table 6. *Rotated Component Matrix and Communality*

Item	Component						Communality	
	1	2	3	4	5	6	Initial	Extraction
Item_43	.689						1.000	.484
Item_45	.578						1.000	.508
Item_47	.578						1.000	.516
Item_34	.491	.425					1.000	.499
Item_36	.485		.475				1.000	.467
Item_26	.473		.452				1.000	.518
Item_44	.461	.396					1.000	.454
Item_46	.453	.316					1.000	.487
Item_30	.431	.368					1.000	.420
Item_37	.429		.379	.365			1.000	.525
Item_31	.424	.322					1.000	.460
Item_6		.690					1.000	.530
Item_9		.667					1.000	.518
Item_27		.631					1.000	.494
Item_16		.576				.308	1.000	.512
Item_23		.494					1.000	.491
Item_20	.379	.465					1.000	.466
Item_25		.366	.304	.321			1.000	.427
Item_8			.699				1.000	.588
Item_15			.644				1.000	.599
Item_22	.385		.538				1.000	.479
Item_33				.651			1.000	.573
Item_32		.311		.553			1.000	.422
Item_49	.380			.533			1.000	.474
Item_40			.361	.487			1.000	.485
Item_13					.745		1.000	.620
Item_12				.363	.706		1.000	.693
Item_14	.355		.310		.458		1.000	.585
Item_29						.751	1.000	.336
Item_21						.401	1.000	.497

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 10 iterations.

An investigation into the item communality revealed that the average communality which is got by adding up all the communalities and dividing by 30 gave 0.435. Since our sample is more than 300 and the average communality is less than 0.6 the Kaiser criterion for correctly retaining the extracted factors has been violated. Hence, all the six factors with eigenvalues greater 1.0 cannot be retained. A bail out of this problem is to look at the Scree plot (Figure 1) as suggested in the literature (e.g Field, 2009).

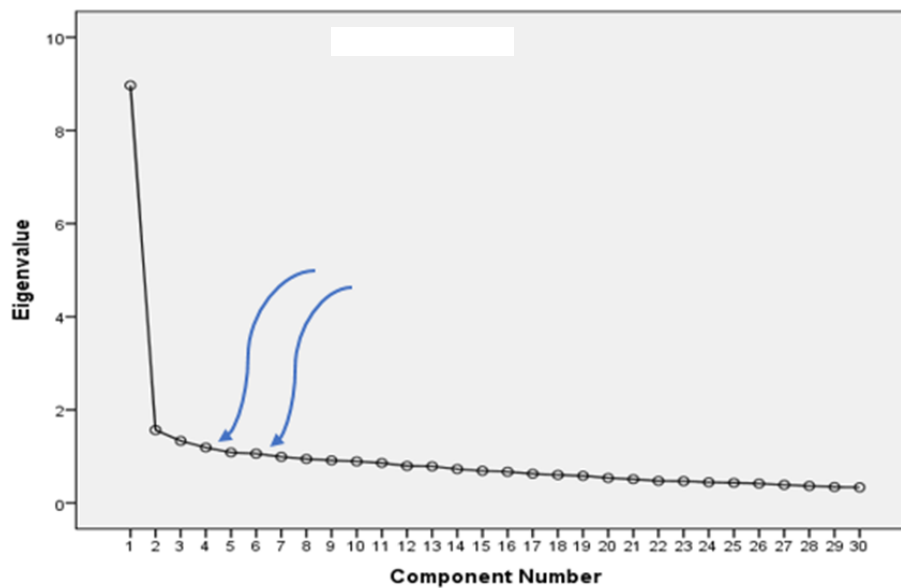


Figure 1. Scree Plot Indicating Number of Retained Factors

It can be read from the Figure 1 that we have two options of either retaining 4 factors or 6 factors. Due to the aforementioned low average communality and the large sample coupled with the fact that 3 items each are extracted in factors 4 and 5 and only 2 items in factor 6 the default recommendation of EFA was therefore disregarded. In sum, we have only retained factors 1, 2, 3 and factors 4, 5 and 6 were merged to be one factor which gave us four factors. These also have some implications on the nomenclatures of the ATMS subcategories. Factor 1 is now student's perception of difficulty, factor 2 – feelings of anxiety towards mathematics, factor 3 – usefulness of mathematics and factor 4 – Mathematics phobia. The distribution of these items by factors is presented in Table 7 as well as Cronbach's Alpha of the items in each factor.

Table 7. Distribution of ATMS Items and correlations

Factor	Attitude subcategory	Item number	Cronbach's Alpha
1	Students' perception of difficulty	6, 9, 16, 20, 23, 25, 27 and 34	.81
2	Feelings of anxiety towards mathematics	30, 31, 37, 43, 44, 45, 46 and 47	.80
3	Usefulness of Mathematics	8, 15, 22, 26, 36 and 40	.75
4	Mathematics phobia	12, 13, 14, 21, 29, 32, 33 and 49	.62

Evidence of Internal Consistency

Having retained four factors, Cronbach alpha was computed to estimate internal consistency and reliability of the scores on the subcategories of the ATMS. Factor I contains 8 items with a mean of 23.50 (SD = 7.26). Factor I is characterized by students' perception of difficulty items. The scores for these items had a Cronbach's alpha value of .81. Factor II contains 8 items with a mean of 22.87 (SD = 7.98). Factor II is characterized by feelings of anxiety towards mathematics items. These items produced a Cronbach's alpha value of .80. Factor III contains 6 items with a mean of 15.47 (SD = 5.72). Factor III is characterized by usefulness of mathematics items. The scores on these items produced a Cronbach's alpha value of .75. Factor IV contains 8 items with a mean of 24.82 (SD = 5.66). Factor IV is characterized by mathematics phobia items. The scores for these items produced a Cronbach's alpha value of .62. These data indicated high level of reliability of the scores on the subcategories. Table 8 presents sample items based on the attitude subcategories the full mathematics attitude inventory is available upon request from the corresponding author.

Table 8. *Sample Items on Final ATMS*

Factor	Sample Item
I – Students' Perception of Difficulty	1. Math is hard for me 5. Usually I have difficulty with mathematics 9. Math confuse me
II – Feelings of Anxiety towards Mathematics	6. I hate studying maths, even the easiest parts 18. I do not know how to study math 29. I'm one of those people who were not born to learn math
III – Usefulness of Mathematics	3. Taking math is a waste of time 7. Math will not be important to me in my life's work 11. Doing well in math is not important for my future
IV – Mathematics Phobia	4. I am afraid to ask questions in math class 24. When a woman has to solve a math problem, she should ask a man for help 30. It's hard to believe a female could be a genius in math

Conclusion

The importance of attitudes of students towards mathematics cannot be overemphasized with due consideration for number of researches related to its measurement or its correlation with students' academic achievement and performance. Despite the diverse disparity in the attempts to measure these attitudes, some important common points have also emerged, especially concerning the factor structure of the construct underlying attitudes towards mathematics. Palacios et al. (2014) posited that liking/enjoyment of mathematics, the value/utility of mathematics, perception of self-efficacy, and mathematical anxiety have been present in an important part of the research on this topic. This study stemmed from the measurement of students' attitudes towards mathematics through the development of an instrument with the caption "Attitudes towards Mathematics Scale". We have not only used the Nigerian data for the development of ATMS but also used some sophisticated statistics in the analysis.

A sample of 510 respondents were used which is higher than some previous researches reported on attitude (Jenkins & Gering, 2006). The adequacy of this sample was also confirmed for the EFA using KMO index and Bartlett's sphericity test that proved significant at $p < 0.01$ with .923 index. The reliability of the instrument after series of item deletions to optimize the coefficient was 0.91 which can be considered superb. Even though the Cronbach's alpha is less than that reported by Tapia (2004) and Palacios et al. (2014), the discrepancy can be ascribed to the larger samples involved in both studies which are 545 and 4807 respectively.

Four factors were finally retained which constitute the four mathematics attitudes subcategories. The factors are (1) students' perception of difficulty, (2) feelings of anxiety towards mathematics, (3) usefulness of mathematics and (4) mathematics phobia. The items in factor 1 addressed perceptions of students in relation to confusion, math difficulty, low self-assessment of performance, encountered trouble in mathematics, etc. Items in factor 2 addressed students' feelings of inability to study mathematics, boredom, terrible strains in class, hatred for mathematics, etc. Items in factor 3 addressed the relevance of mathematics in students' future careers, mathematics as a waste of time, limitations of mathematics to science careers and the teachers' thoughts on the utility of mathematics. Lastly, items in factor 4 described students' lack of confidence in mathematics, fear of asking questions in mathematics class, lack of supportive teachers to instil confidence in students and

mathematics as male domain discipline. These factors have been supported by what are available in the literature (Alken, 1974; Fennema & Sherman, 1976; Palacios et al., 2014; Tapia & Marsh, 2004).

Finally, a very important discovery in this study is the deletion of items that addressed positive attitudes towards mathematics due to their poor item-item total correlations. Items such as “I like Math”, “I enjoy studying Math”, “The topics taught in mathematics classes are very interesting”, etc, that addressed liking – enjoyment of mathematics were deleted. Further, items such as “I can become a good student of mathematics”, “I am good at mathematics”, “I am sure of myself when I do math”, “I know I can do well in math”, etc., that addressed motivation and self-confidence in mathematics were also deleted. A possible explanation for this phenomenon is that students over the years have developed negative attitudes towards mathematics which manifested when completing the questionnaires. Perhaps, students’ poor performance, poor methodologies of their teachers or ill treatment from their teachers could be responsible for this attitudinal change.

Recommendations

Based on the findings of this study the following were recommended:

- a. The instrument ATMS is recommended for use to measure secondary school students’ attitudes towards mathematics (it is available on request from the corresponding author).
- b. Mathematics educators and researchers should intensify more efforts to improve negative attitudes of students towards mathematics.
- c. Mathematics educators in every other part of this country can replicate this study or improve upon it.

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The Effect of Chemistry Laboratory Activities on Students' Chemistry Perception and Laboratory Anxiety Levels

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Abstract

Chemistry lesson should be supported with experiments to understand the lecture effectively. For safety laboratory environment and to prevent laboratory accidents; chemical substances' properties, working principles for chemical substances' usage should be learnt. Aim of the present study was to analyze the effect of experiments which depend on laboratory usage techniques on science teacher candidates' laboratory anxiety and chemistry perception. The study was conducted with 41 science teacher candidates who registered General Chemistry-II course in Bartın. In the study a pre-test and post-test procedure was applied. To collect data Chemistry Laboratory Anxiety Instrument and Chemistry Perception Questionnaire were used. Chemistry Laboratory Anxiety Instrument was developed by Bowen (1999) and adapted into Turkish by Azizoglu and Tiryaki (2006). Moreover, Chemistry Perception Questionnaire, was developed by Wells (2003) and adapted by Tosun (2013). At the beginning of the semester, the scales were administrated to science teacher candidates as pre-test. During the semester, experiments which depend laboratory usage techniques have been conducted. At the end of the semester, the scales were administrated to science teacher candidates as post-test. Findings of the study revealed that, science teacher candidates' anxiety level decreased on the other hand there was no statistically significant difference for teacher candidates' about chemistry perception.

Keywords: Chemistry perception questionnaire, laboratory anxiety scale, experiments, science teacher candidates

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Introduction

Laboratory is part of science education and plays a significant role in science education (Hofstein & Lunetta, 1982; Hofstein & Mamlok-Naaman, 2007). Laboratory education includes definition of the nature of science and the features of scientific theory, the use of scientific notation, the development and use of models, the development of experiment systems to test hypothesis, understanding the differences between observation and inference, and presentation of data (Lawson, 1995). Studies suggest that laboratory work is influential in improving these skills, academical achievement, attitudes towards laboratory skills and in reducing laboratory anxiety (Alkan & Erdem, 2013; Can, 2013; Aydogdu, 2012; Erokten, 2010; Freedman, 1997).

Teachers report that laboratory work is necessary in science education. However, there are certain problems inhibiting the full use of labs in science education, including inefficient physical setting, the lack of materials, teachers' insufficient information about lab materials and laboratory usage techniques. Laboratory usage techniques are related to knowing the properties of glass and chemicals used in laboratory, laboratory safety rules, steps to be taken to avoid accidents in laboratory and what to do if any accident occurs during the laboratory work (Boyuk et. al., 2010; Aydogdu, 1999).

Yilmaz (2004) examined the chemicals used in the experiments covered in high school third grade science textbooks in terms of the hazard characteristics and it was found that textbooks contained no information about safety. In addition, it was concluded that although students reported the hazardous nature of the acids and bases commonly used in the experiments, but they could not give the related examples. Aydogdu and Yardimci (2013) suggested what should be done to avoid the potential laboratory accidents and what to do if the laboratory accidents occur. For examples, if mercury is poured, which may cause poisoning, sulphur should be used to prevent its evaporation; knowing that spirit contains alcohol, which is volatile, and that while using a spirit stove these should be taken into consideration and the type of glass used in experiment tubes should be known.

Eddy (1996) carried out a study on the comprehension of chemophobia. In the study it was found that during studying, mixing or transmitting unfamiliar chemicals, students experience anxiety. Mallow (2006) argued that science anxiety can be defined as fear of learning science. It may be originated from negative thoughts about science, lack of analytical thinking at the early levels of education and from teachers or role models. Bowen (1999) first used the term chemistry laboratory anxiety and developed Chemistry Laboratory Anxiety Instrument. The scale has the following sub dimensions; working with chemicals, using equipment and procedures, collecting data, working with other students and having adequate time. These dimensions may refer to the laboratory usage techniques (Bowen, 1999). Students may also have anxiety about other courses (Berber, 2013; Azizoglu & Uzuntiryaki, 2006; Bowen, 1999; Eddy, 1996). For instance, Berber (2013) concluded that during the physics laboratory students experience anxiety while drawing graphics and studying independently. In addition, it was found that students reported to have difficulty in understanding the goal of laboratory work, in converting units and in using laboratory materials.

In order to comprehend a concept about science education it should be well known. Belief and attitude, which is related to individuals' experience and acts and which can be learned, are not the same (Koballa, 1988). Attitude statements refer to one's attitude towards science such as "I like science", "I hate science", and "science is horrible". However, such statements as "science is complex", "science mostly covers mathematics" are about beliefs of individuals (Koballa & Crawley, 1985). Perception is a general concept and includes attitudes, views, beliefs or thought. Wells (2003) developed Chemistry Perception Questionnaire in order to reveal students' perceptions about chemistry. The sub dimensions of the scale are aptitude, chemophobia, discipline, ethnicity and gender (Wells, 2003).

Aim of the present study is to analyze the effect of laboratory activities which depend on laboratory usage techniques on science teacher candidates' laboratory anxiety and chemistry perception. In parallel to this aim the study attempts to answer the following research questions:

1. Is there any effect of laboratory experiments which are convenient with laboratory usage techniques on science teacher candidates' laboratory anxiety?
2. Is there any effect of laboratory experiments which are convenient with laboratory usage techniques on science teacher candidates' perceptions about chemistry?

Method

The participants of the study were a total of 41 science teacher candidates, who registered the course General Chemistry Laboratory-II at Bartın University during the spring semester of the academic year 2013-2014. The data of the study were collected by using Chemistry Laboratory Anxiety Instrument and Chemistry Perception Questionnaire. The study was designed as a pre-post test without control group research. Karasar (2012) argued that in the model of one group pre-post test independent variable is implemented on the group and before and after the implementation it is measured. The independent and dependent variables employed in the study are as follows:

Dependent variable 1: Laboratory anxiety

Dependent variable 2: Chemistry perception

Independent variable: The implementation process of the laboratory experiments carried out taking into consideration the laboratory usage techniques

The laboratory usage techniques refer to the safety of teacher, students, equipment and school during the experiential activities in laboratory, the technical specifications and the use of the laboratory equipment, properties of chemicals and the techniques of the use of them, inefficient reactions of teachers and students in the face of undesirable events in laboratory and approaching problems using a scientific approach (Aydogdu & Candan, 2012; Aydogdu & Şener, 2016).

Data collection tools

Chemistry Laboratory Anxiety Scale

Chemistry Laboratory Anxiety Instrument was developed by Bowen (1999) and adopted into Turkish by Azizoglu and Tiryaki (2006). The scale consists of 20 and 4 subdimensions. The subdimensions are as follows: using laboratory equipment and chemicals (6 items), working with other students (4 items), data collection (6 items) and the effective use of laboratory time (4 items). The Cronbach Alpha internal consistency coefficient for the sub-dimensions ranges between 0.86 and 0.88. In the scale there are fifteen positive and five negative items (Azizoglu & Tiryaki, 2006).

Chemistry Perception Questionnaire

Wells (2003) developed Chemistry Perception Questionnaire, which was adopted into Turkish by Tosun (2013). The scale is consisted of twenty items and five subdimensions. The subdimensions included in the scale are gender (5 items), value (5 items), chemophobia (3 items), the scope of chemistry (4 items) and aptitude (3 items). The Cronbach Alpha internal consistency coefficients for the subdimensions range between .445 and .864. The Cronbach Alpha internal consistency coefficient for the scale as a whole is .745 (Tosun, 2013).

Chemistry Laboratory Anxiety Instrument and Chemistry Perception Questionnaire were used as both pre-test and post-test. Following the implementation science teacher candidates' pretest and posttest scores were compared. Science teacher candidates' anxiety before and after laboratory experiments carried out taking into consideration laboratory usage techniques, perceptions before and after the implementation and the comparison of their anxiety and perceptions were analysed.

Data analysis

The data obtained were analysed using PASW 18 in order to determine whether there is statistically difference between the pre-test and post-test scores, dependent sample t-test was employed. In addition, the scores from the pre-test and post-test were compared.

Findings

Findings related to first sub-problem of research

For Chemistry Laboratory Anxiety Instrument and Chemistry Perception Questionnaire, the answers of science teacher candidates for the positive statements were coded as fully agree (5), partially agree (4), undecided (3), partially disagree (2), disagree (1). For negative statements the answers were recoded as fully agree (1), partially agree (2), undecided (3), partially disagree (4), disagree (5). The results of dependent sample t-test about the pre-test mean scores and post-test mean scores on Chemistry Laboratory Anxiety Instrument are given in Table 1.

Table 1. *t-test results about the pre-test mean scores and post-test mean scores on the anxiety scale*

		N	\bar{X}	sd	df	t	p
Anxiety	Pre test	41	70.4	15.17	40	-2.39	.022
	Post test	41	76.3	14.40			

Table 1 presents that there is statistically significant difference between the mean pre-test scores (\bar{X} =70.4, sd=15.17) and mean post-test scores of the participants on the anxiety scale (\bar{X} =76.3, sd=14.40) ($t(40)=-2.39$, $p<.05$). Table 2 presents the findings about the mean scores in the subdimensions of Chemistry Laboratory Anxiety Scale.

Table 2. *t-test results about the pre-test mean scores and post-test mean scores in the subdimensions of Chemistry Laboratory Anxiety Instrument*

Chemistry Laboratory Anxiety Instrument		Pre test		Post test		Sd	t	p
Sub dimensions	N	\bar{X}	Sd	\bar{X}	Sd			
I Using laboratory equipment and chemicals	41	20.95	6.21	23.80	5.91	40	-2.55	.01
II Studying with other students		14.87	4.55	14.90	3.77		-0.03	.97
III Data collection		20.80	5.66	13.78	4.96		-2.20	.033
IV The effective use of laboratory time		13.78	4.13	14.75	3.65		-2.39	.13

Table 2 shows that the mean scores for three sub-dimensions of the laboratory anxiety scale on the pre-and post-tests are found to be significantly different: using laboratory equipment and chemicals ($t(40)=-2.55$, $p<.05$), anxiety about productively use of lab time ($t(40)=-0.03$, $p<.05$) and data collection ($t(40)=-2.20$, $p<.05$). However, there is no significant difference between the mean scores for studying with other students ($t(40)=-2.39$, $p>.05$). Table 3 shows the percentage of the science teacher candidates scores for pre-test and post-test of Chemistry Laboratory Anxiety Instrument based on each item.

Table 3. *Pre-test and post-test percentage distributions of science teacher candidates for items of Chemistry Laboratory Anxiety Instrument*

Item	Pre test (%)			Post test (%)		
	1-2	3	4-5	1-2	3	4-5
1	39.0	12.2	48.8	29.3	14.6	56.1
2*	14.6	9.8	75.6	7.3	4.9	87.8
3	43.9	19.5	36.6	36.6	22.0	41.5
4	22.0	14.6	63.4	26.8	12.2	61.0

5	24.4	24.4	51.2	34.1	19.5	46.3
6	34.1	19.5	46.4	14.6	9.8	75.6
7	22.0	19.5	58.6	9.8	12.2	78.0
8	22.0	24.4	53.7	12.2	17.1	70.7
9*	14.6	19.5	65.8	19.5	12.2	68.2
10	22.0	29.3	48.8	22.0	19.5	58.5
11*	29.3	14.6	56.1	26.8	0	73.2
12	39.0	14.6	46.3	12.2	9.8	78.0
13	24.4	19.5	56.1	12.2	17.1	70.7
14	17.1	22.0	61.0	24.4	14.6	61.0
15	22.0	26.8	51.2	12.2	19.5	68.3
16	29.3	9.8	61.0	14.6	4.9	80.5
17	31.7	14.6	53.7	22.0	0	78.1
18*	17.1	31.7	51.3	17.1	19.5	63.4
19	26.8	17.1	56.1	14.6	12.2	73.2
20*	22.0	19.5	58.5	4.9	39.0	56.1

* positive statements

According to Table 3, in the pre-test the percentages of answers given as partial or full disagreement for negative items (items representing anxiety; 1., 3., 6., 7., 8., 10., 12., 13., 15., 16., 17. and 19.) is less, but it increases in the post-test. Similarly, in the pre-test the percentage of the answers indicating partial or full agreement to the positive items (items representing non-anxiety; 2., 9., 11. and 18) is less, but it increases in the post-test. The following are examples for the items for which an increase was observed:

1. *statement* "I am anxious when I use chemicals during lab." in the pre-test 48.8% of the participants did not either fully or partially agree with this item. However, in the post-test 56.1% of the participants did not either fully or partially disagree with this item.
2. *statement* "When I work in the chemistry lab, I feel at ease using the equipment." in the pre-test 75.6% of the participants either fully or partially agree with this item. However, in the post-test 87.8% of the participants either fully or partially disagreed with this item.
3. *statement* "When I get ready for lab, I get concerned about recording the data we will generate." in the pre-test 36.6% of the participants either fully or partially disagreed with this item. However, in the post-test 41.5 % of the participants either fully or partially disagreed with this item.
6. *statement* "When I get ready for chemistry lab, I get concerned about the chemicals we will use." in the pre-test 46.4% of the participants either fully or partially disagree with this item. However, in the post-test 75.6 % of the participants either fully or partially disagreed with this item.
7. *statement* "When working in the chemistry lab, I feel nervous carrying out the lab procedures." In the pre-test 58.6% of the participants either fully or partially disagreed with this item. However, in the post-test 78.0 % of the participants either fully or partially disagreed with this item.
8. *statement* "I am anxious when I record data during lab." in the pre-test 53.7% of the participants either fully or partially disagreed with this item. However, in the post-test 70.7% of the participants either fully or partially disagreed with this item.
9. *statement* "I feel comfortable working with other students when I am in lab." in the pre-test 65.8% of the participants either fully or partially agreed with this item. However, in the post-test 68.2% of the participants either fully or partially agreed with this item.
10. *statement* "When working in the lab, I am nervous about the time it will take." In the pre-test 48.8% of the participants either fully or partially disagree with this item. However, in the post-test 58.5% of the participants either fully or partially disagreed with this item.

11. *statement* “I am comfortable being near chemicals when I am in lab.” in the pre-test 56.1% of the participants fully or partially agreed with this item. However, the percentage of such answers increased to 73.2% to this item.

12. *statement* “I am anxious when I carry out a lab procedure.” in the pre-test 46.3% of the participants fully or partially agreed with this item. However, the percentage of such answers increased to 78.0% to this item.

13. *statement* “When working in the chemistry lab, I feel nervous about recording the data I will need.” In the pre-test 56.1% of the participants fully or partially disagreed with this item. However, the percentage of such answers increased to 70.7% to this item.

15. *statement* “When preparing for lab, I am concerned about the time available for doing the experiment.” in the pre-test 51.2% of the participants fully or partially disagreed with this item. However, the percentage of such answers increased to 68.3% to this item.

16. *statement* “When working in the chemistry lab, I feel nervous being around the chemicals.” In the pre-test 61% of the participants fully or partially disagreed with this item. However, the percentage of such answers increased to 80.5% to this item.

17. *statement* “I feel anxious when I use equipment during lab.” in the pre-test 53.7% of the participants fully or partially disagreed with this item. However, the percentage of such answers increased to 78.1% to this item.

18. *statement* “When working in the chemistry lab, I feel at ease recording the necessary data.” in the pre-test 51.3 % of the participants fully or partially agreed with this item. However, the percentage of such answers increased to 63.4% to this item.

19. *statement* “When I get ready for chemistry lab, I get concerned about working with other students” in the pre-test 56.1% of the participants fully or partially agreed with this item. However, the percentage of such answers increased to 73.2% to this item.

Findings related to second sub-problem of research

Table 4 shows the results of t-test concerning the pre-test and post-test scores on the Chemistry Perception Questionnaire.

Table 4. *T-test results of the pre and post-test scores on the Chemistry Perception Questionnaire*

		N	\bar{X}	sd	df	t	p
Perception	Pre test	41	76.59	9.21	40	-1.86	.070
	Post test	41	79.15	8.60			

According to Table 4 the mean of pre-test scores (\bar{X} =76.59, sd=9.21) and the mean of post-test scores (\bar{X} =79.15, sd=8.60) on the chemistry preception scale are not significantly different ($t(40) = -1.86, p > .05$). Table 5 presents the results of t-test about the pre-test and post-test scores regarding the subdimension of the chemistry perception test.

Table 5. *Results of t-test about the pre- and post-test scores regarding the subdimension of the chemistry perception test*

Chemistry Perception		Pre test		Post test		df	t	p
Sub dimensions	N	\bar{X}	sd	\bar{X}	sd			
I Gender	41	22.71	2.94	22.17	2.80	40	1.23	.23
II Value		20.61	2.90	20.29	3.30		.73	.47
III Chemophobia		11.80	2.92	12.51	2.35		-1.68	.09
IV Scope of chemistry		11.07	2.70	12.39	2.99		-2.67	.01
V Aptitude		10.39	2.05	11.17	2.45		-2.36	.02

Tablo 5 presents that there is a statistically significant difference between the mean pre-test scores and the mean post-test scores for the subdimensions of the scale: scope of chemistry ($t(40) = -2.67, p < .05$) and tendency ($t(40) = -2.36, p < .05$). However, there is not statistically significant difference between the mean pre-test scores and the mean post-test scores for the subdimensions of

the scale: gender ($t(40)=1.23$, $p>.05$), value ($t(40)=.73$, $p>.05$) and uneasiness ($t(40)=-1.68$, $p>.05$). Table 6 shows the percentage of the science teacher candidates' mean scores in pre-test and post-test on the Chemistry Perception Questionnaire based on each item.

Table 6. *Percentages of the item scores in pre- and post-tests on the Chemistry Perception Questionnaire*

Item	Pre test (%)			Post test (%)		
	1-2	3	4-5	1-2	3	4-5
1*	19.5	17.1	63.4	9.8	22.0	68.3
2	9.8	14.6	75.6	12.2	9.8	78.0
3	53.7	22.0	24.4	31.7	29.3	39.1
4	7.3	17.1	75.6	9.8	12.2	78.0
5*	2.4	24.4	73.2	4.9	22.0	73.1
6	36.6	34.1	29.3	14.6	24.4	60.9
7	26.8	22.0	51.2	14.6	36.6	48.8
8	2.4	2.4	95.1	4.9	4.9	90.2
9*	4.9	9.8	85.4	7.3	14.6	78.1
10*	7.3	26.8	64.8	9.8	31.7	58.5
11	12.2	24.4	63.4	4.9	12.2	83.0
12	73.2	12.2	14.7	58.5	14.6	26.8
13	4.9	2.4	92.6	0	7.3	92.6
14	2.4	7.3	92.7	0	7.3	92.7
15	41.5	34.1	24.4	34.1	26.8	39.0
16	2.4	7.3	90.2	2.4	12.2	85.4
17*	7.3	41.5	51.2	14.6	34.1	51.2
18	9.8	9.8	80.5	9.8	9.8	80.5
19	2.4	4.9	95.1	0	2.4	97.6
20*	0	22.0	78.0	2.4	22.0	75.6

*positive statements

According to Table 6, in the pre-test the disagreement answers (both fully or partially) for the negative items (items 2., 3., 4., 6., 11., 12., 15. and 19.) in the Chemistry Perception Questionnaire had lower percentages, which increased in the post-test. In regard to the first statement, the answers of “completely agree” and “agree” had lower percentage in the pre test, while it increased in the post test. The following examples reflect such items:

1. *statement* “Chemistry is interesting to me.” in the pre-test 63.4% of the participants fully or partially agreed with this item. However, the percentage of such answers increased to 68.3% to this item.
2. *statement* “I am afraid that I could get injured in chemistry labs.” in the pre-test 75.6% of the participants fully or partially disagreed with this item. However, the percentage of such answers increased to 78.0% to this item.
3. *statement* “Chemistry has too much math.” in the pre-test 24.4% of the participants fully or partially disagreed with this item. However, the percentage of such answers increased to 39.1% to this item.
4. *statement* “Males are better at chemistry than females are.” in the pre-test 75.6% of the participants fully or partially disagreed with this item. However, the percentage of such answers increased to 78.0% to this item.
6. *statement* “I don’t have enough math background to do well in chemistry.” in the pre-test 29.3% of the participants fully or partially disagreed with this item. However, the percentage of such answers increased to 60.9% to this item.
11. *statement* “I am afraid that chemistry might expose me to dangerous chemicals.” in the pre-test 63.4% of the participants fully or partially disagreed with this item. However, the percentage of such answers increased to 83.0% to this item.

12. *statement* "Chemistry has too many concepts or ideas." In the pre-test 14.7% of the participants fully or partially disagreed with this item. However, the percentage of such answers increased to 26.8% to this item.

15. *statement* "Chemistry requires the learning of too many unrelated facts." in the pre-test 24.4% of the participants fully or partially disagreed with this item. However, the percentage of such answers increased to 39.0% to this item.

19. *statement* "Chemistry is more difficult for females." In the pre-test 95.1% of the participants fully or partially disagreed with this item. However, the percentage of such answers increased to 97.6% to this item.

Conclusion and Suggestions

The major findings and the suggestions based on these findings of the study which carried out with the aim of examining the effects of the chemistry laboratory experiments performed taking into consideration the laboratory usage techniques on the perceptions and anxiety of science teacher candidates can be given as follows:

The post-test mean scores of science teacher candidates ($\bar{X}=76.3$) are higher than their mean score in the pre-test ($\bar{X}=70.4$) on the chemistry laboratory anxiety scale. The results of t-test showed that this difference is statistically significant ($t(40)=-2.39$, $p<.05$). Therefore, it is safe to argue that following the implementation the anxiety of the participants about the chemistry laboratory activities reduced. It was also seen that the percentage of the items on the Chemistry Laboratory Anxiety Instrument mostly increased after the implementation. Concerning the subdimensions of the Chemistry Laboratory Anxiety Instrument it was found that the anxiety of the participants decreased in terms of using the laboratory materials, using chemicals, working with other students, and time management. These findings are consistent with the previous findings (Anilan et. al., 2009; Erokten, 2010; Can, 2013). Some of the major findings of the studies dealing with the views of the science teacher candidates about the accidents at the science laboratories are as follows: for them the reasons for the accidents at the science laboratories are not knowing the techniques of laboratory usage and of working with chemicals (Aydogdu, 2015). The findings about the subdimensions of the chemistry laboratory anxiety are consistent with the previous findings.

Science teacher candidates' mean post-test scores ($\bar{X}=76.59$) and their mean pre-test scores ($\bar{X}=79.15$) are similar on the Chemistry Perception Questionnaire. The results of t-test showed that this difference is not statistically significant ($t(40)=-1.86$, $p>.05$). However, the percentage of the items on the Chemistry Perception Questionnaire showed that there was a positive change in the perceptions of the participants about chemistry and chemistry laboratory. Because the post-test scores show that they are less afraid of injury during the experiments and being subject to hazardous chemicals during the course. In the laboratory activities performed taking into consideration the laboratory usage techniques they learn what to use how and where. Such a learning positively affect their perceptions about chemistry. In addition, the scores for the two subdimensions of the Chemistry Perception Questionnaire were found to be statistically significant in t-test: scope of chemistry ($t(40)=-2.67$, $p<.05$) and tendency ($t(40)=-2.36$, $p<.05$). Wells (2003) argued that tendency refers to one's chemical ability or his interest in chemistry. Therefore, this finding suggests that the interest of the participants in chemistry improved.

In short, laboratory experiments performed taking into consideration the laboratory usage techniques work for the goals. Such laboratory experiments reduce the anxiety of teacher candidates about laboratory and positively affect their perceptions. In laboratory work it seems that the information and skills of teacher candidates improve. However, future studies should be expanded to analyse the level of anxiety and perceptions of science teacher candidates to make it easier for them to employ the laboratory use techniques.

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Peer Response as an Effective Writing Strategy

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Abstract

This paper presents the peer response as an effective strategy in the teaching of college writing. In the textual analyses, feedback conference and through the evaluation questionnaire, peer response strategy was assessed as dynamic and successful and that editors and writers worked constantly with each other as a matter of scaffolding wherein writers chose their editors based on perceived scholastic standing, peer relation, and shared fields of interests. It was also found out that the writers were expecting more on the suggested changes for improvement and the identification of common errors for corrections than on the estimated grade given to their works. It is therefore concluded that peer response could be an effective way of managing big writing classes, capitalizing on the editing skills of students. This decentralized writing technique empowers students to manage their own pace, control their own taste of subject matter, and discover their own style.

Keywords: peer response, peer editing, writing strategy

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Introduction

This study was designed to obtain information on the relevance of peer response as an effective strategy in teaching college writing. As writing remains an essential medium of learning not only that it serves as an outlet for student creativity and intellect but also as another instrument in assessing their verbal and mental developments where all other types of learning emanate from. Thus, writing is given high regard in schools, be it in any form of academic and professional papers that are required to students and which are usually given much weight in the grading system.

Peer response can be defined as the ‘use of learners as sources of information and interactants for each other in such a way that learners assume roles and responsibilities normally taken on by trained teacher, tutor, or editor in commenting on and critiquing each other’s draft in the process of writing’ (Liu and Hansen, 2002:1). Considering writing as a recursive process involving sub-processes such as generating ideas, focusing, structuring, drafting, evaluating, and reviewing (White and Arndt, 1996), peer response creates a comfortable and trusting writing environment for students (Liu and Hansen, 2005).

As usually practiced, peer response is reserved for experts, those who excel both in craft and substance. In a writing class in English, that would be the job of the teacher, who reads, edits, and judges the works of his students based on craftsmanship and substance. If there are about fifty students in a class, it would literally mean a great job. Hence, it is neither practical nor necessary that the teacher alone should pass judgment over a written work. To help out the students become better writers, they must develop their own editorial skills, practically because they are the very first readers of their own works.

However, teachers seldom do give their students an opportunity to pass judgment on their classmates’ works. So, students are missing out an essentially important aspect of the writing process, i.e. the social dynamics of writing. Students usually are given instructions to write an article and submit it the next day. Upon submission, instructor reads it, edits it, assigns it a grade, and records it (or returns it to the writer for improvement and resubmission). That is basically the flow of a writing class in most English classrooms in the Philippines. While it is true that the article has been checked and returned by the teacher to the student, it cannot be denied that only the teacher was the sole reader and editor of the text—the sole judge of its craft and substance. It cannot be denied, too, that students would just accept whatever the judgment passed was (and sometimes the teacher does not even provide feedback). Liu and Hansen (2005) believe that ‘when properly implemented, peer response can generate a rich source of information for content and rhetorical issues, enhance intercultural communication, and give students a sense of group cohesion’.

In peer response, merely finding problems in a piece of writing is not enough. A peer reader should offer some solutions to the problems that have been identified. Individual conferences, self-evaluation, and peer evaluation all help English teachers manage the study load, the biggest single obstacle to writing assignments in many writing classrooms (Readence, Bean & Baldwin, 2001). Further, it also believed that the students should be introduced gradually to the writing process and encouraged to improve their writing through prewriting and careful revision. With these also in mind, the researcher implemented this peer response to immerse students through the varying stages of the writing process, with students acting as writers and editors of their works (Salomone and McDonald, 2005).

The researcher (also the instructor in the writing classes) always believes in the thought that writing is a dynamic process; consequently, to add more actions to the process, it (process) has to involve more students and not only the writer and the teacher in the different stages of writing. To solve this impasse, the researcher came up with a more liberating and emancipating writing strategy in

his writing classes: the peer response as a critical strategy for improving students' writing (Bijami, Kashef & Nejad, 2013).

Theoretical Framework

Peer response (or peer review, peer tutoring) has been used since the ancient Greek era (Topping, 2006). Peer response is supported by several theoretical frameworks. Peer response is supported by the collaborative learning theory, which holds that learning has to be socially constructed through interaction with peers (Bruffee, 1984; Eryaman, 2008; Eryaman & Genc, 2010). Support for peer response also comes from Vygotsky's zone proximal development theory (1978), which holds that the cognitive development of individuals results from the guidance (scaffolding) of more experienced peers. Also supportive of the peer response is the socio-constructivist theory (Vygotsky, 1978), which holds that knowledge is socially-constructed as a result of interaction among students, and where the density of learning activities takes place (Gutierrez & Stone, 2000). This interpersonal relationship may be effective when students have more contacts with other students, thereby generating more ideas (Goalty, 2005), developing an inventory shared knowledge (Henderson & Bradley, 2008; Prior, 2006; Gutierrez, 2008), that in the end creates a writing community, in which student-writers tend to work with more advanced peers (Gee, 2005; Lave & Wenger, 1991). Hence, the writing process becomes interwoven with the social, cultural, historical, and linguistic orientations of the student-writers (Bomer & Laman, 2004). These initiatives have been also commonly seen in the classrooms as peer tutoring, cooperative learning and peer collaboration (Christianakis, 2010). Hence, a growing range of researchers has highlighted the use of peer feedback because of its social, cognitive and affective benefits (Hinkel, 2004; Lundstorm & Baker, 2009; Min, 2008; Pol, et al., 2008; and Storch, 2004), which guides student learning (Orsmond, et al., 2013).

Objectives of the Study

With the above premises, this study was set at ascertaining the dynamics of peer response as an effective strategy in teaching college writing. Its purpose was to provide teachers of English with the practical skills and raise awareness on the importance and implementation of this writing strategy in the classroom. Specifically, it is aimed at (1) assessing the dynamism of the peer response for both the writers and the editors; (2) determining the factors considered by the editors in choosing the writers they are to work with, and vice versa; (3) finding out editors and writers' expectations; (4) identifying the most common writing problems committed by the writers as noted by the editors; (5) describing the editor-writer relationship; and (6) highlighting the success and effectiveness of the peer response.

Significance of the Study

This study is expected to humbly provide practical knowledge and skills to English teachers, most importantly the teachers of writing classes, in the employment of a more emancipating writing policy that would liberalize their classrooms from the teacher-centered practice of judging student writings to a student-centered one. The findings of the study will help the students achieve and appreciate the essence of being a writer and an editor as well. Moreover, the findings of the study may provide English classrooms with some strategies and techniques to immerse students into actual practice of the writing process in the context of the backward approach in language teaching and learning.

Methodology

This study can be considered as qualitative and descriptive-interpretative because it describes the evaluation of the participating students on the peer response strategy employed by the researcher.

Participants

The participants of this study were 155 students (all from three freshmen writing classes during the second semester of academic year 2014-2015) of Pangasinan State University in Alaminos City. It turned out in the end of the sessions that 30 students were selected as editors, and there were

125 student-writers. Not only were the participants' evaluation responses taken into account but also the observations of the researcher during the various sessions of the writing activity.

Peer Response Guidelines

The peer response sessions had the following guidelines, to wit:

Activities	Time Frame
1. The instructor tells the students that each of them must choose a peer to be his editor. Then he discusses the peer response and writing session proceedings, including the manners of planning, drafting, editing, and revision.	Week 1 – Wednesday
2. Every week, instructor assigns ten students to write 5-paragraph articles on any topic of interest. Students write the first and second drafts during the weekends.	Week 1 – Friday
3. Students submit their second draft to the editor of their choice for critiquing. This may be done in a form of printed copy submission or online submission (e-copy). Editors read, proofread and edit the second drafts; and write their observations and comments as marginal notes or on a separate sheet.	Week 2 – Monday
4. Editors return the articles to the writers for revision, with comments attached.	Week 2 – Tuesday
5. Writers resubmit the revised articles to their editors for 'mirroring'. If suggestions were followed and noted errors were corrected, editors mark the article as 'revised', and forward it to the instructor.	Week 2 – Wednesday
6. The instructor accepts the article, reads and comments on it. If errors are further noted, he returns it to the writer for further revision. Otherwise, he shall mark it as 'final in form', and shall be given a grade.	Week 2 – Thursday
7. Steps 2-6 are repeated until all student-writers have done their articles.	Week 2 – Friday

Basic Assumptions

The peer response underscored two basic assumptions, namely (1) the writer writes a not less than a 5-paragraph article, says what kind of writing it is, what general purpose it has, accepts the judgments of the editors, and abides by the comments of the editor; and (2) the editor gives the writer editorial comments by the margin, or on a separate sheet, tries to meet the expectations both have agreed on, and provides suggestions to the writer as to how to change his work for the better.

Data Gathering Procedures

During the feedback conference, questionnaires and interviews were used as data gathering instruments to obtain information to (1) assess the dynamism of the peer response for both the writers and the editors; (2) determine the factors considered by the editors in choosing the writers they are to work with, and vice versa; (3) find out editors and writers' expectations; (4) identify the most common writing problems committed by the writers as noted by the editors; (5) describe the editor-writer relationship; and (6) highlight the success and effectiveness of the peer response. Constant observations and monitoring were done as well all throughout the duration of the writing session. Their works were kept on file for further reference; i.e. the student drafts were scanned individually to find out common errors committed and the suggestion sheets or marginal notes were also noted to identify what editors gave their writers. Ratings given by the editors on the draft and revised manuscripts were also taken into account to determine meaningful improvement.

Results and Discussions

As this study ascertained the dynamics of peer response as an effective strategy in teaching writing, the results were summarized and presented in tables, whenever applicable, for greater and easier description, interpretations and reference.

Assessment of the Dynamism of the Peer Response

The editors and writers were asked as to the dynamism of the writing experience they had during the peer response sessions. As shown in Table 1, the activity was rated as **dynamic** by both the editors (86.7%) and the writers (94.4%), respectively.

This dynamism may be founded on the assumption of peer response in which the writer comes to the editor for relationship, having in mind the intention to establish a dynamic and interactive exercise. Hence, the purpose of this exercise is to arrive at agreements on the basis for a writer and editor 'connection'.

Table 1. *Dynamism of the Peer Response, by Editors and Writers*

Assessment Results	Writers		Editors	
	F	%	f	%
<i>Dynamic</i>	118	94.4	26	86.7
<i>Not dynamic</i>	4	3.2	4	13.3
<i>Does not matter</i>	3	2.4	0	0
Total	125	100	30	100

This concept of discourse highlights the need for interactions and exchange of not just views, emotions, values, and beliefs, but that of techniques and styles as well, that oftentimes are provided by a "dedicated" reader of the text made, which of course in this case, is the editor. Draayer (1990) supported this with his advice to students,

"It is neither possible nor desirable for the teacher to be your only editor. In order to grow as a writer, you must develop your own editorial skills. Editing raises specific obstacles you have to overcome. Some of these have to do with understanding the art and craft of writing, but others have a more personal basis. As a student, you should experience both the technical and interpersonal sides of editing, where your social skills and responsive abilities as writers and editors come together."

With this, peer response has been essentially utilized to better improve learning by allowing students construct their own knowledge through social interface (Liu, et al., 2001). It is claimed that students learn while reading the works of their peers (Zhao, 2014). Essentially, peer response is conducted to improve the writing skills of students (Corbin, 2012), to increase motivation to write collaboratively (Farrah, 2012).

Factors on Choosing Writers and Editors

When the editors were asked on how they chose the work to edit, and writers were asked on how they chose their editors, varied answers came out; hence, the researcher clustered these responses into four common factors as shown in Table 2.

How the editors considered their choice of writers were **by class standing** (rank 1, 39.2%), **by shared field of interest** (rank 2, 36.0%), **by peer relation** (rank 3, 24.0%), and **by certain personal standards** (rank 4, 0.8%), respectively. As for the writers, they chose their editors **by peer relation** and **by shared field of interest**, (tied at rank 1, 36.67%), **by certain personal standards** (rank 2, 16.67%), and **by class standing** (rank 3, 10.0%), respectively.

Table 2. *Factors on Choosing Writers and Editors*

<i>Factors Considered</i>	<i>Writers chose their editors</i>		<i>Editors chose their writers</i>	
	<i>f</i>	<i>%</i>	<i>f</i>	<i>%</i>
<i>By peer relation</i>	30	24.0	11	36.67
<i>By class standing</i>	49	39.2	3	10.00
<i>By shared field of interest</i>	45	36.0	11	36.67
<i>By certain personal standards</i>	1	0.8	5	16.67
Total	125	100	30	100

This implies that the editors and the writers have exercised certain degrees of standards in choosing their editors, and in accepting their writers. Furthermore, as Aquino, et al (2000) underscored the importance of proofreading and editing by positing that it is integral to have someone, who is a better reader, to edit the work. Presumably, that better reader (editor) is someone who is academically better than the writers yet he may whom he shares common interests with. These choices have reflected their preferences with respect to the academic standing (in choosing editors) and shared fields of interest and peer relation (in choosing writers). Friendship bias (as found in Cheng & Warren, 2005; Harris & Brown, 2013; Azarnoosh, 2013) and non-proficient editors (as found in Hu, 2005; Rollinson, 2005; Tsui & Ng, 2000) were not problems.

Further, since writers choose their editors (or vice versa) by shared fields of interests and peer relations, the more they are comfortable when giving feedback and the better they understand one another (Zhao, 2014). Rollinson (2005) further noted that writers need an audience that understands them so as to remove difficulty and immediate response is given.

Expectations of Writers and from Editors

The researcher used what Draayer (1990) spelled out on what writers might want from editors and/or what editors may be giving their writers; these are (a) questions about the work, (b) suggested changes, (c) list of strengths, (d) list of weaknesses, (e) list of things the editor observes or notices, (f) an estimate of the mark writers would like to receive, (g) corrections, (h) ideas to expand in the writing, (i) discussion of content, and (j) praise. The editors were asked to identify three things that they give their writers after editing their works. The writers were also asked to identify three things they expect to receive from their editors. Their responses were recorded in Table 3.

Table 3. *Expectations of Writers and from Editors*

<i>Expectations</i>	<i>What writers want from editors</i>		<i>What editors give their writers</i>	
	<i>F</i>	<i>Rank</i>	<i>f</i>	<i>Rank</i>
<i>Praise</i>	7	8.5	4	6.5
<i>Corrections</i>	76	2	11	3
<i>Discussions of content</i>	30	5	10	4
<i>Strengths</i>	18	6	4	6.5
<i>Weaknesses</i>	13	7	4	6.5
<i>Ideas to expand</i>	72	3	17	2
<i>Things he notices</i>	49	4	3	9
<i>Estimate of grade</i>	7	8.5	4	6.5
<i>Suggested changes</i>	98	1	23	1

The editors and writers had clear expectations on what to give and what to receive. These are the *suggested changes* (rank 1), *ideas to expand and corrections* (tied at rank 2) and *discussion of content* (rank 3). The editors and writers have positively been looking forward to complimenting each other, committing themselves to common expectations and interests, and responding to writing needs that both care about; thus establishes relationship between editors and writers (Howard, 2010). Writing well is not the solitary job of the writer, as an engineer works hand in hand with his architect to see to it that the masonry satisfies the intended design. Therefore, it would be a better practice if

student-editors take the editorial enterprise very seriously, and student-writers insist that they submit their writings for editing. Both should fully understand their mutual responsibilities. Their consistent responses exemplify their mutual responsibilities over the work at hand.

Surprisingly, both the editors and writers were not up to grades but for the development of ideas. They were more interested at improving the work and the various ways of doing it. This finding further implies that writing is not considered by the writers and editors as a product but a process, a work in progress.

Similarly, according to Min (2005), students claimed to have gained more awareness on their own writing because of the suggestions given by their editors. Students also claimed that their peers had good suggestions for improving their writings (Hu, 2005). In addition, students may develop a 'sense of ownership of text' as they are not obligated to use all the comments and suggestions they received (Tsui & Ng, 2000: 162).

Most Common Writing Problems

Asked what writing errors they encountered in most of the writings they had edited, the editors' responses are shown in Table 4.

The most common writing problems identified were along *vocabulary use* (rank 1), *placement of sentences* (rank 2) and *defining purposes and surface errors* (tied at rank 3), respectively. Writers had problems in using appropriate vocabulary particularly in keeping the tone and mood of their writings. They also had problems in sentence placements, whether clefted or fronted, active or passive, dangling or run on, among others. Furthermore, the purpose of their writings was hard to tell by reading the introductory paragraph. A number of the writings were also riddled with surface errors such as spelling, punctuation, syllabication, among others. Mawlawi Diab (2010) also showed that the students committed errors on subject/verb agreement, pronoun agreement, wrong choice of words, and sentence structures.

Table 4. *Most Common Writing Problems Identified by Editors*

<i>Writing Problems</i>	<i>F</i>	<i>Rank</i>
<i>Defining purpose</i>	10	3.5
<i>Irrelevant materials</i>	4	7
<i>Placement of sentences</i>	13	2
<i>Sentence variety</i>	7	5
<i>Voice and style</i>	2	8
<i>Vocabulary use</i>	15	1
<i>Order</i>	6	6
<i>Surface errors</i>	10	3.5

Moreover, the intention of this exercise is not only to consider the writing as good or bad, but to pursue an approach that leads to "making observations." An observation, according to Draayer (1990), is simply a record of something you noticed, however insignificant it seems. Observations are the foundations of any adequate judgment. Good observations lead writers to attend to something they might otherwise have overlooked. Good observations will also lead editors to make useful suggestions the writer can build on, suggestions that stop short of passing judgment.

Hence, editors are expected to observe (1) what the writer is saying, (2) the content of the writing, and (3) about how they are saying it (or the method). The best moment of peer response comes when writer and editor see a way to enhance the purpose of the writing. At that moment, a light turns on in the writer's head, illuminating the way to a clear and final product, explained Draayer (1990).

Editor-Writer Relationship

When asked how they can describe the editor-writer relationships, the 87% of the editors confirmed that they *constantly* worked with their writers. On the part of the writers, 89% of them said that they *constantly* worked with their editors. These constant relationships included exchanging notes on some suggested changes, mirroring activities to test that what had been suggested by the editors were carefully noted and incorporated in the paper, and revising and proofreading activities.

In the light of these editor-writer relationships, Readence, Bean & Baldwin (2001) suggested that peer evaluation can play an important role in the revision process. If students have tried to evaluate their own writing objectively, they would know how hard this process can be. They would know what they want to say, even if the actual version they produced on study is incoherent. A peer reader will quickly find these problems.

Students can become skilled in evaluating each other's writings when they have some practice and clear guidelines on the process. Students should begin editing a peer's work by first complimenting their partner on some aspects of the writing. It is also suggested that students phrase any negative comments as questions. This approach avoids engendering any defensive feelings as a peer helps in the revision process. Hence, the practice of peer response is important because it allows the practice of giving and receiving individual comments (Lundstorm & Baker, 2009).

However, it was found out that 43% of the editors experienced anxiety in editing someone else's writings, and 45% of the writers felt threatened that their writings were critiqued and evaluated by their peers. The anxiety felt by both the editors and writers may have stemmed up from the thought of having another person read and/or edit their writings, though they both knew the benefits of the peer evaluation. When asked if their works improved, 97% of the writers responded in affirmation.

Success and Effectiveness of the Peer Response

Upon the end of the peer response sessions, it was evaluated to be *successful* by the editors (96.7%) and *successful* by the writers (96.8%), respectively, based on Table 5. No one considered it a failure, and only 3% evaluated the peer response as very successful.

Table 5. *Success and Effectiveness of the Peer Response*

<i>Level of Success and Effectiveness</i>	<i>On the part of the editors</i>		<i>On the part of the writers</i>	
	<i>F</i>	<i>%</i>	<i>f</i>	<i>%</i>
<i>Very successful</i>	1	3.3	4	3.2
<i>Successful</i>	29	96.7	121	96.8
<i>Failure</i>	0	0.0	0	0.0

Generally, the peer response was a success in its strictest sense. The participants considered it an effective strategy in writing classes. It is through this strategy that participants were able to look at their own writing styles and that of their classmates not at the point of comparing who's a better writer and who's the lousier one; but, comparison on what could have made their works better after submitting it for peer response or peer editing. It may not produce a perfect writer but peer response could undoubtedly produce a diligent writer who listens to his editor and/or reader for comments and suggestions; hence, the start of a healthier peer relationship in an English classroom. As Suzuki (2009) posited, peer revision may have improved both the self-confidence and decision-making of student writers throughout the whole process. Maarof, et al. (2011) also added that since students become aware on how their peers write, how writing takes place, and how revision is carried out, they become more autonomous writers. Also, Bijami, Kashef and Nejad (2013) affirmed that peer response provides a flexible opportunity to help students write critically and with autonomy, and authority.

Conclusions

Writing has never been a one man's job, for at all times, the writer is the first reader and editor of his own work. Student peer response is an effective way of training students to become good

editors and readers, by providing them with good scaffolding environments. The dynamism of good peer response in writing depends on the perceived connection between the editors and writers, and their shared expectations. This editorial partnership is successful and effective only when the editors and writers focus their attention on the things they notice on the writing rather than on what they think it should contain, neither the grades nor marks, but on the suggested changes for improvement. The peer response would be an effective way of managing big writing classes, capitalizing on the editing skills of students. This decentralized writing technique empowers students to manage their own pace, control their own taste of subject matter, and appraise their own style.

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12-14 Aged Turkish Students' Levels of Using Media Tools (Bad Säckingen Town Sample, Germany)ⁱ

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Abstract

The aim of this study was to determine the levels of Turkish students attending Hauptschule, Realschule and Gymnasium in Bad Säckingen in the state of Baden Württemberg, Germany, in terms of using media tools. Of the qualitative data collecting tools, an interview method was applied in the research. In the context of this research, interviews were carried out with 13 students attending Hauptschule, 14 students at Realschule, and 8 students at Gymnasium, using semi-structured interview forms prepared by the researchers. The questions were prepared considering the media tools the students were using widely at the end of an observation lasting a whole year. The data acquired at the end of the student interviews was analysed using a content analysis method. The results showed a similarity in terms of the preferred media tools and the time the students spent on these media tools. It was concluded that there was a close similarity in the period students spent daily on television, on the internet, and on their mobile phones; the students attending Hauptschule and Realschule mostly preferred Turkish channels and programs, while the Gymnasium students did not in general make any distinction between the Turkish and German channels; what the students mostly preferred were TV series and game programs; students attending these three schools did not read newspapers and journals much, but sometimes books; the period spent on reading books was slightly higher in the Gymnasium students; and the students at all these three schools used the internet mostly for similar interests (such as for accessing social networks, watching and downloading videos/films, playing games, and obtaining information).

Keywords: Media, Turkish Students, Gymnasium, Hauptschule, Realschule

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Introduction

It is well-known that in many countries children and youngsters alike use many different media tools effectively. The studies in both foreign countries and our country (Media Awareness Network, 2005; SETA, 2012; Jim-Studie 2013; Kim-Studie, 2014; TÜİK, 2013) have revealed that online activities are very common among young people, and that they are interested in all types of media tools. These studies emerged mainly in the form of the internet, the application of e-mail-depending on the use of the internet, Mp3/Mp4, the computer, and mobile phones used by the students.

There are positive and negative aspects of using these tools. The negative aspects of the media are seen in the form of the spreading of violent behaviour, exposure to sexual content secretly or openly, the promotion of the imaginary body image, the presentation of habits which damage health through attracting interest in activities and exposure to persuasive advertising content which targets children. According to Gidle (2004), the media offer two opposing effects on children and adolescents: Opportunities and Risks. Not only does the globalized media allow for the development perspectives of the children, the sharing of new talents among children, accessing information on an egalitarian basis, and causing cultural identification, but also leads to the loss of values and the corruption of childhood (Eryaman, 2006, 2007).

The researchers have shown that industrially developed countries use very different media tools, and access these tools very easily compared to industrially undeveloped countries. In Germany, which is the one of the most developed countries in the world, there is at least one television in most homes where young people live (97 % in 2010), DVD or video recorder (89 %) (Kaiser Family Foundation 2010, 9). Generally, in Germany, the time spent on media tools was on average, 583 minutes in 2010. In this ratio, the time spared for television was 220 minutes, listening to the radio 187 minutes, and connecting to the internet 83 minutes (Kaiser Family Foundation 2010, 11). These ratios revealed that media applications are used efficiently in Germany.

In Germany, in addition to the media tools which are used in homes, there are also many kinds of media tools used in schools. Germany has a school/education system which is suited for its social structure. The system operates on the basis of an elective school type for children under 10 in accordance with the classes/layer in the society, and to create a pyramid-shaped school system to train the workforce, which is predicted by the economy. Perceptibly, after 4 years in first grade, the children are sent to the 9 year primary school, 10 year secondary school and 13 (12) year high school according to their marks and the advice of the teacher/school, and it is compulsory for them to study at these schools (Ercan, 2008). In brief, one of these schools is Gymnasium, which educates the most talented students and prepares them for college; the other school is Realschule, which is similar to educational institutions for middle level students; and the last one is Hauptschule, which prepares them for vocational training (wikipedia.org.). Approximately 400 thousand Turkish students continue their primary and secondary education in German public schools. 41.7 % of all Turkish students who attend elementary and secondary schools continue on to Hauptschule, and 5.7 % continue on to Gymnasium. A study conducted in Germany in 2010 revealed that the majority of students, who attended Hauptschule, Realschule, and Gymnasium, connect to the internet, use a mobile phone, watch TV, listen to the radio and music, and play video games (Jim-Studie, 2013). There are no more studies about media usage habits concerning Turkish students who attend German public schools. All in all, the aim of this study was to determine the levels of Turkish students attending Hauptschule, Realschule and Gymnasium in Bad Säckingen in the state of Baden Württemberg, Germany, in terms of using media tools.

The Purpose of This Study

The aim of this study was to determine the levels of Turkish students attending Hauptschule, Realschule, and Gymnasium in Bad Säckingen, in the state of Baden Württemberg, Germany, in

terms of the following media tools. For this aim, it was sought to find the answers to the following questions:

1. Is there any difference between Turkish students attending Hauptschule, Realschule and Gymnasium in terms of watching television time?
2. Is there any difference between Turkish students attending Hauptschule, Realschule and Gymnasium in terms of which country (Turkey, Germany) channels are watched most?
3. Is there any difference between Turkish students attending Hauptschule, Realschule and Gymnasium in terms of watched German channel types?
4. Is there any difference between Turkish students attending Hauptschule, Realschule and Gymnasium in terms of the type of Turkish channels watched Turkish?
5. Is there any difference between Turkish students attending Hauptschule, Realschule and Gymnasium in terms of the programs watched on Turkish channels?
6. Is there any difference between Turkish students attending Hauptschule, Realschule and Gymnasium in terms of time listening to the radio?
7. Is there any difference between Turkish students attending Hauptschule, Realschule and Gymnasium in terms of the time spent reading newspapers?
8. Is there any difference between Turkish students attending Hauptschule, Realschule and Gymnasium in terms of the time spent reading magazines?
9. Is there any difference between Turkish students attending Hauptschule, Realschule and Gymnasium in terms of the time spent reading books?
10. Is there any difference between Turkish students attending Hauptschule, Realschule and Gymnasium in terms of time spent using the internet?
11. Is there any difference between Turkish students attending Hauptschule, Realschule and Gymnasium in terms of reasons for using the internet?
12. Is there any difference between Turkish students attending Hauptschule, Realschule and Gymnasium in terms of time spent using a mobile phone?

Method

The Model of the Study

This is a qualitative study with a case study design. Yıldırım and Şimşek (2011) describe the qualitative research as "used in qualitative data collection methods like observation, interviews and document analysis, which follows a qualitative research process for determination of perception and events in the natural environment in a realistic and holistic form".

This study has been of benefit for the case study, which is one of the designs of qualitative research. Case studies are done in order to describe, explain, and evaluate different social phenomena. Therefore, this study has attempted to evaluate the levels of Turkish students attending Hauptschule, Realschule, and Gymnasium in Bad Säckingen in the state of Baden Württemberg, Germany, in terms of using media tools.

Study Group

In this research, the study group was composed of 13 students attending Hauptschule, 14 students at Realschule and 8 students at Gymnasium in Bad Säckingen in the state of Baden Württemberg, Germany, in the 2014-2015 educational period. In the selection for the study group, a maximum variation sampling method was used, which is a type of purposive sampling method. The main objective in the maximum variation sampling method is to create a relatively small sample, and to reflect on the diversity of the individuals involved in the studied problem at a maximum level (Yıldırım and Şimşek, 2011).

Table 1. *The Schools and the Number of the Turkish Students*

Schools	The Number of Students
Bad Säckingen Scheffel Gymnasium	8
Werner Kirchhofer Realschule	8
Laufenburg Hans Thoma Schule	6
Bad Säckingen Hans Thoma Schule	3
Murgtalschule	10
Total	35

Data Collection Tool

In this study, a semi-structured interview form was used as a collecting data tool, which is a type of interview method. In semi-structured interviewing, a guide is used, with questions and topics that must be covered. The interviewer has some discretion about the order in which the questions are asked, but the questions are standardized, and probes may be provided to ensure that the researcher covers the correct material. This kind of interview collects detailed information in a style that is somewhat conversational. Semi-structured interviews are often used when the researcher wants to delve deeply into a topic and to understand thoroughly from the answers provided. (Harrell and Bradley, 2009). Prior to the researcher preparing the data collection tool, the students were observed in their schools through participation observation. Within the scope of the research, the interviews were conducted with 35 students. The interview questions were prepared as a result of a one-year observation, taking into account the widely used media tools used by the students.

Data Analysis and Interpretation

The data obtained from the students' interviews was analysed using the content analysis method. The aim of the content analysis was to obtain the concept and relationship which explained the collected data (Yıldırım & Şimşek, 2011). In this context, it attempts to define the data and uncover the truth that may be stored in the data through the content analysis. When we examine the following, we see what was done in the sections of the content analysis:

Decoding of the data: As a result of the interviews with students, the acquired codes and themes were given in attachment-1. In the interview with the students, 49 codes were obtained from the data when the sub-problems were considered. Each code was given under the related theme title.

Findings the themes: From the obtained codes, the themes were obtained, which explained the data in overall level and code collecting in certain categories. In the interview with the students, 7 themes from the data were obtained when the sub-problems were considered.

Organizing Code and Themes: In the interview with the students, the 49 codes obtained were divided into 7 themes.

Interpretation of Results: In this last stage, an attempt was made to elicit extensive comments to give meaning the data, which was collected to explain the relationship between the findings, to specify the cause and effect relationship, to make some deductions from the findings, and to illustrate the significance of the obtained results.

Results

In this part of the study, the findings were obtained in accordance with the answers of the participants, which were analysed and interpreted.

1. Results Related to the First Sub-Problem

Table 2. TV Watched Rates per Day

Schools	The Codes Related to TV Watched Rates			
	Never	1 Hour	2-3 Hour	+4 Hour
Hauptschule	-	1	10	2
Realschule	-	2	7	5
Gymnasium	-	3	4	1
Total	-	6	21	8

When Table 2 is examined, it is seen that the students watch TV generally and the watched rates are higher for the students attending Hauptschule and Realschule

2. The Results Related To the Second Sub-Problem

Table 3. Which Countries' (Turkey, Germany) TV Channels are watched generally

Schools	The Codes Related to Countries' TV Channels		
	Turkish Channels	German Channels	Both Countries Equally
Hauptschule	6	5	2
Realschule	5	4	5
Gymnasium	2	2	4
Total	13	11	11

When Table 3 is examined, it can be seen that students at all schools did not make a distinction between the channels and the watched channels of both countries at equal rates.

3. The Results Related To the Third Sub-Problem

Table 4. The most watched German Channels

Schools	The Codes Related to German Channels				
	RTL	Disney Channel	Nicledion	Super RTL	Pro 7
Hauptschule	8	5	8	4	6
Realschule	9	4	10	4	7
Gymnasium	3	3	3	2	4
Total	20	12	21	10	17

When Table 4 is examined, it can be seen that the most watched German channels were RTL, Pro 7 and Nicledion by the Hauptschule and Realschule students; and Gymnasium students watched Pro 7 in general.

4. The Results Related To the Fourth Sub-Problem

Table 5. The most watched German Channels

Schools	The Codes Related to Turkish Channels						
	TRT	ATV	E.STAR	SHOW	TV8	Kanal 7	Euro D
Hauptschule	1	7	9	5	7	1	8
Realschule	5	9	9	5	4	-	11
Gymnasium	3	-	5	3	3	-	7
Total	9	16	23	13	14	1	26

When Table 5 is examined, it can be seen that the most watched Turkish channels are EURO D, EURO STAR, and ATV by the Hauptschule and Realschule students; and the Gymnasium students generally watch EURO D, EURO STAR.

5. The Results Related To the Fifth Sub-Problem

Table 6. *The Most Watched Programs on Turkey Channels.*

Schools	The Codes Related to the TV Programs				
	TV Series	News	Game Show	Religious Prog	Magazine
Hauptschule	12	-	5	-	-
Realschule	13	-	8	-	1
Gymnasium	8	1	1	1	1
Total	37	1	14	1	2

When Table 6 is examined, it can be seen that almost all the students who attended the three schools mainly watched the TV series and Game Shows on the Turkey channel. All the students stated that they especially watched TV series such as Arka Sokaklar, Güzel Köylü, Küçük Ağa, Küçük Gelin, Güllerin Savaşı, MedCezir, Kara Para Aşk, Paramparça, Kertenkele, Poyraz Karayel, Beni Affet, Kara Dayı, Kiraz Mevsimi, Maral, Kurtlar Vadisi Pusu, Kara Ekmek, Zengin Kız Fakir Oğlan, and Game Shows such as Survivor and Ben Bilmem Eşim Bilir on Turkish channels.

6. The Results Related To the Sixth Sub-Problem

Table 7. *The Radio Listening Time*

Schools	The Codes Related to the Radio Listening Times		
	I never listen	I sometimes listen	I usually listen
Hauptschule	8	4	1
Realschule	10	3	1
Gymnasium	5	3	-
Total	23	10	2

When Table 7 is examined, it can be seen that most school students do not listen to the radio, but a minority do.

7. The Results Related to the Seventh Sub-Problem

Table 8. *The Newspaper Reading Rate*

Schools	The Codes Related to Newspaper Reading Rates		
	I never read	I read everyday	I read sometimes
Hauptschule	10	-	3
Realschule	12	-	2
Gymnasium	3	2	3
Total	25	2	8

When Table 8 is examined it can be seen that most students do not read newspapers in general, but just a few do sometimes.

8. The Results Related to the Eighth Sub-Problem

Table 9. *The Journal Reading Rates*

Schools	The Codes Related to the Journal Reading Rate		
	I never read	I read weekly	I read sometimes
Hauptschule	10	-	3
Realschule	10	-	4
Gymnasium	5	1	2
Total	25	1	9

When Table 9 is examined, it can be seen that most students do not read journal in general, with some exceptions.

9. The Results Related to the Ninth Sub-Problem

Table 10. *The Reading Books Rates*

Schools	The Codes Related to the Reading Books Rate		
	I never read	I read every day	I read sometimes
Hauptschule	3	-	10
Realschule	2	-	12
Gymnasium	-	3	5
Total	5	3	27

When Table 10 is examined, it can be seen that most of the school students do not read books in general, and only three students from the Gymnasium read every day.

10. The Results Related to the Tenth Sub-Problem

Table 11. *Daily Internet Using Time Rate*

Schools	The Codes Related to the Internet Usage Time			
	1 Hour	2-3 Hours	3-4 Hours	+4 Hours
Hauptschule	-	5	1	7
Realschule	1	3	2	8
Gymnasium	-	2	1	3
Total	1	10	4	18

When Table 11 is examined, it can be seen that all school students use the internet and the using rate is a bit higher among the Hauptschule and Realschule students.

11. The Results Related To the Eleventh Sub-Problem

Table 12. *The Rates Related to Reasons for Using the Internet*

Schools	The Codes Related to the Using the Purpose of the Internet				
	Games	Access information	Watching Videos/Films	Listening to Music	Social Networking Site
Hauptschule	4	4	9	2	12
Realschule	6	5	8	1	13
Gymnasium	3	3	2	3	6
Total	13	12	19	6	31

When Table 12 is examined, it can be seen that all the school students use the internet to connect to social networking sites and this purpose is followed respectively by watching videos/films, playing games and accessing information.

12. The Results Related to the Twelfth Sub-Problem

Table 13. Daily Mobile Phone Using Time Rate

Schools	The Codes Related to the Using Mobile Phone			
	1 Hour	2-3 Hours	3-4 Hours	+4 Hours
Hauptschule	1	3	1	8
Realschule	2	3	2	7
Gymnasium	1	4	1	2
Total	4	10	4	17

When Table 13 is examined, it can be seen that all the school students use a mobile phone, the usage rate is much higher in the Hauptschule students, and this school is followed respectively by Realschule and Gymnasium.

Results and Discussion

It was determined that in the first sub-problem's results that all school students watch TV, in terms of the watching rate, the Hauptschule students spend more on television, and those who attended the Realschule and Gymnasium follow respectively. A study which was conducted in 2013 in Germany also supports this conclusion. A study which was carried out regarding the total 1200 students aged between 12-19 who attend Hauptschule (N: 120), Realschule (N: 420) and Gymnasium schools (N: 660) showed that in terms of watching TV rate Hauptstchule comes first and this school is respectively followed by Realschule and Gymnasium (JIM-Studie, 2013). A study conducted by KIM-Studie reached a similar conclusion. It was determined that in the second sub-problem's results that in terms of watching German and Turkish channels, the students who attended Hauptschule and Realschule watch Turkish channels in general, and Gymnasium students watch both countries' channels equally. The reason behind this may be related to the fact that Realschule and Hauptschule students do not understand enough High German (Hoch Deutsch), which is spoken on German channels, so they watch the Turkish channels. It was determined that in the third sub-problem results that the most watched German channels were Nicledion, RTL and Pro 7 by all the three school students. According to the study which was conducted by KIM-Studie (2014), the girls who attended Hauptschule, Realschule and Gymnasium schools watched Kika, RTL and the Disney Channel in particular, and the boys watched Pro7, NICK and Super RTL. In another study, which was conducted on children aged 12-19 in 2013, it was shown that the most watched German TV channels were ProSieben (38 % of the girls and 59 % of the boys) and then RTL (20% of the boys and 4% of the girls), RTL2 (11% of the boys and 4% of the girls), RTL Nitro (3% of the boys and 5% of the boys), Sat.1 (5% of the boys and 1% of the girls), Viva (2% of the boys and 3% of the girls), Vox (5% of the boys and 0% of the girls), DMAX (0% of the boys and 7% of the girls), Nick (2% of the boys and 2% of the girls), Das Erste/ARD (1% of the boys and % 3 of the girls), Super RTL (0% of the boys and 1% of the girls) and ZDF (2% of the boys and 2% of the girls). It is determined in the fourth sub-problem results that all three schools' students mainly watched the Turkish channels Euro D, Euro Star, TV8, Show TV, ATV, TRT, and Kanal 7 respectively. Since Euro Star and Euro D have broadcast many youth series (Med Cezir, Karagül, KirazMevsimi, Acil Aşk Aranıyor, Maral, AslaVazgeçmem, GüllerinSavaşı vb.) these channels are watched by youngsters most. A survey, "Television Watching Tendency of the Turkish People who Live in Germany", which was done by RTÜK (2007) and over 15 years, and with 1005 people surveyed, revealed that Turkish people mainly watched three channels Kanal D (22.5%), ATV (18.6%) and Show TV (16.6%).

As a determining factor of the top-rated channel "better series (53%)" was the most frequently expressed reason, the other reasons which were mentioned were "better information (36.8%), and the multiplicity of the education and information programs (23.5%)". It was determined in the fifth sub-problem results that all three schools' (Hauptschule, Realschule ve Gymnasiums) students mainly watched series and games show which were broadcast from Turkish channels. The study which was done by RTÜK (2007) showed that the third generation in Germany mainly watched domestic TV series on Turkish channels. It was determined in the sixth sub-problem results that most students did not listen to the radio; with some exceptions. In contrast to this data, according to some research which was conducted by KIM-Studie (2013) related to the 1200 students who attended Hauptschule, Realschule and Gymnasium revealed that 56% of the Hauptschule, 57% of the Gymnasium, and 53% of the Realschule school students listen to music on the radio. It was determined in the seventh sub-problem results that the situation in terms of reading newspapers, the Hauptschule and Realschule students did not read newspapers, but the Gymnasium students read them occasionally. A study which was conducted by KIM-Studie (2014) reached a similar conclusion. 689 students from Hauptschule, 72 students from Realschule, 169 students from Gymnasium, and 110 students from other schools participated in the research. After the research results were determined, it was concluded that 3% of the Hauptschule, 3% of the Realschule and 4% of the Gymnasium students read newspapers. It was determined that in the eighth sub-problem results that all three schools (Hauptschule, Realschule ve Gymnasium) students do not read journals. In contrast to these research results, according to some research called KidsVa, which was done in the publication, "Egmont Epaha", in 2015, 90% of the German children between 4-13 took books or journals at least once a week. It was determined in the ninth sub-problem results that the situation in terms of reading books every day is that the majority of Hauptschule and Realschule students read books occasionally, and a minority of the Gymnasium students read a book every day. A study which was conducted by JIM-Studies (2014) reached a similar conclusion. It was revealed that 49% of the children aged 12-13 read a book daily, 15% once a week and 24% once a month and 12% never read books. This study also revealed that 20% of students from the Hauptschule read daily, 10% once a week, 21% once a month and 44% never read; 34% of students from the Realschule read daily, 13% once a week, 33% once a month, and 20% never read; 46% of students from the Gymnasium read daily, 15% once a week, 27% once a month, and 11% never read. It was determined in the tenth sub-problem results that the majority of the Realschule, Hauptschule, and half of the Gymnasium students used the internet 4 hours and above, the other half of the Gymnasium students used it between 2-4 hours. In Germany, according to a study which was conducted by JIM-Studie (2013), it was revealed that 73% of children aged between 12-19 use the internet daily, and the same study also showed that 88% of the Hauptschule students, 87% of the Realschule students, and 91% of the Gymnasium students used the internet. It was determined in the eleventh sub-problem results that all the students usually used the internet to connect to social networking sites. And as well as this reason, the students often use the internet respectively for watching or downloading videos/films, accessing information, playing games, and listening to music. A study which was conducted by KIM Studie 2014, revealed that 88% of the students aged 6-13 accessed the internet in their rooms. These children used the internet for the following: 55% homework, 46% playing games, 40% accessing information about famous persons, 34% obtaining news or announcements, and 34% to shop. According to a study which was conducted by 16. Shell Jugendstudie (2010), there were different internet usage between the German youth (25% playing games, 24% networking, 17% functional users, 34% multi-users (Albert ve Diğerleri, 2011). This study also mentioned that there was a very strong link between the types of internet user, based on age, gender and social status. The study (N= 4400) conducted by Kleimann et al (2008) reached different results. Children in particular preferred to use the internet to access information, to communicate, and for consumption and entertainment. 23% of these children used the internet between 4-6 hours almost every day. Further, it was also expressed that the internet was used in particular for sharing sites and conducting information exchange regarding academic issues. It was determined in the twelfth sub-problem results that all the students spared approximately 2-3 hours for mobile phone usage daily. The rate of spare 4 hour and above is seen mostly among Hauptschule and Realschule students. A study which was done by JIM Studies 2013 revealed that 81% of the 12-19 aged students spent time on their mobile phones. The same study showed that 78% of the Hauptschule students, 83% Realschule students, and 81% Gymnasium students used a mobile phone

Conclusion

The results show a similarity both in terms of the preferred media tools and the time the students spent using these tools. It was concluded that there was a close similarity in the periods the students spent daily on television, the internet, and mobile phones; the students attending Hauptschule and Realschule mostly preferred Turkish channels and programs, while the Gymnasium students generally did not make any distinction between the Turkish and German channels; what the students mostly preferred were TV series and game programs; students attending these three schools seldom read newspapers and journals, but sometimes books; the period spent on reading books was slightly higher in the Gymnasium students; and the students attending all these three schools mostly used the internet mostly similar interests (such as for accessing social networks, watching and downloading videos/films, for playing games, and searching for information).

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Equating TIMSS Mathematics Subtests with Nonlinear Equating Methods Using NEAT Design: Circle-Arc Equating Approaches

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Abstract

The purpose of this study is to equate Trends in International Mathematics and Science Study (TIMSS) mathematics subtest scores obtained from TIMSS 2011 to scores obtained from TIMSS 2007 form with different nonlinear observed score equating methods under Non-Equivalent Anchor Test (NEAT) design where common items are used to link two or more test forms. The ultimate goal is to determine whether different forms of mathematics tests that administered in different years with anchor (common) items caused any inequalities with respect to students. In addition, results obtained from chained and frequency estimation based on equipercentile equating methods were compared to four different methods (Tucker, Levine, Braun-Holland and chained) based on a new nonlinear equating approach called circle-arc equating in order to see which method is the most appropriate for equating these forms. The results of different nonlinear equating methods were compared with respect to Root Mean Squared Error (RMSE) index, mean of bootstrap standard errors (MBSE) and mean of bootstrap bias. Results indicates that TIMSS 2007 mathematics tests were easier than TIMSS 2011 mathematics across the score scale which indicates that results were biased against to students participated to TIMSS 2007. Moreover, equating methods based on nonlinear circle-arc equating outperformed the equipercentile equating methods and presmoothing decreased both standard error and bias associated with each method.

Keywords: TIMSS mathematics subtest, Nonlinear Equating NEAT designs, Circle-arc equating approaches.

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Introduction

Large scale international assessments, such as the Trends in International Mathematics and Science Study (TIMSS) and Program for International Student Assessment (PISA), are used as an important assessment tool not only for making important policy decisions (Arim & Ercikan, 2014), but also to determine effectiveness of the present school curricula, students' achievement and effectiveness of the education system of participating countries (Keser, 2005; Uzun, Butuner & Yigit, 2010, Ozdemir, 2014). Another important aspect of these large scale assessments is that they are repeated in a certain period of time which enables policy makers and stakeholders in education to evaluate the educational developments and improvement within these period of time. In order to maintain comparability of these large scale assessments, equivalence of these forms administered in different years has to be satisfied. Otherwise, results obtained from different forms of these test administered in different years might cause biased inferences and decision made upon these assessment might not be valid and reliable (Eryaman & Schneider, 2017).

The Trends in International Mathematics and Science Study (TIMSS) is a well-known large scale assessment which aims to examine students' academic achievement based on some given variables in every 4-year-period. It not only aims to evaluate educational achievement of 4th grade and 8th grade students with respect to mathematics and science, but also gather comprehensive information from students, teachers and school principals about the teaching and learning of mathematics and science.

TIMSS is administered in approximately 50 countries and to thousands of students in each participating country. Limited version of TIMSS was first administered in 1995. In total, 59 countries participated in TIMSS 2007 and 57 countries with 4th grade students and 56 countries with 8th grade students participated in TIMSS 2011. TIMSS applied in different years basically consist of two sections that are mathematics and science, respectively. The content of mathematics consist of fraction, measurement, data representation, analysis and probability, proportionality, geometry and algebra. On the other hand, the content of science part consists of life science, physical science, earth science, biology, chemistry, and physics. Turkey only participated in TIMSS 1999 and 2007 at 8th grade level, while participated in TIMSS 2011 at both 4th and 8th grade levels (Erkan, 2013). Since these tests are administered in every 4-year circle, it is important to examine and check the statistical equivalence of test. Because violence of statistical equivalence of tests administered in different years may lead to biased inferences.

Ercikan (2014) stated that the item level and test level comparability were related to item and construct bias where item bias was caused by translation/adaptation effects, differential familiarity with item context and content (Ercikan, 1998; Ercikan & McCreith, 2002; Hambleton et al., 2005), while construct bias was caused by factors such as conceptual inequivalence of the construct, inconsistency in theoretical definitions or the measurement of the construct across cultures (Ercikan & Lyons-Thomas, 2013; Geisinger, 1994; Hambleton, 1993, 1994; 2005; Hui & Triandis, 1985; Oliveri, Olson, Ercikan, & Zumbo, 2012; Reise, Widaman, & Pugh, 1993; Sireci, Bastari, & Allalouf, 1998; van de Vijver & Tanzer, 1997). Another source of bias was associated with methods in which differences in test administrations, differential familiarity of examinees with item and test formats and administering tests that measure same construct in different year might cause bias inferences with respect to students and stakeholders in education. At that point, test equating comes in handy and is used to determine and reduce methodological biases and inequalities.

Statistical procedures commonly used to determine the statistical equivalence of different test forms that aim to measure same traits or abilities are called test *equating* and *linking*. Especially, when the test forms are administered across more than one occasion or more than one examinee group, then security of test, statistical equivalence of test and overexposure of test items become major concern of test developers and policy makers. Although alternative test forms are used to

prevent item exposure, multiple test forms measuring the same construct but administered in different years may differ in difficulty levels. Therefore, test equating procedure is used to adjust for differences in difficulty levels of test form administered in the same year or different years in order to produce score scales that can be used interchangeably (Albano, 2014).

Equating methods aim to define statistical relationship between different test score distribution and score scales associated with different test forms that are constructed based on the same specification and similar statistical features. Equating functions related to each equating methods which defines these relationships convert scores from one scale directly to their equivalent values on another so that equated scores can be used interchangeably (Hambleton & Swaminathan, 1985; Holland & Dorans, 2006; Kolen & Brennan, 2004). On the other hand, linking is used to define statistical relationship between different test forms that are not constructed based on same specifications and equated scores can be considered as similar but cannot be used interchangeably. This study is restricted to nonlinear equating methods under non-equivalent anchor test (NEAT) design and test linking is the beyond the scope of this study(for more details about linking, see Holland & Dorans, 2006).

Equating Designs

Equating design has to be specified after determining the forms that will be equated. Equating design determines how test forms and individuals sampled; and how data was collected (Kolen & Brennan, 2004; Mao, von Davier & Rupp, 2006; Gok & Kelecioğlu, 2014; Albano, 2014). Determining proper equating design is also considered to be the most important step of equating (Holland & Dorans, 2006). There are three commonly used equating designs called “single group design”, “random group design” and “non-equivalent anchor test (NEAT) design” (Crocker & Algina, 1986; Kolen & Brennan, 2004).

In the single-group design, there is only one sampled group that takes the both forms (X and Y) which will be equated. Since group ability remains unchanged, any observed differences are attributed to test forms. In the random group design, groups are drawn from the same population and each group takes different forms. Since samples are drawn randomly from the population, group ability is assumed to remain same and any observed differences in score distributions are attributed to test forms themselves.

For both the single group design and the random group design, group abilities are assumed to be equal and constant. However, when the groups are not equivalent with respect to ability level, then the groups might be drawn from different populations (such as P and Q) and ability differences become a confounding factor. In order to solve these two problems arising from nonequivalent groups, anchor tests (V) that include common items are used for both groups. Ability differences appeared in groups are assumed to be removed or controlled by means of common items (Kolen & Brennan, 2004; Albano, 2014). In this study, NEAT design was used to equate TIMSS mathematics subtests administered in different years.

Equating types and methods

Generally, equating methods are classified as Classical Test Theory-based (CTT-based) equating methods and Item Response Theory-based (IRT-based) equating methods. These methods differ in required assumptions and mathematical functions being used to define relationship between score distributions. The most common equating methods based on CTT are called “linear equating”, “mean equating” and “equipercentile equating” methods (Barnard, 1996; Kelecioğlu, 2014). Moreover, some researcher classifies the equating methods as *standard equating methods*, which can be found in Kolen and Brennan (2004), and von Davier et al. (2004), and *nonstandard equating methods* some of which are new methods while the others are extension of standard methods. For instance, von Davier (2011b) refers to hybrid methods such as local equating (van der Linden 2011) and the Levine nonlinear method (von Davier, Fournier-Zajac & Holland 2007) as nonstandard equating methods (Gonzales, 2014). Apart from that, some researcher defines the CTT-based

equating methods as equating types and classify them into two groups called *linear equating* that express scores on one scale with straight line and *nonlinear equating* that express scores on axis with curvilinear line (Albano, 2014).

Linear equating consist of *identity*, *mean* and *linear equating* and differ from one another in terms of intercept and slope. On the other hand, nonlinear equating consists of *equipercentile* and a new approach called *circle-arc equating* (Livingston & Kim, 2009). Nonlinear equating methods differs from one another in terms of the number of coordinates being estimated. In this study, mathematics subtest administered in different years were equated with nonlinear equating methods under NEAT design. A brief information about equating types (equipercentile and circle-arc equating) and equating methods based on these equating type is provided in the following section.

Equipercentile equating

Equipercentile equating constructs a nonlinear relationship between score scales of tests forms (X and Y) that are to be equated. It is more appropriate to use equipercentile equating methods when difficulty levels of forms differ and difference in difficulties fluctuates across the score scale. Assuming that scores on form X are equated to scale scores on form Y and let $F(x)$ and $G(y)$ be the associated cumulative distribution functions (CDF) of the scores. When CDF functions are set equal ($F(x) = G(y)$) and solved for y, then the formula for the equipercentile equating function is produced:

$$equipy(x) = G^{-1}[F(x)] \quad (1)$$

The cumulative distribution function is approximated using percentile ranks, when the score scales are discrete in which this particular procedure is called continuizing the discrete score distributions (for details, see Kolen and Brennan 2004, ch. 2).

For nonlinear equating methods under NEAT design, a lot of techniques and functions have been developed for estimating the relationship between total scores on X and Y and the respective anchor scores on V. These techniques are all based on certain assumptions about the relationships between total scores and anchor scores for the populations that groups are sampled (P and Q). These techniques are referred to here as equating methods based on nonlinear equating under NEAT design. There are two common equating methods for equipercentile equating under NEAT design that are called *frequency estimation* and *chained equating* methods, respectively.

Frequency estimation involves a synthetic population taking forms X and Y are required. In frequency estimation method, conditional distribution of total scores on X for a given score point in V and the conditional distribution of total scores on Y for a given score point in V is the same across populations. On the other hand, chained equating method (Livingston, Dorans, and Wright 1990) can be applied to both linear and equipercentile equating under NEAT design. What differs chained equating from other methods is that it does not require synthetic populations but only requires an additional equating functions for estimating equivalent scores (for more details, see Livingston, Dorans, and Wright 1990; Holland and Dorans, 2006; Albano, 2014).

Circle-arc equating

As like equipercentile equating, circle-arc equating also defines a nonlinear relationship between score scales. Although the main idea behind circle-arc equating was first proposed by Divgi (1987), Livingston and Kim (2010) were those who proposed it as a nonlinear equating method and put into an equating framework. They suggest that when forms differ in difficulty, the relationship between test forms appear to be curvilinear. The main idea behind this method is first to define two end points and a middle point estimated from data, then constrain the estimated equating curve to pass through these points. The maximum and minimum possible scores on the test forms are set as the end points, while the middle point are determined by the mean scores of the test to be equated (Livingston & Kim, 2010). Therefore, the circle-arc equating function derives from the mathematical formulas restraining an arc of a circle to pass through these three pre-specified points.

Many different ways can be used to find the radius (r) of the circle and midpoint with the three known points. The formula for the radius of circle is as follows:

$$r = \sqrt{(x_c - x_1)^2 + (y_c - y_1)^2} \quad (2)$$

Solving equation (2) for y produces the circle-arc equating function:

$$circa(x) = y_c \pm \sqrt{r^2 - (x - x_c)^2}, \quad (3)$$

where (x_c, y_c) is equal to estimated midpoints with different methods and r is the radius of the circle. Equating methods based on circle-arc equating under NEAT design apply only to estimation of this midpoint (x_c, y_c) . Commonly used equating methods under NEAT design to estimate midpoints are *chained equating method* demonstrated by Livingston and Kim (2009), *Tucker, Levine* and *Braun-Holland* equating methods (Albano 2014). In this study, circle-arc equating was defined as equating type and *chained equating, Tucker, Levine* and *Braun-Holland* equating methods were used to estimate midpoints. Thus, four different equating methods based on circle-arc equating and two different equating methods based on equipercentile equating were used to equate TIMSS 2011 mathematics subtest to TIMSS 2007 mathematics subtest under NEAT design in order to determine best equating methods.

Generally, smoothing methods are used to reduce or remove irregularities caused by sampling error in the score distribution. Smoothing methods are also used to reduce irregularities caused by equipercentile equating function. There are two commonly used methods including polynomial loglinear presmoothing (Holland and Thayer, 2000) and cubic-spline postsmoothing (Kolen, 1984). In this study, loglinear presmoothing method, with polynomial degree equal to 3 ($C=3$), was used in order to see how presmoothing effect each nonlinear equating methods and distribution of equated scores.

Purpose of Study

The purpose of this study is to equate Trends in International Mathematics and Science Study (TIMSS) mathematics test scores obtained from TIMSS 2011 to scores obtained from TIMSS 2007 form with nonlinear observed score equating methods under Non-Equivalent Anchor Test (NEAT) design. The ultimate goal is to determine whether different forms of mathematics tests administered in different years with anchor (common) items caused any inequalities with respect to students. In addition, results obtained from different equating methods based on equipercentile equating methods were compared to a new nonlinear equating method called *circle-arc equating methods* so as to determine the most appropriate equating method.

Research questions

The main goal of this study is to equate mathematics tests administered in different years with nonlinear equating methods under NEAT design so as to determine whether administering different form cause any inequalities with respect to students. Therefore, research questions were as follows:

- I. What is the relationship between observed scores and equivalent scores obtained from different equating methods based on equipercentile equating and circle-arc equating?
- II. Do TIMSS mathematics test forms administered in different years cause any inequalities with respect to students?
- III. How does presmoothing affect the distribution of observed scores and equated scores?
- IV. How do nonlinear equating methods differ in terms of standard error, RMSE and bias values?
- V. How does presmoothing affect the distribution of standard error, RMSE and bias values across the score scale?
- VI. What is the best nonlinear equating methods to equate TIMSS mathematics subtests under NEAT design?

Methodology

Research Model

The model of this study was casual comparative research; since it aimed to investigate the statistical relationship and differences between two mathematics tests which assumed to measure same construct and administered in different years by different nonlinear equating methods under NEAT design.

Study groups

In this study, data from TIMSS 2011 and TIMSS 2007 mathematics subtests administered to eighth grade Turkish students were used. The ultimate goal of TIMSS survey is to determine student achievement in mathematics and science in the participating countries. TIMSS 2007 mathematics test was comprised of 14 booklets with 115 items and 4498 eighth-grade Turkish student participated in total. On the other hand TIMSS 2011 mathematics test was comprised of 14 booklets with 119 items and 6928 Turkish students participated.

Raw scores obtained from TIMSS 2011 mathematics subtest booklet 12 were equated to TIMSS 2007 mathematics subtest booklet 14 with two different nonlinear equating methods named as equipercentile equating and circle-arc methods, respectively, under NEAT design. TIMSS 2007 mathematics test booklet 14 was administered to 323 students and TIMSS 2011 mathematics tests booklet 12 was administered to 495 students. Both booklets contain 23 dichotomous items and 7 out of 23 items are anchor (common) items. It is assumed that each booklet used for equating represent the other booklets administered in the same year, since booklet administered in the same year contain anchor items and the total scores are equated before revealing the results.

Data Analysis

For equipercentile equating, two different equating methods named as “frequency estimation” and “chained equating” were used, while for circle-arc method, four different equating methods named as “Tucker”, “Levine”, “Braun-Holland” and “chained equating” were used, respectively. In addition, observed scores obtained from both forms were presmoothed before equating in order to examine effect of presmoothing on different equating methods. The results of different nonlinear equating methods were compared with respect to Root Mean Squared Error (RMSE) index, mean of bootstrap standard errors (MBSE) and bias. The R package called “equate” (Albano 2014) was used to conduct equating analysis.

Assumptions of Observed Score Equating

Test forms that are being equated based on Classical Test Theory (CTT) have to satisfy three main assumptions of equating. These assumptions are unidimensionality, equal reliability, and equivalent difficulty levels (Angoff, 1984; Dorans & Holland, 2000; Kolen and Whitney, 1982). Therefore before conducting the analysis, assumptions of unidimensionality, equal reliability and equivalent difficulty levels were checked.

A test is assumed to be unidimensional only when there is just one dominant factor or ability being measured by items (Hambleton et al., 1991). In order to check unidimensionality of each form, factor analysis was conducted. Table 1 presents the results of factor analyses related to each TIMSS mathematics subtest.

Table 1. Factor analysis results associated with TIMSS mathematics subtests

Factors	TIMSS 2007 Booklet 14			TIMSS 2011 Booklet 12		
	Eigen Values	Explained Variance	Cumulative Variance (%)	Eigen Values	Explained Variance	Cumulative Variance (%)
1	7,301	31,744	31,8	7,113	30,926	30,926
2	1,392	6,053	37,797	1,226	5,329	36,255
3	1,222	5,313	43,111	1,096	4,767	41,022

Table 1 presents Eigen values, explained variance and cumulative variance related to first three factors of each form based on factor analysis results. Results indicate that the first factor (dominant factor) of TIMSS 2007 mathematics subtest explained 31.74 percent of total variance, while the first factor of TIMSS 2011 mathematics subtest explained 30,93 percentage of the total variance. Büyüköztürk (2007) suggests that when the first factor of a test explains 30% (or more) of total variance, then this test is considered to be unidimensional. According to results in Table 1, both forms measured same construct and were unidimensional and therefore, the unidimensionality assumption of equating was satisfied.

Table 2 presents the results associated with the other two assumption of equating named as equal reliability and equivalent difficulties, respectively.

Table 2. *Descriptive statistics associated with each form and assumptions*

	Mean difficulties	Reliability (α)	Variance	Standard deviation	Mean	Skewness	Kurtosis
TIMSS 2011 Booklet 12	0.391	0.892	33,693	5,804	8,96	0,745	-0,425
TIMSS 2007 Booklet 14	0.389	0.891	33,441	5,782	9,00	0,721	-0,514

Table 2 shows that Cronbach alpha reliability (α) of TIMSS 2011 booklet 14 and TIMSS 2007 booklet 12 were 0.891 and 0.892, respectively. Z statistics based on difference between two reliability coefficients was not statistically significant ($z=-0.072$; $p>0.05$). On the other hand, mean difficulty of TIMSS 2011 booklet 14 was 0.389 and mean difficulty of TIMSS 2007 booklet 12 was 0.391. Z statistics based on difference between two ratio was not statistically significant ($z=-0.092$; $p>0.05$). Therefore, reliability coefficients and mean difficulties of two test forms were assumed to be almost identical. As a result, the three main assumptions of equating based on CTT were satisfied.

Descriptive statistics shown in Table 2 also indicates that both test forms were positively skewed with negative kurtosis statistics. In addition, mean, variance, reliability and mean difficulties of each form were compared by using Z test procedure. As a result, difference between two forms related to mean, variance, reliability and mean difficulties were not statistically significant ($p=0,05$) which indicates that each forms were almost identical.

Findings

In this study, raw scores obtained from TIMSS 2011 mathematics subtest booklet 12 were equated to TIMSS 2007 mathematics subtest booklet 14 under NEAT design with two different nonlinear equating methods named as equipercentile equating and circle-arc methods, respectively. In addition, raw scores were presmoothed with log-linear presmoothing method in order to examine how smoothing effects distribution of raw scores and the standard error, RMSE and bias related to each non-linear equating method.

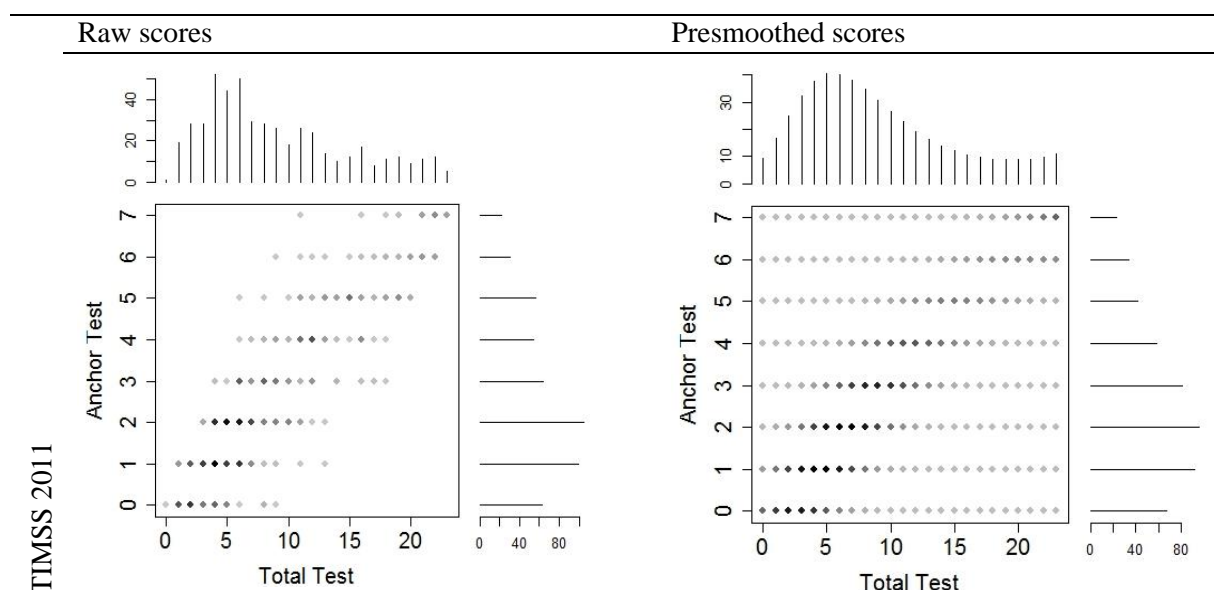
Raw scores of TIMSS 2011 mathematics subtest and equivalent scores of TIMSS 2011 equated to TIMSS 2007 mathematics subtest scores with different equipercentile and circle-arc equating methods *without presmoothing* under NEAT design were presented in Appendix A. On the other hand, equivalent scores obtained from different equipercentile and circle-arc equating methods with *presmoothing* under NEAT design were presented in Appendix B.

The results of equipercentile equating showed that equivalent scores of TIMSS 2011 mathematics subtest ranged between -0.38 and 23.08. However, when raw scores were presmoothed, equivalent scores ranged between 0 and 23.08 which implies that equipercentile equating with presmoothing yielded more accurate result. On the other hand, the results of different circle-arc

equating methods indicate that equivalent scores of TIMSS 2011 mathematics subtest ranged between 0 and 23 for both raw and presmoothed scores. This finding indicates that equivalent score interval remained same with circle-arc equating methods. Therefore, one can conclude that circle-arc equating method yielded more accurate results compare to equipercentile equating method.

According to results in Appendix A and B, all raw scores of TIMSS 2011 mathematics subtest were smaller than TIMSS 2007 mathematics subtest equivalent scores based on circle-arc equating results which indicates that there was a linear relationship between mathematics subtest raw scores and TIMSS 2011 mathematics subtest equivalent scores. Therefore, it can be concluded that TIMSS 2007 mathematics subtest was easier than TIMSS 2011 mathematics subtest along the score scale. This equating result is an indicator of inequality with respect to student attended in 2011 TIMSS mathematics subtest caused by administration of different forms in different years.

On the other hand, there was nonlinear relationship between raw scores and equivalent scores obtained from equipercentile equating methods without presmoothing. However, when the raw scores were presmoothed, all raw scores of TIMSS 2011 mathematics subtest appeared to be smaller than equivalent scores based on equipercentile equating results indicating that there was a linear relationship between raw scores and TIMSS 2011 mathematics subtest equivalent scores. When compared to results of equating without presmoothing, equipercentile equating methods with presmoothing yielded more accurate and consistent results. As like equating results obtained from circle-arc equating, equipercentile equating results also indicate that different mathematics subtest applied in different years caused inequalities with respect to students.



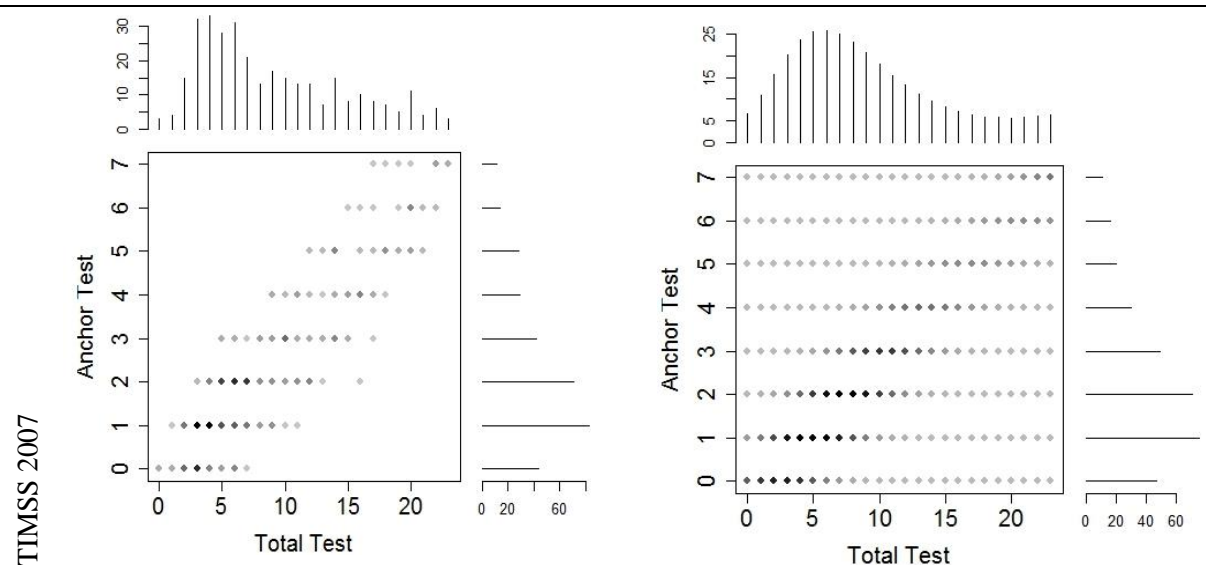


Figure 1. *Distribution of raw and presmoothed scores related to TIMSS mathematics subtests*

Figure 1 depicts frequency distribution of raw scores without presmoothing on the left hand side and distribution of presmoothed scores related to each test forms on the right hand side. In addition, Figure 1 shows the frequency distribution of total test scores on the horizontal line and frequency distribution of anchor test scores on the vertical line. With the help of graphs in the Figure 1, one can easily observe the effect of presmoothing on the raw scores for each test forms with anchor items.

Figure 2 depicts distribution of mean equated scores versus total observed scores. Red lines in the Figure 2 represent the equated scores related to equipercentile equating methods, while green and yellow lines represent the equated scores related to different circle-arc equating methods. In addition, one can observe the effect of presmoothing on the relation between mean equated scores and total scores for each non-linear equating methods by examining the graph on the right hand side.

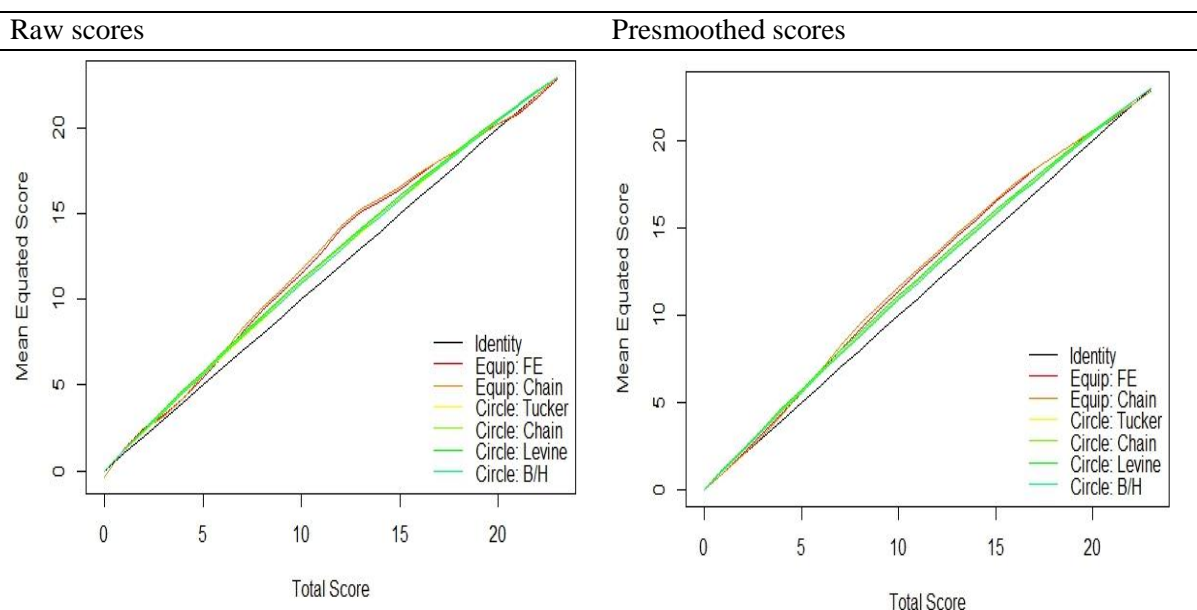


Figure 2 *Distribution of Mean Equated scores versus Total scores*

Figure 2 shows that relationship between mean equated scores and observed scores was almost identical for equipercentile equating methods. Likewise, circle-arc equating methods yielded

similar results. However, compared to the relationship between mean equated scores and observed scores associated with equipercentile equating methods, circle-arc equating methods yielded more consistent results. Without presmoothing the relationship between mean equated scores and observed scores associated with equipercentile equating became more divergent around the mean. On the other hand, both circle-arc and equipercentile equating methods yielded similar results when observed scores were presmoothed. Thus, it can be assumed that presmoothing increased accuracy of observed score equating for each nonlinear equating method.

Table 3. *Equating results associated with nonlinear equating methods without presmoothing*

Equating type	Equating method	MBSE	bias	w.bias	RMSE
Equipercentile Equating	Frequency E.	0.790	0.906	0.038	1.309
	Chained	0.853	0.984	0.041	1.414
Circle-Arc Equating	Tucker	0.237	0.598	0.027	0.643
	Chained	0.240	0.669	0.030	0.711
	Levine	0.263	0.744	0.034	0.789
	Braun-Holland	0.241	0.600	0.027	0.646

Table 3 presents RMSE, MBSE and bias statistics associated with different equipercentile equating and circle-arc methods without presmoothing.

The results given in Table 3 indicate that when the results of different equipercentile equating methods were compared, frequency estimation equipercentile equating method without presmoothing yielded smaller MBSE (0.790), RMSE (1,309) and bias (0.906) statistics and outperformed the chained equipercentile method. On the other hand, when the results of different circle-arc equating methods were compared, Tucker circle-arc equating method yielded smallest BMSE (.237), RMSE (0.643) and bias (0.598) statistics. Although, Tucker circle-arc equating method outperformed other equating methods, Braun-Holland and chained circle-arc methods yielded almost similar results. Table 3 also shows that, regardless of methods being used, the circle-arc equating methods yielded relatively small equating errors and bias statistics compared to equipercentile equating methods. Therefore, it can be concluded that circle-arc equating methods without presmoothing outperformed the equipercentile equating methods.

Table 4 presents RMSE, MBSE and bias statistics associated with different equipercentile equating and circle-arc methods with presmoothing based on bootstrap method.

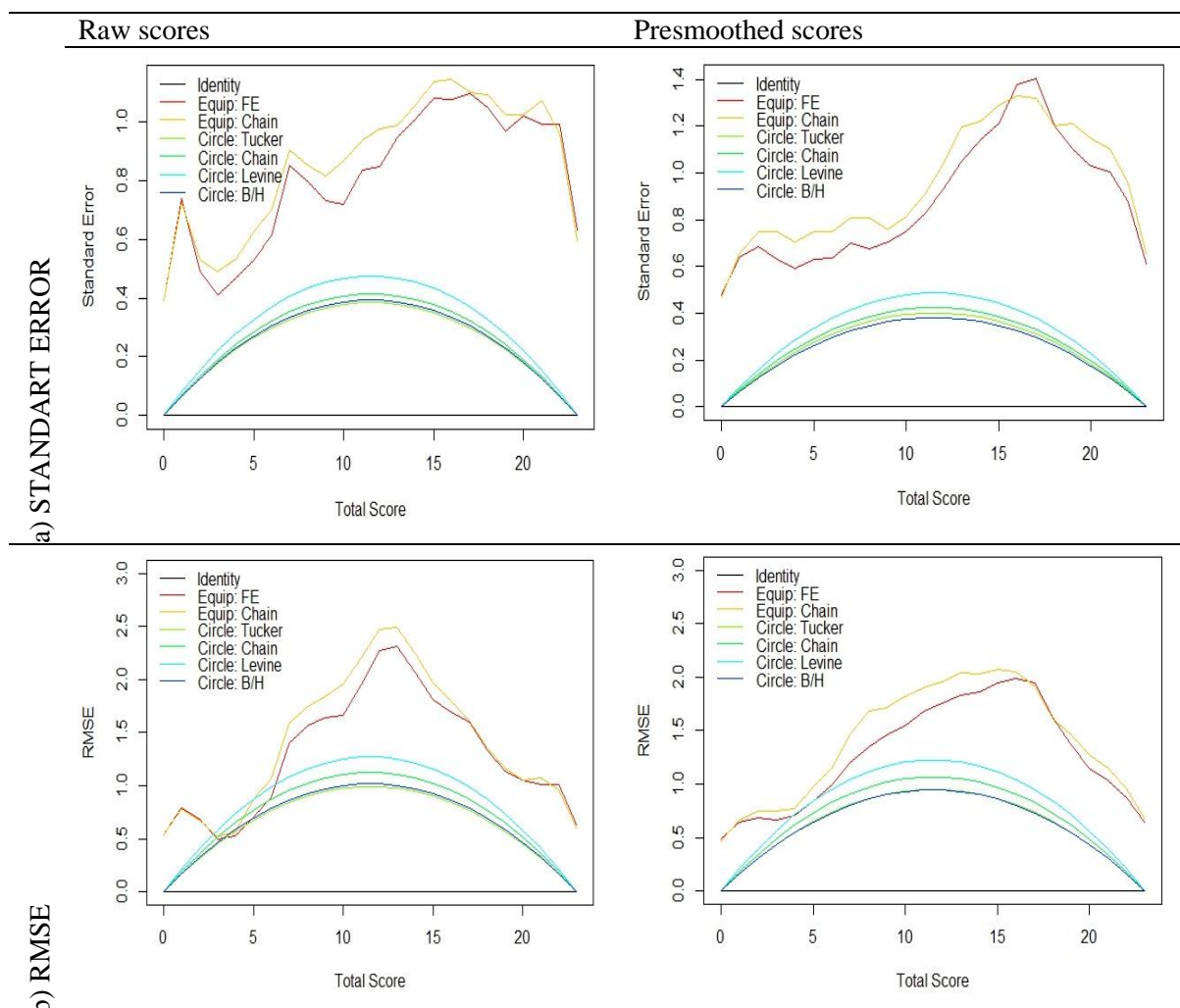
Table 4. *Equating results associated with nonlinear equating methods with presmoothing*

Equating type	Equating method	MBSE	bias	w.bias	RMSE
Equipercentile Equating	Frequency estimation	0.905	0.897	0.036	1.324
	Chained	0.986	0.944	0.039	1.437
Circle-Arc Equating	Tucker	0.233	0.561	0.026	0.607
	Chained	0.251	0.631	0.029	0.679
	Levine	0.286	0.705	0.032	0.761
	Braun-Holland	0.231	0.575	0.026	0.619

When different methods based on equipercentile equating were compared, chained equipercentile equating method with presmoothing yielded smaller MBSE (0.905), RMSE (1.324) and bias (0.897) statistics and outperformed the frequency estimation equipercentile method. On the other hand, Braun-Holland circle-arc equating method yielded smallest BMSE (.231), while Tucker circle-arc method yielded smallest RMSE (0.607) and bias (.0561) values respectively. In addition, presmoothing decreased MBSE, RMSE and bias values substantially for circle-arc equating methods which indicates that presmoothing decreased both random and systematic errors associated with each equating method. On the other hand, presmoothing increased MBSE and RMSE while decreased bias values for equipercentile equating methods which indicates that presmoothing increased random error and decreased systematic errors associated with each equipercentile equating method.

In general, circle-arc equating methods outperformed equipercentile equating methods and presmoothing decreased MBSE, RMSE and bias values substantially for equating methods based on circle-arc equating. Therefore, Tucker and Braun-Holland circle-arc equating methods with presmoothing can be considered as the most appropriate method for equating TIMSS mathematics subtest administered in different years.

Figure 3 presents the distribution of standard error (SE), RMSE and bias statistics along with the score scale for each equipercentile and circle-arc equating methods. In addition, distribution of SE, RMSE and bias statistics along with the presmoothed score scale were given on the right hand side so as to see effect of presmoothing. Yellow and red lines in each graph represent findings related to equipercentile equating methods, while green and blue lines represent findings related to circle-arc equating methods.



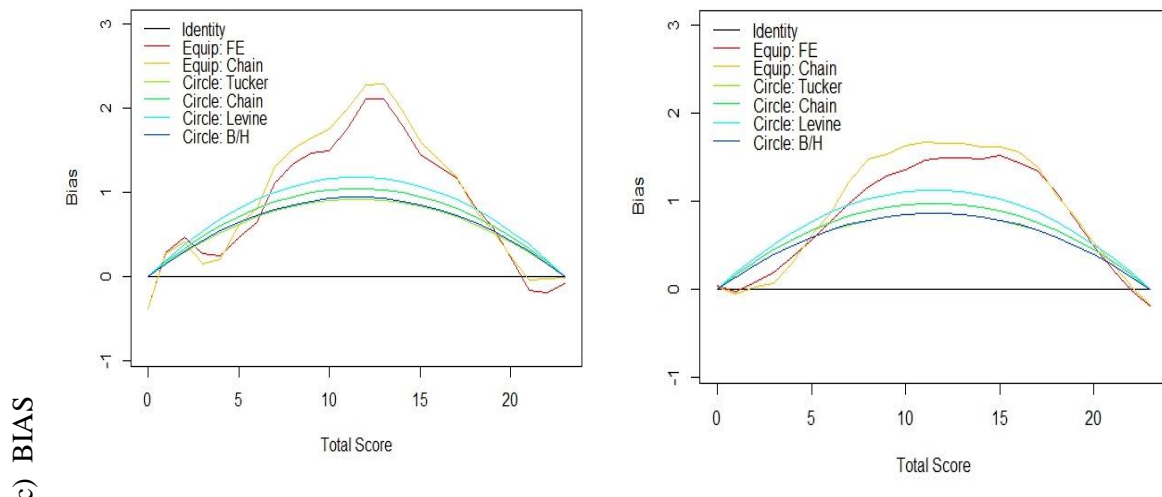


Figure 3. *Distribution of SE, RMSE and Bias values associated with each equating method*

Graphs related to distribution of standard errors in Figure 3 indicates that standard errors of circle-arc equating methods were relatively smaller than standard errors of equipercentile equating methods along with the score scale. In addition, standard errors of circle-arc equating methods had curvilinear distribution, while standard errors of equipercentile equating methods did not have a certain distribution pattern. Moreover, highest and lowest observed scores had the smallest standard errors, whereas observed scores around the mean had the highest standard errors for circle-arc equating methods. For equipercentile equating methods, as the observed score increased so did the standard errors. On the other hand, when the observed scores were presmoothed, standard errors associated with both circle-arc and equipercentile equating methods tended to decrease somewhat.

Graphs related to distribution of RMSE in Figure 3 indicates that RMSE of circle-arc equating methods were relatively smaller than RMSE of equipercentile equating methods along with the score scale in general. However, both circle-arc and equipercentile equating methods yielded similar RMSE values when observed scores were equal (or close) to 5. As like standard errors, RMSE values of circle-arc equating methods had curvilinear distribution, while RMSE of equipercentile equating methods did not have a certain distribution pattern. Moreover, highest and lowest observed scores had the smallest RMSE, whereas observed scores around the mean had the highest RMSE values for both equipercentile and circle-arc equating methods. On the other hand, when the observed scores were presmoothed, RMSE associated with both circle-arc and equipercentile equating methods tended to decrease somewhat.

Graphs related to distribution of equating bias associated with each equating methods in Figure 3 indicates that equating bias of circle-arc equating methods were relatively smaller than equating bias of equipercentile equating methods along with the score scale, in general. However, when observed scores were equal or smaller than 5 and greater than 20, equipercentile equating methods yielded smaller bias values compared to circle-arc equating methods. As like standard errors and RMSE distribution, equating bias of circle-arc equating methods had curvilinear distribution, while bias of equipercentile equating methods did not have a certain distribution. Moreover, highest and lowest observed scores had the smallest bias, whereas observed scores around the mean had the largest bias values for both equating methods based on equipercentile and circle-arc equating. On the other hand, bias values associated with both circle-arc and equipercentile equating methods tended to decrease somewhat when the observed scores were presmoothed.

Conclusion and discussion

Large scale tests, such as TIMSS, require administering different forms each period of time since traits being measured remains same. However, educational testing services must take into

account the psychometric and practical issues that may cause inequalities and biased measurement. This study aimed to check statistical equivalence of TIMSS mathematics subtest test administered different years and to determine the most appropriate nonlinear equating method.

Equating results indicated that TIMSS 2007 mathematics subtest was easier than TIMSS 2011 mathematics subtest across the score scale and there was a nonlinear relationship between raw scores and equivalent scores of TIMSS 2011 mathematics subtest which indicates that results were biased against to students participated in TIMSS 2007. This is an indicator of methodological bias (Sireci Patsula & Hambleton, 2005) caused by using different test forms which aims to measure same construct and affects the comparability of test scores (Arim & Erçikan, 2014). These biased score might also affect the educational inferences and decisions made upon these scores. Therefore, the scores obtained from TIMSS mathematics tests administered in different years cannot be used interchangeable.

Kan (2011) examined OKS tests administered in different years so as to determine whether scores obtained from these two forms could be treated as interchangeable and whether these two form caused any advantage or disadvantage on examinees performance. He equated the raw scores on 2005 OKS form to 2003 OKS form with linear equating under single group design. Similar to results obtained from this study, Kan (2011) also found that scores obtained from two different OKS tests administered in different years could not be used interchangeably.

When it comes to comparison of nonlinear equating methods, results indicates that the new circle-arc methods outperformed the equipercentile methods and yielded more consistent results with smaller MBSE, RMSE and bias values. In addition, when observed scores were presmoothed, MBSE, RMSE and bias values associated with circle-arc methods were decreased substantially. Unlike circle-arc equating, standard error and RMSE values associated with equipercentile equating tended to increase, while bias values associated with equipercentile equating tended to decrease in the case of presmoothing. This result suggests that presmoothing tended to increase random errors and decrease systematic errors with respect to equipercentile equating methods. Hanson, Zeng and Colton (1994) stated that both presmoothing and postsmoothing methods could improve estimation of the equipercentile equating function. However, Parshall and his colleague (1995) found that decreases in sample size caused substantial increases in standard errors indicating that equipercentile equating methods were negatively affected from decrease in sample size. Livingston and Kim (2009) suggested that one could prefer circle-arc equating to equipercentile equating when the samples were too small for equipercentile equating.

Equivalent observed scores obtained from circle-arc equating methods had least standard error, RMSE and bias statistics regardless of methods being used. Some other studies (Butler and Hanson, 1997; Zhu, 1998) yielded parallel result. Hanson, Zeng and Colton (1994); and Kelecioğlu and Oztürk (2013) found that presmoothing and postsmoothing improved estimated equipercentile function and reduced equating error in random group design.

As a result, nonlinear Tucker and Braun-Holland circle-arc equating methods with presmoothing were considered to be the most appropriate equating methods for TIMSS dataset administered in different years, since they yielded the least standard random error, bias and RMSE coefficients. Demir and Güler (2014) examined the statistical equivalence of different PISA 2009 science tests administered at the same time with different equating methods under NEAT design. In this study, PISA 2009 science tests were equated with Tucker linear equating, Levine linear equating, and frequency prediction and Braun-Holland linear equating methods. They found that among these linear equating methods, Braun-Holland linear equating method was the most appropriate for PISA 2009 science tests which supports the results of present study.

Results of this study indicate that different methods based on circle-arc equating outperformed the other nonlinear observed score equating methods based on equipercentile equating.

. In this study real data set obtained from TIMSS mathematics subtests were used. However more research should be conducted in order to see how different conditions, such as different sample sizes, equating designs and postsmoothing affect the circle-arc equating methods. Moreover, it is suggested to compare the performance of circle-arc equating methods with other linear observed and true score equating methods.

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Appendix A. Equated scores associated with different nonlinear equating methods under NEAT design without presmoothing

Raw Scores	Equipercentile Equating		Circle-Arc Equating			
	Frequency	Chained	Tucker	Chain	levine	Braun Holland
0	-0.38	-0.38	0.00	0.00	0.00	0.00
1	1.54	1.52	1.15	1.06	1.19	1.15
2	2.61	2.55	2.29	2.10	2.37	2.29
3	3.27	3.17	3.42	3.15	3.52	3.42
4	4.22	4.19	4.53	4.19	4.66	4.53
5	5.44	5.56	5.63	5.22	5.79	5.63
6	6.55	6.72	6.71	6.25	6.89	6.71
7	8.15	8.30	7.78	7.28	7.98	7.78
8	9.38	9.48	8.84	8.30	9.04	8.84
9	10.55	10.69	9.88	9.31	10.10	9.88
10	11.62	11.80	10.91	10.32	11.13	10.91
11	12.78	13.17	11.92	11.33	12.15	11.92
12	14.11	14.24	12.92	12.33	13.15	12.92
13	15.11	15.29	13.91	13.32	14.13	13.91
14	15.84	15.95	14.88	14.31	15.10	14.88
15	16.42	16.50	15.84	15.30	16.04	15.84
16	17.35	17.41	16.78	16.28	16.98	16.78
17	18.24	18.29	17.71	17.25	17.89	17.71
18	19.07	19.15	18.63	18.22	18.79	18.63
19	19.81	19.82	19.53	19.19	19.66	19.53
20	20.26	20.25	20.42	20.15	20.52	20.42
21	21.02	20.94	21.29	21.10	21.37	21.29
22	22.10	22.08	22.15	22.06	22.19	22.15
23	23.08	23.08	23.00	23.00	23.00	23.00

Appendix B. Equated scores of different nonlinear equating methods under NEAT design with presmoothing

Raw Scores	Equipercntile Equating		Circle-Arc Equating			
	Frequency	Chained	Tucker	Chained	Levine	Braun-Holland
0	0.01	0.00	0.00	0.00	0.00	0.00
1	1.07	1.03	1.15	1.06	1.19	1.15
2	2.18	2.09	2.29	2.10	2.37	2.29
3	3.31	3.17	3.42	3.15	3.52	3.42
4	4.46	4.43	4.53	4.19	4.66	4.53
5	5.63	5.69	5.63	5.22	5.79	5.63
6	6.80	6.91	6.71	6.25	6.89	6.71
7	7.98	8.12	7.78	7.28	7.98	7.78
8	9.14	9.37	8.84	8.30	9.04	8.84
9	10.29	10.46	9.88	9.31	10.10	9.88
10	11.42	11.60	10.91	10.32	11.13	10.91
11	12.53	12.73	11.92	11.33	12.15	11.92
12	13.62	13.75	12.92	12.33	13.15	12.92
13	14.67	14.78	13.91	13.32	14.13	13.91
14	15.68	15.77	14.88	14.31	15.10	14.88
15	16.63	16.69	15.84	15.30	16.04	15.84
16	17.54	17.58	16.78	16.28	16.98	16.78
17	18.39	18.42	17.71	17.25	17.89	17.71
18	19.20	19.22	18.63	18.22	18.79	18.63
19	19.98	19.99	19.53	19.19	19.66	19.53
20	20.73	20.73	20.42	20.15	20.52	20.42
21	21.49	21.48	21.29	21.10	21.37	21.29
22	22.26	22.26	22.15	22.06	22.19	22.15
23	23.08	23.08	23.00	23.00	23.00	23.00

Educational Reform in Turkey

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Abstract

As a country seeking admission to the European Union, this paper explores educational reforms in Turkey that enhance its possible entry into the European Union and changes still needed for it to be an equal partner. An overview of the school system in Turkey is provided including information on teacher training and preparation, special education policy, and post high school participation. Its educational system still faces significant hurdles and must address human rights issues in order to provide equal access and nondiscriminatory education for all. While strides have been made to improve educational opportunities, inequality is still a reality for many females and those of lower socio-economic status. Higher education opportunities continue to improve with infrastructure problems competing to keep pace with the number of facilities available. Turkey continues to address these educational concerns while progressing toward the goal of improving its status as a European Union candidate.

Keywords: Turkey, European Union, educational reform, teacher preparation, special education, post high school participation

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Introduction

“Education is the most powerful weapon which you can use to change the world.”

Nelson Mandela

Turkey is a country rich in history and has undergone radical changes in its educational system. As a country seeking admission to the European Union, this paper explores educational reforms in Turkey that enhance its possible entry into the European Union and changes still needed for it to be an equal partner. An overview of the structure of the school system in Turkey is provided including information on teacher training and preparation, special education policy, and post high school participation. Declared a secular state in 1923, Turkey has witnessed changes in the role of religion in education since its inception as a republic. It has also undergone significant curriculum reform in an effort to enhance its entry to the EU. Turkey's educational system still faces significant hurdles and must address human rights issues in providing equal access and nondiscriminatory education for all.

A Brief History

Education has held a rich history and significant place in Turkish society. During the Ottoman Empire, educational needs were met by guilds and medreses (institutions of higher learning). Sultan Mehmet founded the best known among the Ottoman medreses in Istanbul in 1363. During the Ottoman period, the equivalent of universities were established for the purpose of training personnel for the Palace. In 1838, Sultan Mahmut II proposed the introduction of primary and secondary education (Republic of Turkey Ministry of National Education [MoNE], 2012b).

Following the establishment of the Turkish Republic in 1923, a significant event in the history of Turkey's educational system was the Law on Unification of Education in 1924, when a national secular education system was patterned after the Western European model (Gök, 2007). Education was viewed as a critical function in the modernization efforts and nation-building process and was seen as the means to create a new nation based on a single culture, a single ethnic identity and a single religion and language (Çayır, 2009b).

Structure of the School System

Turkey has a centralized governance structure. Under the Basic Law of National Education of 1973, the Ministry of National Education (MoNE) is responsible for the education system at the preschool through secondary levels. The Board of Education develops curriculum and approves textbooks. The Council of Higher Education (YÖK) and its committees are responsible for higher education policies, while the Higher Education Board supervises the institutions (Organization for Economic Co-operation and Development [OECD], 2013). Turkey has three significant documents which steer education: the Strategic Plan for the Ministry of National Education (2010-14) which sets medium- and long-term education goals; the Tenth Development Plan (2014-18) an overall government strategy which includes education; and the Lifelong Learning Strategy Paper which is linked to the European Union's strategy (OECD, 2015).

Free five-year primary education has been compulsory for all citizens in public schools in Turkey since the foundation of the republic in 1923. With the passage of reform legislation in 2012, compulsory education was extended to 12 years and split into three levels of four years each (4+4+4) (OECD, 2013). The new law has been heavily criticized as being politically motivated and counterintuitive to the stated goals (Clark, 2012). Rather than encouraging students to stay in school longer, critics of the new 4+4+4 structure believe this could result in students choosing a vocational education track just four years into their formal schooling at the age of 11.

The enrollment discrepancy gap between boys and girls appears to be growing smaller. A reportedly effective contribution to these advances has been the campaign “OK Girls, Off to School” promoting the schooling of girls, and the use of school transport for children in remote locations (United Nations Development Programme in Turkey [UNDPT], 2013). However, in an analysis of the

“OK Girls, Off to School” program, Yazan (2013) reported that the education campaign aimed at girls addressed to varying extents the criteria of accessibility, probability of enrollment, probability of participation, and length of participation. Yazan felt it failed to meet the standard of educational results, since the project did not track whether the girls were successful in national examinations which are administered at the end of grades six through eight to determine the high school in which they would be placed. Consequently Yazan questioned whether the standard of educational results had been met in the girls’ education project in Turkey. Although the UNDPT indicated a closing of the gender gap, the 2012 reform law allowed parents to home school their children after the first four years of primary education, and Clark (2012) raised the concern that parents in rural and conservative parts of the country might prevent their daughters from attending school after those first four years. Gender is an issue that also requires attention in secondary education. There has been a significant increase in overall literacy in Turkey since 1990, yet the gender gap is large with 7.8 percent of women illiterate compared to 1.7 percent of men in 2011 (UNDPT, 2013).

Equal educational opportunities for students living in remote areas continue to represent an area of concern in Turkish education. As a participant of a Fulbright Group Projects Abroad, the author attended a lecture on urban and rural education presented by a secondary student in Ankara, Turkey that contrasted an eight-year old attending school in a rural setting compared to an eight-year old attending school in Istanbul. The secondary student depicted the story of Ayse and Maya as an example of the disparity of school experiences for many children in Turkey. Ayse attends second grade and is from a rural setting. She walks at least a mile to school, has four hours of lessons, attends classes with 30 students in a mixed class that includes grades one to five and has inadequate supplies. At lunchtime Ayse goes home to work for the family and her school day is finished. Ayse has a 40 percent chance of dropping out of school. Maya is also a second grade student and lives in an urban setting. She rides a school bus, has eight hours of learning, eats balanced meals, and attends interesting field trips. Maya plans to go to college and will choose between medicine, law or engineering. The story was shared to illustrate that the disparity is real for many students in rural settings who struggle to receive the same educational opportunities as those provided in urban settings. Elik (2013) concurs that while developed regions have experienced rather high enrollment, disadvantaged regions have remained below the national average and enrollment levels among female children remained considerably lower than among male children in the disadvantaged areas.

In the post-2012 era, students enter compulsory secondary school after four years of primary and four years of middle school training. Secondary education includes all the teaching institutions with at least four years of education such as general, vocational and technical schools. There are different types of general high schools and include fine arts, religious, science and foreign language schools. Technical and vocational education is offered specifically at technical and vocational training centers (Clark, 2012). Demirbilek (2010) suggests vocational education has been stigmatized in Turkish society due to the low status assigned to the idea of manual work, and a perception exists that vocational education is a last resort for weaker achieving students.

The transition into upper secondary education and tertiary education is highly selective. Graduation rates in upper secondary education for academic and vocationally oriented programs are below the OECD average of 83 percent, but they have increased significantly and both academic and vocational graduation rates were 56 percent in 2011 (OECD, 2015). Although significant improvements have been made in regard to secondary education enrollment, certain gender and geographic differences persist.

Turkey’s investment in education is below the Organization for Economic Co-operation and Development (OECD) average. Turkey spends four percent of its gross domestic product on educational institutions at all educational levels compared with an average of six percent in OECD countries and education makes up 11 percent of Turkey’s total expenditure compared with 13 percent in OECD countries (OECD, 2014b). Ninety-five percent of children between the ages of five and 14 are enrolled in education in Turkey compared with an OECD average of 98 percent. The enrollment

rate of 15 to 19 year-olds has increased significantly from 41 percent in 2005 to 59 percent in 2012 although this represents a slight decrease from 64 percent recorded in 2011 (OECD, 2014b).

Turkey is a participant in the Programme for International Student Assessment (PISA). PISA assesses the extent to which 15-year-old students have acquired key knowledge skills that are essential for full participation in modern societies. The mean scores in PISA 2012 for performance in mathematics, reading and science were 494, 496 and 501 respectively. Turkey fell below the mean in each area with scores of 448 in mathematics, 475 in reading and 463 in science. Turkey has shown some improvement, however. When PISA 2003 scores were compared to 2012 results, Turkey improved both in mathematics performance and in the level of equity in education during the period (OECD, 2014a). Although Turkey has shown progress in enrollment and gender equity, both PISA scores and OECD data indicate Turkey still lags behind most European and Western countries. In its continued endeavor for entry to the EU, Turkey must persist in addressing these issues.

Teacher Training

“Education can be a great equalizer; the one force that can consistently overcome differences in background. But this only holds true when students have access to great teachers.”

The 2014 International Summit, pg. 11

A major concern in teacher training in Turkey has been the overwhelming demand for university faculty. Higher education has become recognized as a catalyst for scientific and economic growth, socio-political progress and intercultural communication. Beginning with a single university in 1923, in 2014 Turkey had 190 institutions of higher education (Council of Higher Education [CHE], 2014). With this growth there has been a significant need for trained and qualified faculty members. Even with the addition of numerous graduate programs at the country's largest universities, a deficit has persisted in the ability to train teachers. To answer the demand for university faculty, Turkey's MoNE developed a scholarship program to sponsor graduate study abroad. The MoNE sent some of the nation's most talented graduate students abroad to obtain advanced degrees with the expectation they return home and serve as faculty members in order to enrich the country's universities with their acquired knowledge and skills. As a recipient of such an opportunity, Çelik (2012) stressed the need for Turkey to carefully review institutional barriers to change, as many of the newly trained faculties have not returned to Turkey. Çelik (2012) articulated the current Turkish system is not ready to operate on the basis of Western standards and while returning graduates are expected to take on the role of helping academic institutions define themselves in the larger academic world they are often penalized in their efforts to bring about reform.

With its shortage of university faculty, Turkey is striving to meet the challenge of ensuring that school leaders and teachers receive quality initial training and continued support to improve schools and student outcomes. Teachers are able to begin their teacher training in specific secondary high schools. They must have a bachelor's degree from an accredited program, be less than 40 years old, and pass the Public Staff Selection Exam. These teacher candidates are then placed in schools based on their exam scores and, to some extent, on their interests. In 2013, the teacher candidate test was revised to include assessments on subject-specific knowledge. The New Teacher Programme was introduced in 2011 to provide in-depth subject matter content and increase the number of general knowledge and elective courses (OECD, 2013). Special education teachers were trained in short-term, in-service programs and certificate programs until 1983 but universities in undergraduate programs now have the responsibility to train special education teachers. Training to become a special education teacher can take place at the undergraduate, graduate or doctorate levels. Training programs prepare teachers for different kinds of disabilities including those who are cognitively disabled, hearing impaired and visually impaired with gifted education included in some training programs (Çavkaytar, 2006). An additional concern in raising the number of highly skilled and qualified teachers is that teachers' salaries in Turkey are low by international standards. After 15 years of experience, a primary school teacher would earn the United States dollar (USD) equivalent of 26,678 while their OECD counterparts would earn 39,024 USD (OECD, 2014b).

Serving Students with Disabilities

Delivery of special education services has consisted of blended education, special education schools, and centers for special education and rehabilitation. Blended education is based on the principle that individuals in need of special education should continue their studies with their peers in state or private formal and informal educational institutions with the provision of supporting educational services. Special education schools are more typically private institutions, which provide services for individuals requiring special education, and where the personnel are exclusively trained. Centers for special education and rehabilitation are private institutions with the goal of eliminating problems resulting from difficulties in speech and language development, voice defects, mental, physical, auditory, and social emotional deficiencies or behavioral disorders with the goal of self-care and independent living skills (MoNE, 2012a). According to Decree Law 573 on special education, the basic principles of special education indicate services should start at an early age, should be planned and provided without separating the individuals who are in need of special education from their social and physical environments as much as possible, and considerations should be made in adapting content and teaching processes (Çavkaytar, 2006). Early Childhood Education and Care (ECEC) is compulsory for three to six year olds in special education and available through public and vocational teaching institutions. It is also available through private institutions at a cost (OECD, 2015).

Using data obtained from the Ministry of National Education of Turkey, Çakiroglu and Melekoglu (2014) conducted a study on the education of students with special needs in inclusive settings. Their study concluded the percentage of students with special needs in inclusive education, is higher in Turkey than many European countries. The results indicated the number of students with special needs, as well as students in inclusive education, has rapidly increased in Turkey. They recommend, however, that focus should be placed on improving the quality and variety of special education services within inclusive education. While Turkey has adopted helpful policies in addressing the needs of students with disabilities, they must be effectively implemented.

Meral and Turnbull (2014) compared the special education law of Turkey with comparable law of the United States. Using the six principles of the Individuals with Disabilities Education Act (IDEA) they compared Turkey's special education statute, Special Education Services Regulation of Turkey (SESRT), to IDEA's major principles with special attention given to the education of individuals with intellectual disabilities. Although the authors found similarities in the provisions of IDEA and SESRT, they found misalignment as well. They concluded if Turkey wants to bolster its application for membership in the European Union they would want to address in greater depth the zero reject principle concerning discipline, nondiscriminatory evaluation with bias free testing and assessment, appropriate services and supplementary aids, least restrictive environment and improved due process procedures.

Post High School Preparation and Participation

Admission to all undergraduate programs in Turkey requires a valid high school diploma and a sufficient score on the Student Selection and Placement Examinations: the Transfer Examination for Higher Education (YGS) and the Placement Examination for Bachelor's (LYS). Admission is based on students' composite scores, which take into account the YGS and LYS scores as well as high school grade point averages (Council of Higher Education [CHE], 2014). Entry to post secondary education is highly competitive and depends on test results at the end of lower secondary school and consequently, many parents prefer their children attend one of the highly selective elite schools where students have a higher possibility of being admitted to a university.

With the increase in the number of higher education institutions, post-secondary education has become more accessible with almost 5.5 million students in higher education in 2013-2014. Having a higher education degree in Turkey has proven beneficial and the government of Turkey has tried to better align tertiary education to the standards of countries in the European Union. The OECD (2015) reports that tertiary-educated 25-34 year-olds can expect to earn 56 percent more than those with upper secondary and post-secondary non-tertiary education. Males have a higher graduation rate in tertiary education than females, which is in contrast to many OECD countries (OECD, 2013).

The value of vocational education is based on its ability to match the skills, knowledge and competencies with the requirements of the labor market and the world of work. Vocational education in Turkey needs to conform to the practice in the field and vocational higher education should reflect the requirements of the labor market both in Turkey and in Europe (Demirbilek, 2010).

Curriculum Reform in Turkey

Historically, Turkey's secular status played a large role in curriculum development. The Turkish Revolution in 1923 established a secular government limiting public expressions of religious faith. Kemalism, also known as Atatürkism, was the founding ideology of the Republic of Turkey. The new Republic tried to build a secular Turkish identity that did not include Islam. Under the rule of Mustafa Kemal Atatürk, high school history textbooks were written to assist in the Kemalist project to develop a secular Turkish identity without Islam. In the first series of textbooks used between 1931 and 1941 emergence of life on Earth is justified with the evolutionary theory and the emergence of religion is examined from a psychological perspective, pre-Islamic Turks were extolled as the real founders of most civilizations, and Islamic doctrine was rejected. Soon after the death of Atatürk, the first volume of textbooks was rewritten. The Kemalist project of creating a secular Turkish identity without Islam ended in 1942 (Ari, 2013).

Currently the MoNE prepares textbooks and allows the use of other textbooks submitted by private publishing companies once they have been approved by the Board of Education. The Ministry has sought curriculum reform based on policies aimed at achieving membership to the EU and preparing the Turkish nation for the new information age. The MoNE introduced new reforms including redesigning the whole curriculum on the basis of a constructivist paradigm and developed new textbooks employing a student-centered approach with the new curriculum to draw on the country's cultural, historical and moral tenets. Although new textbooks have provided for a constructivist approach, there is still evidence that Turkey seeks to create a distinct Turkish identity.

In 2003, Turkey began by reforming curriculum in elementary education (grades 1-8) in mathematics, science, social science, life science, and Turkish. One of the major motivations for the curriculum reform was to reach ideal international standards of education implemented in Europe, North American and East Asia. The reforms also supported children's active construction of their knowledge through problem solving, exploration, reflection and communication (Koc, Isiksal & Bulut, 2007). Early Childhood Education also saw changes in its curriculum. Demircan and Olgan (2011) examined four curriculum models used with early childhood education and their associated assessment systems. The new curriculum was based on a constructive perspective, however in early childhood, it was still missing some of the requirements of constructivist education in terms of assessment techniques.

Çayir (2009a) conducted a review of the new social studies curriculum and concluded the new textbooks did little to address ethnic, gender or language-related differences. The history of Kurds and non-Muslim minorities still was excluded from the curriculum while the importance of Turkish as the only legitimate language was still emphasized. Çayir (2009a) concluded the new Social Studies textbooks showed a narrow definition of nationalism and citizenship and that Turkey needed genuine educational reform and new textbooks in order to expand Turkey's range from the nation to humankind. Öztürk (2011) reviewed history curriculum for secondary schools in terms of teacher autonomy and analyzed whether the change in curriculum brought any significant innovation regarding teacher autonomy. He concluded that although the new curriculum program attempted to introduce a number of innovative approaches and methods, the new history curriculum failed to provide teachers a broad sphere of power and autonomy that would allow them to assume a greater role in the curriculum planning and implementation. It provided little room for teachers in the selection and planning of the teaching content, methods and materials. Öztürk (2011) viewed this as a contradiction to the reform goals that included the development of student-centered teaching methods focusing on the needs, interest and demands of students and their diversities. These studies would

indicate curriculum reform has not aided the quest for EU endorsement and teacher autonomy is a core issue that needs to be addressed in order to adequately deal with the current educational problems in Turkey.

Religion, Secularism, and Human Rights

Education has been a battleground between the secularists and religious conservatives of the current ruling Justice and Development Party (AKP). Recep Tayyip Erdoğan, who won Turkey's first popular presidential election in August 2014 with 52 percent of the vote, has been seen as a champion of the rights of the pious, equalizing the balance after decades of Kemalism. In 2014 almost a million students were enrolled in imam hatip schools (which teach boys and girls separately and devote approximately 13 hours a week to Islamic instruction in addition to the regular curriculum), up from only 65,000 in 2002 when Erdoğan's AK Party first came to power (Afanasieva & Sezer, 2014).

Conflicts arising from religious education have been brought before the European Court of Human Rights (ECtHR) and thus attracted more attention. The annual progress reports prepared by the EU on Turkey have also put emphasis on religious education in Turkey. The main issues that were subjected to criticism from the EU were compulsory religious courses in public education and vocational education of religious minorities (Grigoriadis & Gurcel, 2012).

Some of the most fundamental human rights protected under the European Human Rights Convention are established in article 9, which ensures freedom of religion, and article 2, which establishes parental rights in terms of childhood education. Article 2 concerns a particular aspect of freedom of religion, namely the right of parents to ensure the education of their children in conformity with their own religious convictions: "No person shall be denied the right to education. In the exercise of any functions which it assumes in relation to education and to teaching, the State shall respect the right of parents to ensure such education and teaching in conformity with their own religious and philosophical convictions" (Council of Europe, 2013).

Alevi Muslims, who make up around 15-20% of the Turkish population, have appealed to the European Court of Human Rights to avoid having their children taught the sectarian, Sunni version of Islam. Secularists are concerned about religion being taught to students at younger ages. Islam is now taught in primary schools, and the government is appealing to the European Court of Human Rights to allow more mandatory religion classes for students of all ages (Smart, 2015).

The movement away from secularism was illustrated by the experience of Bill Cobern, director of the Mallinson Institute for Science Education at Western Michigan University. Dr. Cobern visited Sakarya University while in Turkey on a Fulbright fellowship. He felt he was warmly welcomed, but his views on religion and science were not. After a lecture he gave in 2011 on the competing influences of secularism and religion in science education, a high-ranking administrator at Sakarya spoke and made a case that science needed to be understood in the context of Islam. The administrator warned that scientific ideas were acceptable, but that such ideas were not taught by their religion. Coburn's experience highlights what many scholars see as a growing Islamic influence at universities as a result of the policies of Prime Minister Erdoğan and his Justice and Development Party. They express that Mr. Erdoğan and AKP officials have restricted academic freedom and undermined the teaching of topics, like evolution, that go against the party's religious values (Yeginsu, 2013).

In 2013 a wave of demonstrations and civil unrest in Turkey began initially to contest the urban develop plan for Taksim Gezi Park in Istanbul. The protests took on a broader role including issues of freedom of the press, expression and assembly and the government's encroachment on Turkey's secularism. One professor of the state run Bosphorus University, who requested anonymity to avoid reprimand by administrators, described the Gezi Park protests as a tipping point for many branches of society and a much needed release for academics that had been subdued by their institutions (Yeginsu, 2013). The author was present in Istanbul and Ankara at the time of the 2013 protests and witnessed multiple examples of teachers and students in K-20 educational settings

express support for the protests. Some showed solidarity for the cause by clanging silverware on glasses in the school cafeteria, others joined the protests during after school hours, and many verbally expressed their concern for the preservation of academic freedom.

Government officials have traditionally been responsible for selecting the leaders of public universities from among candidates proposed by faculty, however, many professors say rectors now are chosen on the basis of their religious backgrounds. Yeginsu (2013) quotes doctoral student Gul Ara saying, "People say religion is a part of the government's hidden agenda, but it's no secret. Erdoğan has said he wants to raise a religious youth, and the most effective way of doing that is by infiltrating academic institutions" (p. 18). Çakmak (2009) believes it is reasonable to claim that today, under the rule of the Justice and Development Party, pro-Islamic public education constitutes a more serious threat than in the past for a Turkish democracy.

In an article on Turkey's fitness to join the EU, David McAllister, then a Christian Democratic Union candidate for the European Parliament stated in an interview, "The Erdoğan Turkey of 2014 has moved further away from the standards of the European Union. The current assault on freedom of expression in no way conforms with European standards" (Mangasarian & Delfs, 2014, para. 2).

Despite continued areas of concern, the European Commission 2013 Turkey Progress Report indicated there had been good progress in the area of education. The report indicated Turkey continued to improve in its performance in all the targets of Europe 2020 (a 10-year strategy proposed by the EU on March 3, 2010) to reduce the gap with the EU average, except in tertiary education. Tertiary education attainment improved but less the EU average. The report cited significant quality differences among Turkey's universities (European Commission [EC], 2013). The report holds promise that educational reform in Turkey still has areas of concern, but is making progress in bolstering its endeavor to join the EU.

Other Factors in Turkey's Consideration for the EU Status

It must be acknowledged that Turkey's negotiations to become a part of the EU are affected by various factors other than education, but the scope of this paper addresses the issues most closely related to education. Dr. Muzaffer Senel, professor of international relations at Istanbul's Sehir University in an interview with Aljazeera, cited the EU's financial crisis, the rise of right-wing parties in Europe in the late 2000s and Islamophobia as reasons for the stalemate between the EU and Turkey. Issues such as the unresolved Cyprus dispute and the Gezi Park protests have also been cited as reasons for the "frozen relations" (Uras, 2013).

It is important to understand the multiple layers of support and opposition to Turkey's accession to the EU. Eligibility for membership in the EU is a matter of not only meeting economic conditions but also the Copenhagen criteria, established in 1993. These criteria are outlined in terms of politics (including democracy, rule of law, human rights, protection of minorities), economics (a market economy able to withstand the economic forces within the EU), and the country's capacity to take on all membership obligations (Findley, 2010).

Conclusion

The European Commission 2013 Turkey Progress Report indicated there had been good progress in the area of education indicating Turkey continued to improve in its performance in all the targets of Europe 2020 except tertiary education. Tertiary education attainment improved but less the EU average (EC, 2013). This is encouraging information in regard to Turkey's prospects for entry to the EU. However, several areas will need to be strengthened in order for Turkey to be considered an equal partner with its EU counterparts. Continued efforts are necessary to reach the goal of providing equal access and nondiscriminatory education for all. There is still disparity between urban and rural areas and girls lag behind in completion of higher levels of education. National spending on education continues to lag behind OECD averages. Turkey has enjoyed success with enrollment of students aged

five to 14, but continues to witness a less desired rate for those in middle and high school, with enrollment also falling below OECD averages. New teacher preparation was instituted in 2011 and promises to provide more content specific training for teachers, while the need for additional training programs continues. Inclusion of students with special needs in general classroom settings improved in number, but quality of programs still raises concerns. Special education should address the IDEA principles of zero reject, nondiscriminatory evaluation, bias free testing and provision of appropriate services if it wishes to bolster its application for membership in the EU. Post high school education is restricted for many students who are not able to receive sufficient training at the high school level and students experience a great deal of pressure in deciding the future of their educational studies at an early age. With the AKP in power, secular education has been tested. Many see religion playing a greater role in public education in this declared secular state. The ongoing tension of the new role of Islam in public education potentially threatens the right of parents to ensure the education of their children in conformity with their own religious convictions. Curriculum reform has offered a constructivist paradigm and developed new textbooks with a student-centered approach; however, concerns continue that it falls short of real reform in terms of teacher autonomy over content, methods and materials. Turkey continues to address its educational concerns while progressing toward the goal of improving its status as a European Union candidate.

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Using Strategic Planning to Create the Public Good for Higher Education in Volatile Times

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Abstract

The purpose of this study is to assess how public higher education institutions are serving the public good at time when economic, social and environmental conditions are increasingly becoming more volatile. While by no means the only issues of concern, Zizek (2009) argues that impending ecological threats, the growing divide between the rich and the poor, the growing instances of social turmoil and political instability and the threats associated with technology are the most serious issues facing the world today. This paper employs a “gap method” to determine how higher education institutions are serving the public good. The gap method utilizes a researcher created conceptual framework to represent the more volatile factors which have the potential to impact any notion of the public (the four listed above). The framework is used to critically evaluate three strategic plans of higher education institutions in a state on the east coast of the United States.

Key words: Using Strategic, Public Good, Higher Education, Volatile Times

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Introduction

The public good is a notion that will be increasingly critical for higher education scholars to examine and understand. While interpretations vary, the public good can be thought of as the amount of social cohesion between citizens and the presence and access to democratic institutions in a given society as well as the access to healthcare, education and financial opportunity (Calhoun, 1998; Mansbridge, 1998; Marginson, 2007; Putnam, 2000). Public institutions of higher education traditionally have had a special role in promoting the public good because they promote cultural tolerance, social criticism, civic activity and economic equality among other things (Bowen, 1996; Marginson, 2007; Pusser, 2006).

The public good is not a static notion however; rather it is fluid and changes as social conditions and environmental contexts shift (Calhoun, 1998; Mansbridge, 1998). The early years of the twenty first century have already proven to be replete with new and different challenges than societies have faced in the past. Specifically, four related issues which increasingly threaten any vision of the public good and social stability for localities and nations around the world are the widening income gap, increasing social conflicts, the biogenetics revolution and ecological disaster (Zizek 2009). Of course, there is no universal consensus on these threats and many critics argue that these threats are over exaggerated. Nonetheless, they are still issues which will most likely need to be seriously addressed in some manner in the near future. As mentioned previously, the purpose of public institutions, and especially higher education institutions, is to serve society and the public good (Byson, 2004; Pusser, 2006). Thus, higher education institutions should begin to grapple with the threats enumerated above if higher education institutions are to continue in their missions to serve the public good.

The purpose of this study is to assess how public higher education institutions are serving the public good at time when economic, social and environmental conditions are increasingly becoming more volatile. In order to achieve this however, the notion of the public good cannot remain as an abstraction. Instead, the public good must become something empirically measurable. Of course, no research could ever measure the public good in its entirety, but researchers can begin to understand empirical aspects of the public good. One way to empirically measure the public good is to examine a higher education institution's strategic plan.

Ultimately, a strategic plan is a process meant to guide an organization to create public value (Bryson, 2004). Yet, while strategic plans undoubtedly demonstrate how higher education institutions are creating the public good, they may not go far enough in dealing with the four threats outlined above. A new empirical vision of the public good can begin to emerge by examining what current strategic plans call for, where they may fall short and how these gaps can be filled. This paper employs this "gap method."

This paper employs an deductive, a priori coding procedure (Allan, 2008). After reading literature on the public good, especially recent works dealing with the above threats, I have generated a list of terms and ideas which are more representative of this new, more volatile vision which currently impacts the notion of the public good that strategic planners at public institutions increasingly face. I then selected strategic plans from three universities in a state on the east coast of the United states. The purpose of selecting plans from these universities was to give a representative sample of the different types of institutions, at least for the state. The language in the strategic plans was examined to see if it referenced the ideas present in the a priori list. The intent was to examine any gaps between the a priori list and the language of the strategic plan. These gaps can begin to point for new directions for institutions to pursue in order to help shape a new vision of the public good in these increasingly unstable times. This new vision does not exist in a vacuum however; it must be realized through existing structures and capabilities of the institutions, which can be determined through the strategic plan. Further, the new vision is not a static goal to be reached, but rather an

evolving framework to guide higher education institutions in their creation of public value in a volatile era.

Literature Review

This section presents the relevant literature on strategic planning and the public good, and from this literature offers a conceptual model of the a priori list which will be used to examine the strategic plans. I have dealt with the themes addressed in this paper in other places as well, see Letizia (2013; 2015; 2016).

Strategic Planning

Strategic planning has become a necessary tool for both private and public institutions. It essentially is the creation of a map which helps to guide organizational and institutional behavior. While all strategic plans vary, there are some essential components to all plans. Perhaps the most essential, and the starting point, is a definition of an institution's mission (Bryson, 2004). An institution's mission is its reason for existing. In the case of a public institution, this mission is always tied to creating public worth or enhancing the public good. Next are typically goals and vision. The planners decide what goals the institution should strive for. What goals related to the mission are feasible and desirable for the institution? The vision is where an organization hopes to be, of who it hopes to serve, in the future. While a discussion of vision and goals is crucial, they must be approached realistically. Thus, an examination of the current resources of an institution is crucial as well. Relatedly, the question of who the institution serves must be examined. Who are the stakeholders? How can the various groups of stakeholders be served with the resources at the organizations disposal? (Bryson, 2004).

Perhaps the centerpiece of strategic planning, at least according to Bryson (2004) is an exploration of an institution's strengths, weaknesses, opportunities and challenges (SWOC). The SWOC analysis looks to internal strengths and weaknesses of the organization stemming from a variety of sources, such as resources, funding and/or staffing. Next the opportunities and challenges that an institution may face are then realistically examined. Finally, strategic plans should examine how the plan will be implemented and evaluated to see if it is effective. All strategic planning processes vary. Yet, the above components are present in many strategic plans not just in education but across the public and private spheres. In a sense, these components, mission, goals, resources, stakeholders and SWOC analysis are integral pieces to establishing public value (Bryson, 2004). Yet, these components may need to be viewed in the light of a rapidly changing, and much more volatile environment that is increasingly facing public institutions (Malott, Hill & Banefield, 2013).

Bryson (2004) argues that planners must consider a multitude of radical and revolutionary strategies, not simple or minor fixes for their organization, if strategic planning is to be truly effective. This framework is an example of a radical new strategy to reframe organizations in volatile times. While neoliberalism will be examined in more detail in the next section, neoliberalism is basically a theory which holds that public institutions operate more efficiently when they are structured like private, market based institutions (Harvey, 2005). This push to make public institutions resemble the private sector almost always entails reductions in state support, performance funding for results as well as market based goals such as producing patentable products and an educated workforce (Giroux, 2011).

In their 2013 study, Ramachandran, Chong and Wong surveyed institutions in the Malaysian higher education network to determine their use of the ideas of knowledge mobilization. They found that while knowledge mobilization was important to planners, it was not utilized often. The purpose of their study was to identify gaps in the use and implementation of knowledge mobilization techniques and then provide new strategic directions for planners. My study draws off the methods of this study, specifically the notion of employing a gap analysis. Instead of a survey however, I have created an a priori framework to create a qualitative gap analysis. While an imperfect measure, understanding the gap between the a priori framework and the actual strategic plan, as well as the possibilities for achieving this new vision of the public good represented in the framework and present in the plan, can

begin to hint at an empirical measure and strategic directions for higher education institutions to shape the public good in these volatile times. Now, we turn to the actual substance of this new public good and neoliberalism (Allan, 2008).

The Public Good

Scholars can reconceive of the public good as a constellation (Adorno, 1966/2004) built with a number of ideas, and which can enhance the quality of life of citizens. More than just material comfort however, this constellation must provide citizens opportunities for democratic participation in their polity, as well as access to essentials such as education and healthcare. The constellation is nebulous, it grows with new ideas, knowledge and discoveries. Higher education institutions have a special role to play in how this constellation evolves because higher education institutions are centers of knowledge creation (Bowen, 1996; Lattuca & Stark, 2009). Knowledge created in higher education institutions augments the public good constellation, it allows people to think different thoughts and envision new possibilities.

The awesome potential for higher education institutions sketched above however faces many obstacles. Perhaps the greatest obstacle is the dominance of neoliberalism, which is a political and economic theory espoused by many policymakers in the United States and around the world (Malott, Hill & Banefield, 2013; Peet, 2009). Drawing its inspiration from 18th century liberals, neoliberals believe that an unencumbered free market and *lassiare faire* economic system leads to the maximum amount of social harmony (Harvey, 2005; Plant, 2010). Generally, neoliberals view all types of state intervention, and especially state supported institutions such as schools and government agencies, as disturbing the equilibrium of the market. Of course the great paradox of neoliberalism is that many policymakers have no qualms about resorting to state intervention in the form of protective measures and mandates (and in some cases even military use) to establish and protect markets (Chomsky, 1999; Klein, 2007).

Neoliberalism (ironically backed with state power), has helped policymakers in the US and many other countries eviscerate public institutions in their own countries as well as in the developing countries and restructure these state institutions to be more in line with the market. Many devoted neoliberal reformers argue that their methods are meant to make the public sector more efficient. Higher education has been subject to neoliberal reforms for the last four decades. These reforms have included drastically diminished state funding and the imposition of performance based funding mandates to name a few. The call is for efficiency, but many critics of the neoliberalism have pointed to efficiency as a façade for profit accumulation at the expense of the public sector and the middle class (Anwaruddin, 2014). As a tool of profit accumulation, neoliberalism and its evisceration of the public sector may not just aggrandize the already rich. Rather, this pathological drive toward profit accumulation may have more dire effects on the world at large because usual barriers, such as massive impoverishment, ecological destruction and social turmoil are no longer considered barriers, but either knowingly ignored or mediated with paltry remedies.

Radical leftist/Marxist philosopher Slavoj Zizek identifies the main threats of pathological neoliberalism as threats to the shared commons of humanity. He describes three types of shared commons, the commons of culture, or humanities shared language, education, infrastructure and public institutions in general, the commons of external nature and the commons of internal nature which deals with the issues of genetic and technological manipulation of the body and society. The notion of a shared commons is antipathy to neoliberals because public space is to be enclosed and secured for private benefit and profit (Zizek, 2009). Neoliberalism, if left unchecked, may have the potential to annihilate this public space.

Zizek (2009) specifically identifies the threats to the commons as impending ecological disaster, increasing wealth disparities and inequality, increased questions of intellectual property rights and the threats associated with the biogenetic revolution (Zizek, 2009). He argues these four threats are eminent, yet he is by no means the only one to argue this (Anwaruddin, 2014; Fuentes-Nieva & Galasso, 2014; Giroux, 2011; Malott, Hill & Banefield, 2013; Pogge & Horton, 2008;

Singer, 2004). Of course, there is not a universal consensus. Many critics maintain the threat of environmental destruction and global warming are at best overblown and at worst downright false. Similarly, some also argue that rising levels of inequality are beneficial to the global economy and compatible with democracy. This paper argues that environmental destruction and rising levels of inequality are serious threats which must be contended with. These threats are also not limited to one country. Yet, to understand global inequality, certain factors must be considered. There are two ways to evaluate global wealth inequality. The first consideration is: are we looking strictly at wealth inequality between the world's richest and poorest residents, which is a situation where high levels of inequality can exist while poorer people still have more than enough, just not in proportion to the richer citizens (Singer, 2004). This is in contrast to the actual welfare of the world's poor. How hard is the life of people who are classified as poor? This paper looks at both, inequality and the state of the poor because both are rising. While the distance between the rich and the poor is growing, the lot of the poor and even middle class, even in so called advanced countries is becoming more difficult. Billions of children, including millions in the United States suffer from starvation and malnutrition.

Perhaps the most telling statistic is the fact that the richest 85 people in the world own as much wealth as the bottom three billion, or half of the world's population (Fuentes-Nieva & Galasso, 2014). This trend, whether we consider inequality as the distance between the rich and the poor, or the actual state of the poor and middle and lower classes, are both getting worse. Further, neoliberal policies such as tax breaks for the wealthy, business friendly policymakers and the gutting of public institutions (specifically public education) are the main culprits (Giroux, 2011).

As Peter Singer (2004) argued over a decade ago, the world population may need to stop imagining itself divided into artificial boundaries called nation states. Rather, it makes sense for the world population to begin to see itself as just that, a world population which faces a number of complex issues that can only be solved in a global framework, not by divisive nation states (Singer, 2004). Of course, it is not desirable or feasible for citizens to just forget their local communities. Instead, Marginson and Rhoades (2002) global-national-local or glo-na-cal heuristic is of use here. Instead of seeing local context, the national context and the global context as separate spheres, Marginson and Rhoades (2002) argue that all of these spheres are related. An apt metaphor is a circuit. Local happenings can inform national conversations (unfortunately, the events of Ferguson and Staten Island are examples of this), and these events usually feed into global conversations. The glo-na-cal is a continuous circuit, the events of which constantly inform each other. If the public good is understood as a circuit where all events are connected, then one does not have to give up their communal or national affections for some distant global citizenship. Rather, one's global citizenship is intimately connected to one's national and local affections. So, when Singer (2004) calls for citizens in countries (especially western countries) to take a more global view, Marginson and Rhoades (2002) heuristic may be a way to accomplish this global understanding without losing one's local and national identity. In fact, a glo-na-cal conception of the public good can simultaneously strengthen ones global, national and local identity.

Also, when referencing the public good, it is important to understand that there is no one single public good. Rather, different groups of citizens will have different visions of the public good (Calhoun, 1998; Mansbridge, 1998). A classic example here would be the opposed visions of the public good between businessmen and environmentalists. We need ways to recognize differences but cogently speak of the public good for a variety of different groups in any polity (Calhoun, 1998; Mansbridge, 1998). The framework created in this paper can act as such a method to facilitate dialogue aboutbetween different visions of the public good by employing a glo-na-cal heuristic when proposing strategic directions for future strategic planners to consider.

As the threats to the various shared commons progresses, higher education institutions find themselves in a precarious position. Formerly, higher education institutions, at least in the United States, were entrusted with a large share of the state's tax dollars in exchange for liberally educating state citizens as well as providing service to the state. This was the traditional social contract that public higher education institutions had with their state legislatures and taxpayers. This social

contract has now broken down (Lewis & Hearn, 2003). State funding for higher education institutions across the United States has been slashed dramatically due to neoliberalism. So, a new social contract between institution and state may be needed (Kallison & Cohen, 2009). The strategic directions posed in this paper can help inform a new vision of the social contract.

Higher education institutions, rooted in nation states, cannot obviously solve all these threats. Yet, while they find themselves in a precarious situation, there may be an opportunity here. Higher education institutions can create knowledge, engage in research, service and teaching to stop the enclosure of the various commons and in the widest sense, help to forge a new vision of what it means to be public in the 21st century. They can forge a new social contract not just with their state but with their community, their state, nation and the world. These four threats are by no means the only threats will impact the creation of a new vision of the public good. Nonetheless, these four threats do offer a framework for researchers to use to analyze different pieces of information. This paper will use these four threats as a starting point to examine the strategic plans of certain institutions because it is the strategic plan which outlines how an institution sees itself creating public value (Bryson, 2004). I have also added a fifth threat specific to public institutions, that of diminished state funding. From these five points, a framework was created to analyze the selected strategic plans. The purpose is to identify the gaps between the glo-na-cal vision of the public good elucidated in this paper with how the plans actually produce the public good. Again, the examination of this gap is not meant to point out a deficiency, but rather, to point to the way forward.

Methods

The first task is to determine exactly how the strategic plans of the selected higher education institutions portray the public good. This will be accomplished by using Bryson's (2004) essential elements of a strategic plan (mission, goals, resources, stakeholders, SWOC, implementation and evaluation) to identify what map the plan creates for the institution, what direction the institution is heading toward. These essential elements give a basic illustration of how the institution produces public value. Below is the framework that will be used to examine the essential components of the strategic plans.

Strategic Plan Components	Description in strategic plan	Summary
Mission		
Vision		
Goals		
Resources		
Stakeholders		
Strengths		
Weaknesses		
Opportunities		
Challenges		
Implementation		
Evaluation		

From the summary of the above chart, I created a composite analysis. The composite analysis is indicative of how the institutions see themselves creating public value or the public good. From the composite analysis, I then applied the following framework which draws on the ideas in Zizek (2009):

Threat	Is threat referenced? If so how?	Possible Direction	Strategic
Ecological Threat			
Growing Inequality			
Social Turmoil			

Biogenetics		
Diminished State Funding		

The results of this analysis are the heart of the gap procedure. This gap can be an empirical measure of how the institutions in question are promoting the public good and how these institutions are meeting emerging threats to the public good in this volatile age. This gap, while by no means quantitative, can give scholars a strategic direction to pursue in crafting new plans and policies for universities.

Site Selection

The three universities selected were Colonial University (CU), Land Grant University (LGU) and Fighting Father University (FFU). (All names are pseudonymous. The reason for choosing these three universities was to give a representative sample of different institutions across a state). All universities are public. CU, located in a state on the east coast of the United States, is a considered a most selective university. LGU is a large, research university, located on state's western boundary. FFU is located in the northern part of the state. While this analysis is only for one state, an analysis of the strategic plans of these institutions, taken together, can offer a bigger picture of how certain public institutions are addressing the increasing challenges of neoliberalism. The hope is that other institutional planners can begin to perform gap analyses on their own strategic plans and look to the results of this study to guide their thinking.

Results

For each university's strategic plan, the composite analysis will first be presented. There is a disclaimer here. Strategic plans are constantly changing. They are updated, modified and in some cases scrapped. My analysis is a snapshot of a point in time. In addition, the plan is only words, people may or may not choose to follow it, and ideas not mentioned in the plan may be mentioned or carried out in other parts of the university (for instance, environmental concerns are a focus on the CU website, I just did not see them in the plan). Further, my analysis is my interpretation, and I may have missed specific institutional nuances, or I may have been wrong (Thank you to Pam Eddy for these ideas). Next the results of the framework and the possible strategic directions will be examined for each university's plan.

CU Composite Sketch

The mission of the CU centers on its over 300 year liberal arts heritage and providing a liberal education in conjunction with its graduate/professional programs. Teaching and research are core parts of the mission; they are given the same status (as opposed to just research). Service to the community, state and international sphere are also a part of the mission. The planners at CU desire that the college be recognized as an international leader in undergraduate education. Further, they want CU to be recognized as one the best liberal arts schools in the world. The planners emphasize that CU must foster our global presence to truly become one of the best liberal arts universities. Further, as part of the vision, the planners sought to build an academic community that creates new linkages between faculty and students, as blends learning and living. Below is a list of all the goals that were elucidated in the plan. In some cases, I have copied goals verbatim, in others, I have paraphrased. This was done for all plans.

1. Broaden international reach (mentioned twice).
2. Improve diversity.
3. Encourage interdisciplinary (mentioned twice).
4. Expand need and merit aid.
5. Provide access to all students.
6. Affordability for low and middle income students.
7. Use technology appropriately.
8. Promote engaged learning.

9. Bring faculty and students staff together.
10. Develop critical thinking.
11. Rebuild financial foundation.
12. Recognize all aspects of faculty work.
13. Integrate non-tenured faculty into university channels.
14. Develop policies that respect dual role of faculty as researchers and teachers.
15. Promote lifelong learning.
16. Encourage efficiency.
17. Promote CU through a public relations campaign.
18. Promote a common CU identity.

The resources indicated in the plan were: state support (which is dwindling), growing philanthropy and a new tuition model. The stakeholder are: faculty, students, alumni, parents, state council of higher education in the state, the state's General Assembly, the citizens of the state, in state students, out of state students, the nation and the world.

The strengths of CU indicated by the planners were: the new business model to secure a financial future, the CU tuition promise, engaged learning which is mentioned three times and consists of small classes, faculty-student interaction, intense research and service which leads to discovery. Other strengths identified were student focused education, students learning to ask questions, students learning empathy, curiosity, and ultimately students wanting to make difference in the world. Low student/faculty ratio and the storied heritage/reputation were also cited as strengths. The one weaknesses elucidated was the low faculty and staff salaries. The planners identified four opportunities for CU to build a new and enduring financial foundation on: available public support, growing philanthropy, productivity (efficiency) and performance. The major challenges identified by the planners were the financial challenges facing the university, specifically dwindling state support. A Planning Steering Committee (PSC) was created to help implement the strategic plan from 2015-2019 at CU. The PSC identifies challenges and sets numerical and monetary targets to be reached. So, these targets can serve as an evaluation of the effectiveness of the plan.

CU Analysis

The ecological threat is not mentioned in the CU strategic plan. This may indicate a gap between the strategic plan's conception of the public good and the actual conditions where a public good will be forged in the coming years. There are mentions of increasing CU's global reach and influence however which could be a way to handle the environmental threat. In addition, one of the core tenets of the CU mission is service to the community, the state and the world. Also, one of the goals is to recognize all aspects of faculty. The plan's attention to global reach, service and recognition of different faculty research pursuits could be a foundation for later faculty, administrators, staff and students to build on in regards to the ecological pressures facing the world today. This foundation could include a promotion of faculty teaching and research of various aspects of the ecological pressures and threats we face as a civilization. Of course, the university may deal with political pressure from groups who do not see the ecological threats as threats. Nonetheless, the goals and the vision elaborated on in the strategic plan may be a way to promote a new ecological consciousness at the university. The gap between the impending pressures which will impact the public good and the how the strategic planners perceive CU contributing to the public good is not a deficiency however. Rather, the gap is a space for action. But this cannot just be action, but action informed by theory or praxis (Freire, 2000). This notion of praxis used to fill the gap will be undergird the following examinations of the three strategic plans.

There is no direct mention of global inequality or the condition of the poor, either at home or globally. However, there is mention of assisting low and middle income students who are finding it harder to pay for tuition. There is also much space dedicated to the new tuition policies, mainly keeping tuition reasonable. Affordability is one of the major goals of the plan. Of course, there is no mention of why there are increasing numbers of low and middle income students. So, there is a gap between the plan and reality, but the gap can be narrowed by certain ideas present in the strategic

plan. For one, the broad (and admittedly vague) goal of inspiring critical thinking can be and should be stretched to include thinking about such volatile topics as rising global inequality. When millions cannot read, when millions are starving or living in near poverty, even in the so called rich countries, any institution that claims a desire to have a global reach as CU does must grapple with these serious issues that impact the fostering of a public good. Students must be taught to critically think about these issues and more importantly, change them. Again, the strategic plan does reference that CU students and faculty desire to change the world, and that they usually do. Here, a glo-na-cal perspective could be invoked by faculty, administrators, staff and students. What effect can students in the locality of CU have on global inequality? Their position in their locality must be situated in the much larger frames of the nation and the world, without ever losing sight of the local. Research in the social sciences, natural sciences and business, outreach to entities such as amnesty international and volunteering may be useful tactics and could all qualify as critical thinking, expanding global outreach and promoting engaged learning as well as service to the community and the world.

While there is no direct mention of the growing social turmoil in the United States or globally, one of the goals of the plan is to continue to increase diversity which can be a start. This is admittedly a tenuous connection, but increasing diversity, especially increasing the number of minorities and lower class students and faculty involved in the institution, may be one way to reduce social turmoil. Diversity in many respects is a buzzword, or a word which many institutions evoke but do not truly participate in. If CU is serious about fostering diversity, then this could be an avenue to deal with the growing social turmoil that is present not only in the United States but across the globe. How can the college empower disenfranchised and underrepresented minorities? This does not only refer to race but to all types of under representation, from race, ethnicity, gender, sexual orientation and class to any other conceivable situation where a certain group is disenfranchised or does not enjoy the same privileges as the “dominant” groups. The goals of access and affordability are crucial here. One of the surest ways of empowerment is through education. Yet, this must be an education which again is critical and which teaches students to grapple with the volatile issues that are present the world around them. The planners have also dedicated themselves to securing more need based aid. Need based aid, as opposed to merit based aid, helps the underrepresented students who have a more difficult time attending and staying enrolled in college (Gross, Hossler, Ziskin, & Berry, 2015).

There is direct mention of technology and integrating technology meaningfully. The plan reads: “appropriately integrate technology into our model of engaged learning, and to keep innovating to stay relevant and efficient.” Technology is crucial to any understanding of the public good. Yet, technology is now entwined with domination (Kellner, 1992; Marcuse, 1992). The CU strategic plan uses the word appropriately. What does it mean to appropriately apply technology as the plan intends? In light of the biotechnological threat that Zizek (2009) and others have elucidated, appropriately applying technology may entail an ethical dimension. For instance, many times, universities view technology primarily as a means to profit (Slaughter & Rhoades, 2004). The most lucrative patents are usually sought, patents for commercially valuable but socially suspect uses, such as cosmetics (Slaughter & Rhoades, 2004; Washburn, 2005). Singer (2004) tells of how Western pharmaceutical companies tried to charge exorbitant prices for the HIV/AIDS treatment which would have priced out virtually all poor Africans, while HIV/AIDS had been effectively contained in the West. This is one example of an inappropriate use of technology.

Technology and its uses are determined by the market, not by human need and suffering. The strategic planners have expressed the vision that they want CU to be known as “The Liberal Arts University” in the world. One way to accomplish this could be to recast the use of technology from something distributed by the market to who can pay, to something distributed by human need and suffering. Here, the planners’ goal of promoting interdisciplinary studies could be exploited. The creation and promotion of new technology may need to proceed hand in hand with more advanced understandings which can come from the humanities and the social sciences in order to ensure that technology remains ethical and in the service of humanity, not the market. The tenets of engaged learning which are promoted by the planners could also be of use here. Engaged learning calls for close faculty student interaction and intense research and service which leads to discovery. Engaged

learning could be used in the service of this interdisciplinary quest to humanize science and truly recast the role of liberal arts universities.

The planners bluntly state that one of the major goals of the plan is to “rebuild our financial foundation, taking into account the decline in state support.” They cite this again by referencing CU’s financial rankings “we ranked 32d in quality among the leading national universities but 114th in financial resources to sustain the mission.” One of the key areas affected by diminished state funding is flagging faculty salaries. Faculty salaries in FY13 were at the 14th percentile of CU’s peer institutions. Without the steps taken in the Promise, they were projected to be in the 9th percentile by the 2015/16 academic year. The planners go on to note that “over the last generation, taxpayer support for [CU] has declined from 43% of our operating budget to 13% this fiscal year. The remedy proposed by the planners is forward thinking and necessary. The planners take a four pronged approach centered on capitalizing on philanthropy, being more efficient with existing resources, capitalizing on existing public support and increasing the universities performance in order to demonstrate to stakeholders that money is spent efficiently. The performance piece however is fraught with some difficulties, particularly the fact that singular adherence to performance metrics can blind the institution and its stakeholder to more complex metrics of progress, such as civic action and personal growth. Nonetheless, CU will have to meet performance metrics and go well beyond them to satisfy taxpayers while simultaneously crafting a new measure of success by which to be judged.

While the planner’s recognize the severely diminished state funding, they do not recognize one of the main causes of it. It is true that other state priorities need more money. The irony is that some of the benefits of a more highly educated populace is better overall health and lower incarceration rates (McMahon, 2009). So putting money into K-12 and higher education would most likely reduce the need for prisons and healthcare costs. Perhaps the biggest omission of the planners is that the drastically reduced state funding is deliberate. Neoliberal advocates and policymakers have starved higher education (and K-12 education) of funds as a way of disciplining these public entities. By starving public institutions, neoliberal policymakers hope to make public entities function more in line with the market. The real reason however may be that the public sector, and especially public education, represents an opportunity for businesses to make a profit. So, cut public funding and allow businesses to step in a “save” the failing public entities (Slaughter & Rhoades, 2004; Klein, 2007). While it may draw the political ire of some, strategic planners at public institutions may have to recognize that public institutions, especially public institutions of higher education which have traditionally been labeled as liberal breeding grounds, are targets for many legislators (Lambert, 2014; Newfield, 2008). Building off of the four point foundation, of philanthropy, productivity (efficiency), performance and public support, the college can create a new vision of what it means to be a public institution. This is an unprecedented opportunity.

LGU Composite Sketch

The mission of LGU can be summarized as: address science, technological, economic and social issues, as well as be a military college. In addition, the land grant history of the university implies service to community, state and nation. Another component of the mission of LGU is interdisciplinary research, service between arts, humanities, business, social sciences as well as encouraging research in industry, policy, health, sustainability and security.

The vision of LGU is for the university to become a national and international model for interdisciplinary studies and research and to develop an intellectual environment and encourage the contribution of students in a wide variety of areas. The goals of the strategic plan are as follows:

1. Create dynamic pedagogical methods (mentioned four times).
2. Develop team driven approaches within and beyond university.
3. Be responsive to new discoveries.
4. Create global networks.
5. Promote local, regional, national security, resilience, health and sustainability.
6. Increase undergraduate populations.
7. Increase graduate enrollment, completion and post docs, especially STEM-H and business.

8. Develop learning communities.
9. Increase internationally recognized programs.
10. Develop core competencies in computational thinking, information literacy.
11. Research geared toward practical application (translational).
12. Build upon strengths in basic research.
13. Pursue creation of new units with public, nonprofit and for profit entities that can diversify sources of revenue, mentioned four times.
14. Review and revise current business practices to optimize efficiency and flexibility.
15. Provide support for collaboration between academic units.
16. Provide time and freedom to create and apply new knowledge.
17. Recruit, support and reward outstanding faculty with strong disciplinary expertise and innovation.
18. Allow intra and interdisciplinary teams to work without unnecessary barriers.
19. Maintain growth expenditures toward target of \$680 million.
20. Build on research capacity in national capital region for security and resiliency.
21. Create new “faculties” and new grad programs in informational sciences.
22. Develop research programs in energy and critical technologies with India partnerships.
23. Students will be able to interpret information.
24. Students will be able to gain a global perspective and see diverse perspectives.
25. Expand ability to attract high quality graduate students.
26. Continual improvement of graduate stipends.
27. All majors are responsible for diversity and globalism.
28. Students must learn aspects of other disciplines.
29. Students must have opportunities to interact meaningfully with technology.
30. Involve undergraduates in meaningful, practical research.
31. Continue to use technologies to enhance pedagogy.
32. Increase international experience and utilize classroom space to enhance distance learning.
33. Develop alternate pathways for general education students.
34. Integrate computational science/informatics and digital fluency into other disciplines.
35. Enhance academic advising.
36. Enhance opportunities for nontraditional students and veterans.
37. Enhance health and well-being, cultural awareness, and lifelong learning.
38. Ensure that LGU graduates are poised to succeed in the labor market so they can contribute back to the university as alumni.
39. Help faculty maintain work life balance.
40. Improve campus sustainability.
41. Support academic initiative of the Inter-institutional Academic Collaborative for the ACC.
42. Establish university think-tank.

The resources identified by the planners were state support, increased philanthropy as well as new streams of revenue resulting from institutional partnerships with public, private and for-profit entities. The stakeholders identified in the LGU strategic plan were students (including nontraditional and veteran students), faculty (with emphasis on STEM-H faculty and faculty in new areas such as informatics), philanthropic sources, alumni (including future alumni with potential and willingness to donate), the global community, and other public, private and for-profit organizations, the university president and the implantation panel.

The strengths outlined by the strategic planners are LGU’s abilities to build on local-global connections, their focus on security research as well as the notion of resilience. Resilience, as defined by the planners is the key element in understanding stability in communities of all sizes from atoms, to ecosystems to populations. Another strength is LGU’s research in the area of brain, cognitive and behavioral sciences. Specifically in the field of medicine, a strength the planners cited is the success of the Pseudonym school of health and medicine. Other areas of strength were in food science, water,

ecosystems and communications research. The planners cited the disciplinary foundation of all disciplines as a major strength. The planners also cite that continued commitment of the university to access and affordability through the methods of online education. Finally, the planners cite the continued effort of the university to provide professional development so that faculty can use technology to enhance pedagogy as another strength.

The weaknesses are not necessarily weaknesses, but they do illustrate issues that LGU planners deem important or in need of review for the university. For one, the planners urged that the university must examine the efficiency of shared governance and see if other models are relevant and useful while maintaining the values of shared governance. They also call for the university to reexamine effectiveness of general education program. The planners call for the university to comprehensively evaluate and modify the current curriculum for liberal education. The planners also call for the university “to embrace alternate pathways to a general education and to incorporate computational thinking and informatics/digital fluency as basic skills for all students, thereby enabling students to be engaged citizens and life-long learners.” In addition, the planners call for a review of the administrative leadership structure of the institution, as well as its resource allocation.

Opportunities are areas which the institutional planners want the institution to capitalize on. Some opportunities the planners cited are to capitalize on existing state funding, philanthropy and institute new business practices to sustain revenue streams. The planners also want the university to spearhead the creation of new units and collaborations with public, private and for-profit institutions to channel resources to the university. Perhaps the greatest opportunity that the planners call for is to build on the “One health” paradigm. The one-health paradigm is a holistic view of human, animal and environmental health. Opportunities are also due to the changing technological landscape. LGU planners plan to “enhance classroom and online education by expanding the range of essential skills that students must acquire in order to excel in complex and rapidly changing digital and networked environments.” Perhaps the greatest opportunity in the present and one that LGU planners increasingly mention in some fashion is that of creating strategic global connections with a variety of entities. Along with this, the planners also want to capitalize on and foster radical and innovative research opportunities for students as well as to continue to provide increased e-learning opportunities to take advantage of technology and increase access.

Some challenges that the planners identify due to globalization are “security issues, resource scarcities, political instability and social turmoil.” Along with these challenges, the planners mentioned on three separate occasions that graduates will need new technological and analytical skills in global economy. In addition, the planners argue that international engagement is a necessity for higher education especially as the world experiences major economic, demographic and technical shifts. In this atmosphere, institutions will be “challenged to continue to meet demands for increased productivity and efficiency without sacrificing quality.” To implement the strategic plan, the planners have created an implementation panel to oversee the process. The planners have also called for the creation of new metrics to ensure accountability. Finally, in 2015 which is halfway through the plan, the president and the implementation panel will review the progress of the plan and how its goals are being implemented and achieved.

Data Analysis

The ecological threat is referenced on multiple occasions. The planners do recognize that the ecosystems of this planet, and subsequently our fate as human beings in those ecosystems and the overall environment is under duress. However, the LGU planners are silent on one of the main causes environmental degradation has been global capitalism and rampant consumerism. (But they do however mention demographic shifts which is another likely cause). So the gap between the framework and the plan is smaller in comparison to the CU planners who do not even mention anything related to the environment. Yet, there still may be some room for action because the planners do not address some of the main causes of the ecological threat. The planners placed high emphasis on making student research innovative and allowing students to participate in the process of research and knowledge creation. If this knowledge creation via research is not hampered or confined by

practicality or profitability, it can be the vehicle for creating a dynamic and fluid vision of the public good rooted in a global context, a public good which connects various groups of diverse social actors and gives them the tools to pursue solutions to pressing problems and to ask new questions regarding the environment. The planners pioneer a bold direction to approach the ecological threat; the notion of “one health.” This strategy calls for recognizing health concerns as holistic instead of fragmented into spheres of animal, human and environment. So, instead of seeing the ecological threat as qualitatively different from the global health concerns, the one health paradigm integrates these concerns. Essentially, all spheres must be seen in conjunction with each other. This approach allows hitherto connections between man, animal and environment that may have gone unnoticed to inform research. The call for this new paradigm in healthcare can be further augmented by the repeated calls in the plan for the creation of global partnerships as well as the commitment to the various health programs and disciplines.

There were some reasons for concern however. The planner’s repeated calls for global partnerships with for-profit entities could impact the call for the one health paradigm and overall ecological viability. The mission of for-profit entities are vastly different and in some sense opposed to the mission of LGU, especially in light of its land grant status. While the mission of for-profit entities may entail service and the promotion of health and wellbeing, their ultimate mission is to profit. When partnerships with for-profits are created, there must always be an examination of how their missions to make profit may come in conflict with the mission, goals and vision of LGU especially in regards to the proposed “one health” paradigm.

There is no direct reference to the threat of growing inequality. While there was no direct mention, the planners did call for a continued commitment to increasing access and affordability through on-line education. While this is undoubtedly a necessity, the planners should be cautious. Two decades ago, with the emergence of the first online capabilities, many in higher education predicted the end of brick and mortar buildings, while many administrators saw online education as potentially lucrative (Slaughter & Rhoades, 2004). The current fad is that of MOOCs, and many for-profit entities are jumping on that bandwagon. Of course, there are those who see the awesome pedagogical possibilities of online education and MOOCs and not just their potential cash value. Nevertheless Rhoades et al. (2015) argue that MOOCs, despite potential to democratize education, are really just methods for neoliberals to de-skill professors and students.

The planners do recognize some possible symptoms of growing inequality when they state that LGU “graduates will have to face uncertainties that range from security issues and resource scarcities to political instability and social turmoil.” Yet, like growing inequality, and the ecological threat, the driving causes of the growing social turmoil are not mentioned. So, the gap is partially opened. There is recognition of growing social and political turmoil, but with no recognition of the causes. This lack of recognition of the causes of social turmoil may be more troubling in light of the fact that the strategic planners showed concern regarding the liberal arts and general education curriculum. The planners sought to integrate information literacy, informatics and data analysis into the general education program which in itself is not a bad thing. However, the concern over the liberal arts curriculum cannot turn into devaluation or a lessening of liberal arts offerings. The planners expressed a desire for research to be practical and have practical capability. One familiar critique of the liberal arts and general education classes is that they are not practical. Yet, this seeming lack of practicality cannot be seen as a deficiency. Rather, it must be seen as a benefit. The purpose of the liberal arts is to see *past* practicality, is to see the wider picture and how events connect to each and the past. One of the main purposes of the liberal arts is to be tools to convey the human condition in all its beauty, truth and suffering. This wider and deeper understanding that goes past the day to day is crucial to understanding the increasing social and political turmoil around the globe. History, philosophy, ethics and a host of other disciplines that are not deemed practical or profitable will be absolutely necessary for LGU to elaborate and contribute to the public good. The planners placed high emphasis on making student research innovative and allowing students to participate in the process of research and knowledge creation. If this knowledge creation via research is not hampered or confined by practicality or profitability, it can be the vehicle for creating a dynamic and fluid vision of the

public good rooted in a global context, a public good which connects various groups of diverse social actors and gives them tools to pursue solutions to pressing problems and to ask new questions.

There were multiple references to the challenges and opportunities that technology offers to higher education. One telling reference on the part of the planners was their reference to the appropriate use of technology regarding pedagogy. So, the planners do recognize that technology can pose a challenge and it can be used inappropriately, although they do not specify how. Nonetheless, the planners do recognize that there can be negative impacts of technology, so the gap between the notion of a vibrant public good posited by the framework in this paper and what the planners are arguing for is partially closed, but there is room for movement. The movement here is toward elucidating the dangers of technology. As referenced above, the liberal arts and the general curriculum can be invaluable here.

Yet, the LGU planners also showed concern over the efficiency of shared governance. The planners should be wary not to streamline or lessen the power of shared governance. While shared governance can be time consuming and messy, and while it can be fraught with obstacles, it is democratic and allows different faculty (and hopefully) staff voices to be heard (Ramalay, 2006). If shared governance, along with the liberal arts and general curriculum are streamlined for efficiency, power vehicles of democratic and humanistic expression which can inform more vibrant visions of the public can be silenced and diminished. Like CU, LGU planners are obviously astute to the diminished state funds. Also like CU planners, the LGU planners sought philanthropy and new sources of revenue through institutional and public, private and for-profit partnerships. So, the gap is small on this issue, which is not surprising considering the dramatic decreases. Obviously, new sources of funding are needed to replace the rapidly diminishing state funds. Philanthropy and public-private partnerships are common methods to replace this funding. And while these two methods will be crucial, there are some major drawbacks which must be considered by LGU planners. There is the notion of advocacy philanthropy (Hall & Thomas, 2012). Organizations such as the Lumina Foundation and the Bill and Melinda Gates foundation have a blatant neoliberal agenda. Their philanthropy comes with strings, namely, institutions that accept funding must restructure their policies and practices in ways favorable to the funders, such as instituting more monetary performance indicators (Hall & Thomas, 2012). If institutions rely more on philanthropy which most likely will become necessary, they must take care that the “strings” do not conflict with the public mission of the university. The dangers of public and for-profit mergers and linkages were outlined above.

FFU Composite Sketch

The mission of FFU is the creation of a “more just, free and prosperous world.” This is done through social criticism emanating from a diverse student body and varied research interests. As for their vision, FFU seeks to be not “the best university in the world, but the best university *for* the world.” The planners do not seek rankings, but knowledge that is necessary and useful for social progress. The goals are listed as follows:

1. Learning innovation, use new methods, reward pedagogical innovation.
2. Create useful, targeted and interdisciplinary research for all sectors of society.
3. Expand research across all disciplines.
4. Act as an economic and cultural catalyst.
5. Prepare students for living and working in global world.
6. Deliver on investment, increase graduates.
7. Recruit and retain talented and diverse faculty.
8. Create diverse academic community.
9. Seek new sources of funding through philanthropy, commercialization, alumni and new tuition model.
10. Create accessible pathways for all students.
11. Contribute to the community.
12. Become a model well-being university where all faculty, staff and graduate assistants thrive.

The resources that the planners plan to draw on are: state aid, philanthropy, commercialization and patents, alumni donations and partnerships with industry. The stakeholders the planners identified were FFU graduates (which become engaged citizens and scholars), as well as students, community, faculty, staff, the world, alumni, governments and industry.

The strengths identified by the planners were that FFU is innovative, diverse, entrepreneurial (the university puts ideas in action) and accessible (the university is open to new ideas and methods of doing things). In addition, the planners also identified as strengths the fact that at FFU, students come first; there is an honoring of freedom of thought and expression, that George FFU is a careful steward of public money, and that the university always acts with integrity by being transparent with stakeholders and the public. Another strength the planners identified was George FFU Universities' ongoing support for small business and new entrepreneurial endeavors in the capital region, especially through the FFU Economic Center which assists small businesses in the area. The one weakness that the planners identified was that there was a lack of diversity in FFU's faculty and staff.

The planners identified a number of opportunities for FFU to capitalize on. The first was to support and expand online education as the number of students across the country taking online classes has increased dramatically (this includes synchronous, asynchronous and hybrid classes). The planners also stated that FFU was in the ideal position for economic innovation in the capital region. Further, the planners argued that FFU must build on its existing relationship with the community by becoming an economic and cultural attraction. Specifically, FFU must take advantage of the economy in the southern part of the state and be able to supply social and intellectual capital. Finally, the planners call for FFU to build on the current "pseudonyms consortium" and create a network of universities to provide global learning opportunities for students and global outreach for faculty.

The planners also identified a number of challenges facing FFU. Perhaps the biggest challenge is the drastic decreases in federal and state funding coupled with restraints on tuition increases and concerns over affordability. Further, the burden of paying for higher education which used to be largely assumed by the state is now largely assumed by students and families. Colleges must also demonstrate the benefit they provide to taxpayers. Moreover, college is no longer an option; it is now fast becoming a necessity in the technology driven globalized world. There are also pedagogical challenges. For one, "learners are demanding new physical spaces where they can interact with" faculty, and learn socially. The planners further argued that the "flipped classroom" changes the role of learner and instructor and changes expectations about learning spaces. Along with this, there is an "increased pressure to educate more diverse students, deliver better outcomes and reduce costs" of college going. Another challenge is the fact that the vast majority of college students in the United States are nontraditional in some sense so they have different needs. Many are community college students; others attend two and four year universities on a part time basis, and usually have work or familial obligations which hinder them from completing their studies. The planners also point to the fact that the US has lagged in college participation rates. All of these challenges must be grappled with if FFU is to reach its vision.

FFU laid out an implementation plan. First, each individual school works on their own strategic plan. Individual schools provide their own response to general framework provided by the university. The planners then stated that to achieve the goals and vision of the plan, the university must strengthen resources, specifically technological and financial resources, social capital and brand value. This will be detailed in another strategic plan. The planners also obtain feedback from local governments and businesses to help them implement the visions and goals. A technology plan will also be created to support the strategic goals. Finally, the planners argued that the university must create new budgeting systems. Finally, the planners identify metrics to evaluate if the plan is being correctly implemented. The FFU planners provided the most thorough evaluation metrics out of the three plans. To evaluate diversity and accessibility, the number of programs with alternative pathways will increase as will students coming in from them. To measure return on investment, more than 80% of FFU graduates will be employed six months after they graduate. Increase graduates in high demand

fields. The planners also have said that over 100 enterprises will be created and supported. As for the new funding sources, the planners call for revenues from intellectual property and executive education programs and the number of alumni donors will increase.

In order to create a more diverse academic community, the planners believe that more students should study abroad. The planners also want to double the number of students in cultural, athletic and learning activities. To remedy the lack of diversity regarding faculty and staff, the planners call for more diversity of faculty and staff will increase by 50 percent in underrepresented groups. Another metric to measure faculty pay is the university will reach/exceed the median for its peer group regarding faculty salaries. As for engagement with community, the planners call for the number of community partnerships to increase. Finally, for community engagement, the planners call for career, social, financial, physical, and community measures of well-being to be developed.

Pursuing meaningful research was another goal set by the planners. In order to measure this, the planners state that faculty receiving national recognition will increase, the college will aim to reach the classification of "Very High Research" classification, increase sponsored research funding and increase in citations and policy transfer from research.

Data Analysis

The planners never state that there is an ecological threat. However, one of the goals was community engagement and the planners see research on environmental issues as a major component of community engagement. The planners see environmental issues as a major component of building a better community. In order to meet the increasing environmental threat, faculty and staff can link the environmental issues to the mission of FFU. Examining and rectifying environmental threats (and admitting there is one) may be one necessary method to create a freer and more just society. The planners put a high emphasis on creating research of value. In addition, the vision of the planners and the basis of the whole plan is to be the best university for the world. Again, one method to be the best university for the world is to begin to identify, and create research to rectify, looming environmental threats.

There is no direct mention of growing inequality. There are indirect references to the growth of nontraditional students (but never the reason for this). One major reason for the growth of community college students and nontraditional students is due to the widening income gap. The planners also recognize that due to decrease federal and state funding, the burden of payment for a university education is falling on students and families. Again, as wages stay stagnant or fall, individuals and families have a harder time paying for climbing tuition. This situation can be tied back to the mission- to create a freer, more prosperous and just world. How can prosperity, individual liberty and justice be achieved as long as the vast majority of the world's population, including not only those in developing countries but the growing number of impoverished people in so called developed countries balloons? Furthermore, this drastic increase in poverty and near poverty levels is not due solely (or even largely) to individual initiative or personal motivation when people who work over forty hours are still in poverty. Under the goal of innovative teaching, the planners mention service learning. Service learning can be another method by which students actually engage with the growing disposed populations and other social justice issues. Service learning can be an excellent method to take the knowledge out of the ivory tower and make it useful and make it go toward creating a more vibrant public good.

If the FFU planners truly want to create a freer and more just world, if they want to enhance the life of the community, the nation and the world in a variety of ways, then they must tackle the issue of growing inequality. Fortunately, the goals, mission and vision point in that direction and can be exploited for these purposes. However, the economic goals of the planners may conflict with this. This is not to say that economic goals, such as fostering and supporting small business are incompatible with fostering the public good. In fact, economic innovation and prosperity are central to the public good. The conflict arises when economic opportunity and prosperity only enrich the already wealthy. The planners seek to increase the commercialization of research and patentable products

derived from university research as well as give businesses and industry a larger role in implementing the plan. The creating of wealth, for the university or society in general must always be tempered with a sense of justice and the public good. The purpose of wealth should never be private gain but public good. Again, this aligns with the mission of creating a freer and more just world.

There is no mention of social turmoil. However, there is an entire goal dedicated to enhancing community relations. The planners seek to do this in a number of ways, by creating a more vibrant cultural life and by enhancing art, theater and athletics. While entertainment cannot be panacea for social issues, creating a truly vibrant culture, which allows citizens a vehicle of expression, can be a beneficial thing and a possible check on growing social turmoil. Of course, even the most vibrant culture cannot be a substitute for a truly engaged politics. Another method to stem social turmoil is embedded in the planners' goal of enabling all graduates to pursue meaningful lives and successful careers. Meaningful lives and successful careers, with a vibrant culture and community life, may be a very effective antidote to social turmoil.

The planners do recognize that technology does pose challenges, especially to the transmission of knowledge, but planners generally view technology as a positive occurrence which can enhance teaching and learning, as well as accessibility (though online learning). The planners start, but do not develop a very important issue related to the public good and their overall mission of university, that of technology and knowledge transmission. While technology has made information accessible, this comes with a price. If technology is usurped by corporations and moneyed interests, such as internet broadband, airwaves and media outlets, the information that the public receives may be partisan, biased or manipulative. Information can be restricted and tailored to suit certain parties. Or, entities with power and money can influence the transmission of knowledge. In this case, knowledge represents power and not truth, curiosity or creation. One of the implementation strategies is to create a separate technology plan. Again, in line with the ideas of freedom and justice from this mission, this technology plan and future ones must recognize the ethical issues associated with technology.

As with the other two plans, the FFU planners recognize the diminished levels of state funding. A large part of the strategic plan is dedicated to meeting this challenge. Methods to meet this challenge include increased philanthropy, partnerships with industry, alumni donations and increase commercialization/patents. As mentioned earlier, when a public, not-for profit entity such as a university engages in for-profit endeavors to gain revenue, this can conflict with its public mission. The FFU planners specifically mentioned the commercialization of research. As Slaughter and Rhoades (2004) and Washburn (2005) point out, patenting and commercialization can actually conflict with the aims of science, which are curiosity and the sharing of information. The drive to profit may force some companies to suppress negative data, patents and copyrights can inhibit access to knowledge and information (Slaughter & Rhoades, 2004; Washburn, 2005). Further, if a discovery is made in a public university, subsidized with direct state aid and federal loans, Slaughter and Rhoades (2004) ask if it is ethically correct to be able to patent that discovery or rather if that knowledge belongs to the public because it was financed with public dollars. Part of the mission is to advance society through research and one of the goals to accomplish this is to forge better ties with the community. However, commercialization and patents of research can hinder the flow and access of information and research. Knowledge, research and information should be a public good which enhances (Stiglitz, 1999; Sy, 1999). So, the planners may need to revisit their commitment to commercialization or at least recognize some of the other inherent conflicts between it and fostering the public good, which is their primary good.

Another issue associated with the commercialization of products and the reliance on for-profit partnerships is that the market becomes the tool of distribution of resources. Again this is an example of how information, research and its products should be public goods accessible by all, not private goods determined by the market (Slaughter & Rhoades, 2004). This is an unnecessary restriction of the public good, especially in a so called civilized world. Universities may need to heed this situation.

Concluding Thoughts

Rorty (2008) argued that the future is not a predication; rather, it is a project that must be collectively built. While he did not specifically reference higher education institutions, his remark may be the most appropriate advice for higher education institutions. Higher education institutions have a unique role in building the project that is the future (Pusser, 2006; Marginson, 2010). The role of higher education institutions may be that of truth creators. Truth creation is fundamental to any societal movement because truth must be the guide. Further, truth cannot be influenced by power, money or ideology. Truth must reflect the conditions of the world and society as they are experienced by the vast majority of citizens. Higher education institutions, as knowledge creators, have the ability to create truth. Yet the truth that is created is not static, the truth is never a finished product. Truth is not any one item, idea or framework, rather, truth is the movement between ideas, people and framework.

This study illustrated “gaps” between a researcher created framework which represented some of the pressing issues that global society is contending with, and the capabilities and willingness of institutions of public higher education to meet these challenges. The gap in the CU plan is quite large. There is no mention of the growing ecological threat, growing inequality or social turmoil. There is some mention of integrating technology, but not of the threat that technology poses. As to be expected, there is the most recognition of the issue of diminished state funding. Despite the lack of acknowledgement of the majority of threats, the planners do offer some possible directions for scholars, administrators and researchers to follow in order to enrich the constellation that is the public good, especially the desire to draw off the liberal arts strength and heritage of the university. The planners at LGU perhaps come the closest to realizing some of the major challenges that lie ahead in regards to creating and enhancing this constellation of the public good. For one, the planners directly mentioned the ecological threat and the increasing social turmoil. While they did not examine the causes of these threats, they built in methods in their plan to remedy them, especially the environmental threat. The LGU planners also noted that technology must be used appropriately but did not elaborate on its inappropriate uses. They also pointed to the diminished state funds. While the LGU planners came the closest to closing this gap, some of their methods for doing this could raise new issues. For instance, relying on business and industry partnerships could conflict with the universities public mission. Likewise, the FFU planners also narrow the gap, but not as much as LGU, but moreso than CU. The FFU planners are at least cognizant of the necessity of the environmental research and creating pathways for disadvantaged students, but the FFU planners do not specifically acknowledge all of the threats facing public institutions and impacting the public good. In addition, the planners rely on some methods to create revenue streams which could imperil the public mission of the university, in particular, the goals of commercialization of university research.

Thus, we can say that in all three universities a gap exists but there is no quantitative measurement of this gap, only a quasi, vague understanding. The gaps are not deficiencies; they are opportunities for the institutions to enrich the public good for their communities, their regions, the state and the world. The frameworks created in this study, the capabilities and willingness of the universities and the gap between are *all* components of truth creation. The gaps I have illustrated with this study are meant to point not only future strategic planners, but faculty research and university activity in possible strategic directions to enrich glo-na-cal connections and the glo-na-cal conception of the public good. It is my hope that these strategic directions, while specific to the universities in question, can also be used as a guide for other universities. Because, as Žižek emphatically points out, there is no savior, there is no messiah who can deliver humanity. There are only people and people must act. I would further add that the truth is nothing more than human centered movement toward something deemed collectively better, toward a vision of the public good which will empower and not further impoverish the vast majority of the world’s population. This vision of the public good is fluid and active, circulating through communities, regions, states and the world. Individuals working together will circulate ideas, research and activity through glo-na-cal networks. This paper has tried to establish a crude but useable map and direction for this movement for the universities in question. There is no stopping point however; there is never a point of satiety when creating truth. There will

always be new questions to ask, new problems to solve. Truth making entails never being satisfied and constantly moving forward, and strategic planning and should be an integral facet of truth creation for universities.

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Pre-Service Teachers' Evaluation of Their Mentor Teachers, School Experiences, and Theory–Practice Relationship

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Abstract

This case study investigated practicum experiences of pre-service teachers by focusing on their evaluation of mentor teachers, school experiences, and theory–practice relationships. Interviews were conducted with six teacher candidates, and observations in the participants' practice schools were made. The results revealed that mentor teachers had both positive and negative qualities with respect to social support, professional support, and role-modeling mentoring functions. Moreover, pre-service teachers reported that they mostly experienced or felt difficulty in classroom management; parallel with this difficulty, their learning gains in classroom management were the highest. These teachers also emphasized that there was no relationship between theory and practice in teacher education and that developmental psychology and communication courses and those presenting teaching-related cases were effective at building readiness for the teaching profession. Based on the findings, several suggestions for future practices were proposed in the study.

Key words: Teacher education; cooperating teacher; teaching practice; student teachers; professional development

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Introduction

The teaching practicum is a crucial component of teacher education because pre-service teachers have the opportunity to apply theoretical knowledge learned in courses to real classroom settings (Allen & Wright, 2014; Çelik, 2008; Eryaman, 2007, 2008; Nonis & Tan, 2011). According to case studies regarding prospective teachers' experiences during their final years of teaching preparation, learning to teach is also a complex process shaped by not only personal factors, such as pre-service teachers' beliefs about teaching and learning, but also situational factors, such as wants and feedback from mentors and course teachers (Borko & Mayfield, 1995). Therefore, different stakeholders, including cooperating teachers or mentors and course instructors, play significant roles in pre-service teachers' learning.

Cooperating teachers possess different roles and responsibilities in the teaching practicum. They provide feedback and vocational support, model practices, give support for reflection, and serve as agents of socialization for pre-service teachers (Riedler & Eryaman, 2016; Clarke, Triggs, & Nielsen, 2014). The roles and responsibilities of mentor teachers can be examined with Scandura's (1992) framework for mentoring, which consists of vocational, social, and role-modeling mentoring functions. In vocational and professional functions, the mentor provides coaching, exposure, visibility, career advice, and information and prepares learners for the profession. Social support focuses on counselling and interpersonal relationships. In role modeling, mentors share their opinions and behaviors with their protégés and the protégés in turn decide whether to follow their mentor's model. The findings of different research studies conducted with pre-service teachers emphasize the importance of three functions in this mentoring framework. For example, Torrez and Krebs (2012) indicated that teacher candidates define successful mentor teachers as those who are effective teachers, who create positive relationships with teacher candidates, and who support them during the practicum. Similarly, in Izadinia's (2016) study, open relationship, feedback, encouragement, and support were found the most crucial factors in a mentoring relationship based on pre-service and mentor teachers' opinions. Arkün-Kocadere and Aşkar (2013) also revealed that pre-service teachers negatively evaluate mentor teachers who are not good role models, are not aware of their responsibilities, and are not willing to collaborate. Furthermore, Eraslan (2009) revealed that while learning to teach, prospective teachers place importance on mentor teachers' experience and willingness to teach. While support from mentor teachers increases teaching self-efficacy of pre-service teachers (Moulding, Stewart, & Dunmeyer, 2014), mentor teachers' non-fulfilment of their responsibilities negatively affects practicum experiences of prospective teachers. To illustrate, pre-service teachers become demotivated to teach when they feel unsupported and they experience high levels of stress due to disruptive students and high workloads during the practicum (Chaplin, 2008). Also, mentor teachers' rare and nonconstructive feedback on teaching practices negatively affect student teachers' learning during practicum (Aydın & Akgün, 2014; Kirbulut, Boz, & Kutucu, 2012; Parker 2008; Valencia, Martin, Place, & Grossman, 2009). Therefore, the characteristics of mentor teachers are critical factors that influence pre-service teachers' experiences during the practicum.

Another factor affecting practicum experiences of pre-service teachers relates to teacher education. It is necessary for teacher candidates to have deep understanding of theory and practice to enact their knowledge (Eryaman & Riedler, 2009; Meijer, Graaf, & Meirink, 2011). However, helping pre-service teachers to integrate their knowledge with experiences in their teaching practices is a challenge for teacher educators (Sutherland & Markauskaite, 2012). It is a durable problem for teacher-preparation programs to fill the gaps between teacher education and the practicum experiences (Kessels & Korthagen, 1996; Zeichner, 2010). Due to these gaps, novice teachers experience reality shocks during their first years of teaching (Korthagen, Loughran, & Russell, 2006). To illustrate, Fazio and Volante (2011) and Chiang (2008) revealed that most pre-service teachers were disappointed due to incongruence between their ideal teaching environment and reality. Eraslan (2009) also found that prospective math teachers had difficulty defining the relationship between the content of courses in universities and the content of math instruction in schools. Due to discrepancies

between expectations and reality, teacher candidates face hardships when transferring their knowledge into real classroom settings (Arkün-Kocadere & Aşkar, 2013).

In addition to challenges related to mentor teachers and reality shock, pre-service teachers face pedagogical problems in their teaching practice. Research reveals that one major problem for teacher candidates is classroom management (Baştürk, 2009; Ferber & Nillas 2010; Goh & Matthews, 2011; Koç, 2012; Koç & Yıldız, 2012; Taşdere, 2014). Applying instructional methods in real classrooms is another area of concern for prospective teachers (Goh & Matthews 2011; Taşdere, 2014). On the other hand, building relationships with students (Becit, Kurt, & Kabakçı 2009; Eraslan 2009; Ferber & Nillas 2010; Koç 2012), feeling like a real teacher (Eraslan, 2008; Eraslan 2009), and evaluating the applicability and effectiveness of teaching methods (Becit, Kurt, & Kabakçı, 2009) are some positive experiences teacher candidates have. Moreover, studies indicate that pre-service teachers' self-efficacy (Caires, Almeida, & Vieira, 2012; Can, 2015; Erdem 2008; Gurwitsch & Metzler, 2009; Knoblauch & Woolfolk, 2008; Öksüz & Çoşkun, 2012), and pedagogical and content knowledge (Chien, 2015) improve after the teaching practicum, resulting in teachers feeling more prepared and more willing to teach students (Ronfeldt & Reininger, 2012).

Overall, the teaching practicum is a complex and dynamic process that affects pre-service teachers' professional development both positively and negatively. Hascher, Cocard, and Moser (2004) stated that the quality of the practicum and long-term learning outcomes during the practicum are very uncertain. There is a lack of research regarding how pre-service teachers perceive their professional development in the process of learning to teach (Meijer et al., 2011). In particular, Yaylı (2008) noted that it is necessary to investigate pre-service teachers' transition from theory to practice more deeply and the effect of pre-service teacher-mentor teacher relationships on this process. Studies regarding teacher candidates' in-course and field-based experiences in their profession enable teacher-preparation programs to design curriculums more effectively to mitigate the gap between what is taught and what is learned (Schmidt, 2010). Considering aforementioned gaps in the literature, the aim of this case study is to investigate prospective information and communication technologies (ICT) teachers' evaluations of their mentor teachers, school experiences, and theory-practice relationships in teacher education. The research questions guiding the study are as follows:

- (1) How are mentor teachers with respect to mentoring functions during the practicum?
- (2) What are the prospective ICT teachers' positive and negative experiences during one semester of the practicum?
- (3) What are the opinions of prospective ICT teachers regarding the relationship between theory and practice in teacher education?

Method

Research Design

This research was designed as a case study in which factors related to a case (e.g., context, individuals, events, and processes) were investigated from a holistic viewpoint, and the focal point was how those factors affect related cases or are affected in turn (Yıldırım & Şimşek, 2013). Case study research includes in-depth, detailed data collection processes in which different data sources (e.g., interviews, observations, documents, and reports) are utilized (Creswell, 2007). In this study, the practicum experiences of pre-service teachers were examined by considering different stakeholders, including cooperating teachers, other teachers, administrators, students, and courses taken at university. Data were gathered through interviews and observations.

Participants

The participants were six pre-service ICT teachers who were senior students at the Computer Education and Instructional Technology department in a state university in Turkey taking the School Experience I course during the 2014–2015 fall semester. In School Experience I course, teacher candidates are able to comprehend concepts regarding teaching profession, improve their knowledge and practices through their school experiences, and gain characteristics of an effective teacher. To this

end, the pre-service teachers in the study attended theoretical classes one hour a week, and they made observations and helped their cooperating teachers during class four hours a week in one semester. Moreover, they conducted one lesson in company with their mentor teachers in their practice schools. They also wrote reflective reports on their school experiences, and discussed teaching-related cases with their friends for the requirements of School Experience I course. Personal information about participants is given in Table 1.

Table 1. *Personal Information about Participants*

Participant	Gender	Type of practice school	Plan to be teacher
P1	Female	Secondary school	✓
P2	Female	Secondary school	✓
P3	Female	Vocational high school	X
P4	Male	Vocational high school	✓
P5	Male	Vocational high school	✓
P6	Male	Private primary school	✓

Maximum variation sampling strategy among purposeful sampling methods was used in the study to select the participants. According to Patton (2002), qualitative studies gather data from purposefully chosen samples. In maximum variation sampling, the researcher considers different characteristics of the samples to reveal similarities and differences among various cases. While selecting participants for the study, female and male pre-service teachers in different practice schools (including vocational high schools, secondary schools, and private schools) were chosen. Moreover, there was one pre-service teacher who did not plan to teach after graduation (Table 1).

Data Collection Instruments

Interview protocol. The interview protocol consisted of 14 open-ended questions to get information from participants regarding the above-mentioned research questions. For each research question, at least three interview questions were prepared. In addition, introductory questions related to participants' backgrounds and current lives were posed at the beginning of each interview to establish rapport between the researcher and the participants. Alternative questions were also added for each question. Furthermore, prompts to gain more detailed information were included in most questions. Besides the knowledge questions and unclear questions, short answer questions were avoided to support effective interviewing for each case. While preparing the interview protocol, expert evaluation was taken five times, and revisions were made to create a more-valid data collection instrument. The interviews conducted by the first author lasted approximately 30 minutes, and they were recorded on a tape-recorder and transcribed electronically.

Observation protocol. In addition to the interview protocol, the researchers prepared an observation protocol related to mentors' and student teachers' practices in the classroom to obtain the participants' first-hand experiences at their sites and to record data the participants might not have felt comfortable revealing in interviews (Creswell, 2009). For the observation protocol, the themes the observer paid attention to during observations were determined based on research questions and were described accordingly. After receiving consent from the cooperating teachers in practice schools and the pre-service teachers in the study, observations lasting approximately one hour were conducted by the first author. During the observations, the first researcher was a non-participant observer. Cooperating teachers, pre-services teachers, and students were the individuals observed during lessons in the practice schools. Their actions and the researcher's reflections were written on the observation sheet. Data obtained from observation notes were utilized to supplement interview data and to enable triangulation through the employment of more than one data-collection method.

Data Analysis

The content analysis method was used for data analysis. In content analysis, similar data are gathered under themes; these data are presented and interpreted in a format that readers can easily understand (Yıldırım & Şimşek, 2013). Data were analyzed using four steps, following Yıldırım and Şimşek (2013). In these steps, researchers code data, find themes, arrange codes and themes, and identify and interpret findings. First, the researcher transcribed data obtained from the interviews and read the observations carefully several times; then, codes were derived. For research question 1, an existing framework was used to find themes. Themes for the other research questions were determined based on the codes derived by the researchers. After the codes were arranged under themes or categories, their reliability was investigated. For that aim, 10% of the interview data and code sheets were presented to an expert in qualitative research, and the expert coded interview statements by selecting codes from a code sheet. Cohen's kappa coefficient was calculated at 0.77.

Validity and Reliability

There are two main dimensions of validity and reliability: external and internal. Internal validity in qualitative research relates to the extent to which conclusions relating to observed events and phenomena reflect the real situation (Yıldırım & Şimşek, 2013), while external validity refers to the generalizability of results (Merriam, 2013). Internal reliability pertains to whether other researchers obtain the same results in data coding as the original researcher suggests, while external reliability relates to whether the research will reveal the same results in similar contexts (LeCompte & Goetz, 1982). To ensure the reliability and validity of qualitative research, different strategies have been adopted here. First, a triangulation strategy was used to enhance internal validity (Lincoln & Guba, 1985). Triangulation makes a study stronger by employing different data sources, researchers, and data collection methods (Patton, 2002). In this study, data were collected from not only interviews but also observations to support or corroborate findings obtained from different data collection methods. Moreover, the internal reliability of the research was investigated by calculating Cohen's kappa coefficient, as mentioned in the data analysis. Since the coefficient exceeds the threshold (0.70) for a reliable research (Frankel, Wallen, & Hyun, 2012), it can be concluded that the study is reliable.

Results

The interview and observation protocols were prepared based on research questions, and the data analysis revealed three main themes: the mentoring functions of cooperating teachers; positive and negative experiences of prospective teachers during the practicum; and the opinions of prospective ICT teachers regarding the relationship between theory and practice in teacher education. The findings for these themes are explained in detail below.

Mentoring Functions of Cooperating Teachers

To analyze data related to qualities of cooperating teachers with respect to mentoring functions, Scandura's (1992) mentoring functions framework, consisting of social support, professional support, and role modeling dimensions, was considered. Table 2 shows how cooperating teachers fulfilled these mentoring functions or did not.

Table 2. *Mentoring Functions of Cooperating Teachers*

Theme	Category	Code	Frequency
Social Support	Positive	Caring pre-service teachers' problems	8
		Good communication with pre-service teachers	6
		Encouraging pre-service teachers to teach during practicum	1
	Negative	Weak communication with pre-service teacher	7
Professional Support	Positive	Giving information about teaching profession	4
		Making teaching desirable	1
		Making suggestions about teaching	1
	Negative	Not introducing pre-service teachers with students	2
Role Modelling	Positive	Teaching method (demonstration, analogy)	5
		Good communication with students	5
		Getting attention of the students	3
		Displaying interest to students' learning	3
		Encouraging students to participate in classroom discussions	1
		Being loved by the students	1
		Good communication with inclusive student	1
		Creating positive classroom climate	1
		Knowing students' characteristics in the classroom	1
	Negative	Indifference to misbehaviours	7
		Inefficacy in getting attention of the students	6
		Poor communication with students	3
		Addressing students as girls in the classroom	3
		Ineffective teaching method	2
		Poor time management	2
		Poor plan of classroom activities	1
		Lack of instructional materials	1
		Not being respected by students	1
		Lack of motivators	1

With respect to social support functions, the most emphasized theme is mentor's care for pre-service teachers' problems. Caring mentor teachers expended effort or showed willingness to derive solutions to the problems teacher candidates faced during practicum. For example, one mentor who gave her telephone number to the teacher candidate to use when problematic situations regarding the practicum arose was evaluated positively with respect to social support. It was also found that some mentor teachers communicated well with prospective teachers, while others did not. For example, it was observed that one mentor, whom the student teacher evaluated negatively with respect to social support, was unwilling to answer teacher candidates' questions during breaks. Moreover, one mentor did not meet pre-service teachers before and after classes, as participant 4 stated during an interview. Those two pre-service teachers also stated that other ICT teachers and peers in the practicum gave more social support to them than their mentor teachers did, although others rated their mentor teachers as the best. The perspective of a pre-service teacher regarding her mentor's provision of social support is as follows:

We could not communicate with our cooperating teacher after lessons. She did not make any conservation. Practicum has finished without any conversation. (P3, Weak communication with pre-service teacher)

In professional support function, some mentor teachers in the study provided information about the teaching profession, made teaching desirable, and offered suggestions. With respect to the visibility of pre-service teachers, one teacher did not introduce the pre-service teachers to students in the classroom. As a result, the students in the classroom in which the teacher candidate was not introduced by the mentor teacher called the pre-service teacher “you” rather than addressing her as a teacher. In the interview with this pre-service teacher, it was noted that the aforementioned situation impeded communication between students and the pre-service teacher.

Mentor teachers were also evaluated with respect to their role-modeling function. The mentor teachers’ teaching methods (mostly demonstration), good communication with students, methods to gain students’ attention, and displaying interest in students’ learning were, for the most part, modeled by the teacher candidates. Encouraging students to participate in classroom discussions, being loved by the students, good communication with inclusive students, creating a positive classroom climate, and knowing students’ characteristics in the classroom are other observed positive qualities of mentor teachers. Indifference to misbehaviors, inefficacy in gaining the attention of the students, poor communication with students, addressing students as “girls” in the classroom, ineffective teaching methods, and poor time management are behaviors observed in the classroom that are frequently evaluated as negative by pre-service teachers. Moreover, mentors’ poor planning of classroom activities, lack of instructional materials, not being respected by students, and lack of motivators were not modeled by the pre-service teachers. Therefore, it can be concluded that cooperating teachers may not successfully model all desirable qualities for pre-service teachers. One perspective of a pre-service teacher is as follows:

There was an inappropriate model with respect to time management. 20 minutes are for coursework and 20 minutes are for break. (P4, Poor time management)

Furthermore, data analysis showed that the pre-service teachers in the vocational high school reported almost all the negative role modeling mentoring functions. In observations, it was noted that cooperating teachers in these schools were deficient in role modeling, especially with respect to classroom management. Although inefficacy in classroom management was a problem for mentors in all types of practice schools, observations suggested that it was more salient in vocational schools. To illustrate, the mentor teacher of participant 3 provided different warnings in the classroom to attract the attention of the students, such as the following sentences:

If you don’t stop talking, I will lower your grades... What can I do here? Do you want me to make gymnastics to get your attention? (M3)

Prospective ICT Teachers’ Positive and Negative Experiences during the Practicum

The positive and negative experiences of prospective ICT teachers during one semester of practicum are shown in Table 3.

Table 3. *Prospective ICT Teachers' Positive and Negative Experiences during One Semester of Practicum*

Category	Code	Frequency
Negative Experiences	Encountering/ feeling difficulty	
	In classroom management	13
	In communicating with students	1
	In preparing lesson plan	1
	Seeing teaching profession as monotonous	1
	Administrators' negative communication with pre-service teachers	1
Positive Experiences	Learning outcomes on	
	How to manage classroom	5
	How to communicate with students	1
	How to get attention of students	1
	How to arrange lab	1
	Other ICT teachers' positive communication with pre-service teachers	4
	Observing or communicating with students	4
	Administrators' positive communication with pre-service teachers	1
	Being called as a teacher by the students	1

Pre-service teachers encountered difficulties during one semester of school experience. The difficulty expressed most often relates to classroom management. In observations, it was also noted that while one teacher candidate lectured in practice school, the noise level in the classroom was too high in the learning activity and the mentor teacher had to intervene in that situation. The views of two pre-service teachers who practice in vocational and secondary schools on classroom management are as follows:

While I was lecturing, I realized that classroom management is too difficult for the students in vocational high school. They talk about topics unrelated to the course in the classroom and they use slang words frequently. (P4)

One time I was alone in the classroom. The students didn't listen to me and stop talking, and then I hit the table. It is difficult and they are too active... It is hard to manage them. (P1)

Other negative experiences described by pre-service teachers are encountering/feeling difficulty in communicating with students and preparing lesson plans, seeing the teaching profession as monotonous, and witnessing administrators' negative communications with pre-service teachers. In addition to negative experiences, teacher candidates also described their positive experiences. After one semester of practicum, the pre-service teachers' knowledge and abilities in classroom management, communication with students, getting the students' attention, and arranging laboratory environment improved. Along with encountering/feeling difficulty in classroom management, learning how to manage a classroom was the positive experience most frequently described by teacher candidates. One view expressed by one pre-service teacher is as follows:

According to my observations, student misbehaviors are related to the teacher-student relationship. In my opinion, students should both love their teachers and show respect to them. If there is not respect, nothing will derive successful results. (P3)

Moreover, as seen in Table 3, other stakeholders, i.e., ICT teachers, administrators, and students, play a significant role in the experiences of pre-service teachers in the practicum. Positive communication with other ICT teachers and administrators, observing or communicating with

students, and being called “teacher” by students were positive experiences for pre-service ICT teachers.

Opinions of Prospective ICT Teachers regarding the Relationship between Theory and Practice in Teacher Education

Findings regarding the opinions of prospective ICT teachers on the relationship between theory and practice in teacher education are presented in Table 4.

Table 4. *Opinions of Prospective ICT Teachers Regarding Relationship between Theory and Practicum Experiences*

Opinion	Frequency
No relationship between theory and practice because of	9
Conflict between content of the courses and needs of ICT teachers	4
Mentor teachers’ ineffectiveness in role modelling	2
Lack of applicability of information learnt in the courses	2
Difference between student profile in schools and in books	1
Qualities of the courses beneficial for teaching	15
Teaching-related cases presented in the course	7
Identifying student characteristics	5
Learning how to communicate with students	3
Suggestions to strengthen relationship between theory and practice	12
Practicum for a longer period in teacher education	3
Relating content of existing courses to needs of ICT teachers	3
Increase in the number of courses related to teaching	3
Increasing practice hours of courses	1
Preparing course content related to administrative works	1
Integrating topics related to school experience to other courses	1

All participants denied that there is a relationship between theory and practice for several reasons. The most frequently cited reason was conflict between the content of the courses and the needs of ICT teachers. One view of the pre-service teachers about this finding is as follows:

There is no relationship between courses in university and school. We learn how to manage a project or how to write an article, but school is very different. (P4, Conflict between content of the courses and needs of ICT teachers)

Moreover, mentor teachers’ ineffectiveness in role modeling had a negative effect on building relationships between theory and practice. The lack of applicability of the information learned in courses and the difference between student profiles in schools and that mentioned in the books are other inhibiting factors in building the relationship. Despite the discrepancy between theory and practice, pre-service teachers expressed that some courses were beneficial for their practicum. One quality of these courses is related to their teaching method, which is based on teaching-related cases. In addition, developmental psychology courses helped them identify student characteristics, and communication courses played a role in developing effective communication with students. Pre-service teachers’ statements on the qualities of courses that are beneficial for teaching are as follows:

In the school experience course, we complete scenarios related to teaching. One case is given and we complete it. This method motivates us to become teachers and prepares us for the profession even if we do not implement them. (P4, Teaching-related cases presented in the course)

Developmental psychology course is effective. I learnt the developmental stages of the students; therefore, I can prepare materials and plan lessons according to characteristics of the students. (P1, Identifying student characteristics)

For a stronger relationship between theory and practice, several suggestions were proposed. The ones most frequently expressed were that the practicum should be held during the other years of the teacher education program, course content should be congruent with the needs of ICT teachers, and the number of pedagogical courses should be increased. Other suggestions included that practice hours of courses should increase, course content related to administrative works should be prepared, and topics in the school experience course should be integrated to other courses. Some of the participants' views are as follows:

Universities make contact with schools only for the practicum course. It is wrong in my opinion. Universities should make a longer deal with schools, and the practicum period should be longer. (P5)

The content of the hardware course should be better. We will solve hardware problems encountered in the schools, but the instructor in the university showed only the inside of the computer and told the names of the hardware components. S/he did not teach their functions and what we can do when a problem arises. (P1)

Discussion and Recommendations

Teaching practicum involves different stakeholders, contexts, and experiences. It is a complex process that can be investigated from various perspectives. In this study, prospective ICT teachers' evaluations of mentor teachers, school experiences, and the theory–practice relationship were examined. For this aim, interviews were conducted with six pre-service teachers and observations were conducted in the practice schools of the participants.

The study firstly indicates that mentor teachers have both positive and negative qualities with respect to social support, professional support, and role-modeling mentoring functions. In social support function, it was found that while some mentors care about pre-service teachers' problems related to the practicum and have good communication with teacher candidates, some have weak communication. Similar findings regarding weak communication and lack of collaboration between pre-service teachers and mentors were reported in the research conducted by Arkün-Kocadere and Aşkar (2013) and Taşdere (2014). Hence, it is crucial that mentor teachers be trained and encouraged to establish a positive relationship between them and prospective teachers not to affect practicum experiences of teacher candidates negatively. This study also revealed that pre-service teachers whose mentor teachers did not fulfil their responsibilities in terms of giving social support obtained social support from other stakeholders in the practicum, such as other teachers in school and their peers. Therefore, it can be suggested that based on the qualities of mentor teachers from the point of social support, the importance of other stakeholders being involved in the practicum could be considered more seriously for teacher candidates.

In addition to social support, mentor teachers are expected to give professional support. It was found that some of the cooperating teachers in the current study provided information about the teaching profession, made teaching desirable, and offered suggestions on teaching within the scope of professional support. On the other hand, one mentor teacher did not introduce the pre-service teachers to students in the classroom, and the pre-service teacher evaluated this situation negatively. Furthermore, this negatively affected the communication between students and pre-service teachers and resulted in students calling the pre-service teacher “you” rather than “teacher.” Therefore, it is advisable that mentor teachers give importance to introduce prospective teachers to the class at the

beginning of the semester to both increase visibility of pre-service teachers in classroom and create a positive communication between teacher candidates and students.

Role modeling is another function of mentoring. Cooperating teachers' teaching methods, good communication with students, and their techniques for getting the attention of learners and having interest in students' learning are enabling factors of seeing mentor teachers as role models. Inhibiting factors are their indifference to misbehaviors of students, inefficacy in getting the attention of students, poor communication with students, addressing students as "girls" in the classroom, ineffective teaching methods, and poor time management. Similarly, the pre-service teachers in Yılmaz, Şendurur, and Şendurur's (2016) study highlighted their mentor teachers' teaching methods, interaction with students, and classroom management in their school experiences. These factors can be evaluated as characteristics of a successful or unsuccessful teacher through the eyes of the prospective teachers. Therefore, it can be suggested that mentor teachers' instructional strategies, classroom management skills, and communication or interaction with their students could be critical constructs enabling teacher candidates to take them on as role models. Another striking finding regarding the role-modeling function of mentor teachers is that mentors in vocational high school were evaluated negatively with regard to their classroom management skills. In observations, it was noted that students in these schools show several misbehaviors and that mentors have difficulty preventing them and gaining the attention of the students. This situation can arise from student profiles in vocational high schools in Turkey. The majority of the students with low success rates in secondary school continue their education in vocational high schools, and they tend to be more reluctant to learn compared with students in other types of schools. Therefore, more classroom misbehavior in these schools might be expected. Here, it is necessary for teachers in vocational high schools to put in more effort to prevent misbehaviors and to seek the attention of the learners. Therefore, some professional development workshops can be arranged for those teachers to provide help on how classroom management problems can be handled effectively.

The positive and negative experiences of pre-service teachers during one semester of the practicum were also investigated. The study reveals that these pre-service teachers experience or feel difficulty for the most part in relation to classroom management. Several studies support this finding (Baştürk, 2009; Ferber & Nillas, 2010; Goh & Matthews, 2011; Koç, 2012; Koç & Yıldız, 2012; Taşdere, 2014). Hence, it is crucial that teacher education programs consider how to improve prospective teachers' knowledge and skills on classroom management. Case-based instruction, which can be one way to minimize prospective teachers' potential problems in classroom management based on participants' opinions, is offered and discussed in this paper later. Communicating with students and preparing lesson plans are two other difficulties the pre-service teachers faced. Moreover, one student realized that the teaching profession is monotonous and is not appropriate for her. Likewise, one of the teacher candidates in Kirbulut, Boz, and Kutucu's (2012) study claimed that he did not fit to teaching profession because of not having necessary characteristics to be teacher after his school experiences. On the other hand, Ronfeldt and Reininger (2012) state that pre-service teachers become more willing to teach because of a practicum experience. This study suggests that the practicum can be a turning point for prospective teachers making career decisions. In contrast to negative experiences, observing or communicating with students was a positive experience for pre-service teachers in the practicum. Similar findings have been reported in previous research (Becit, Kurt, & Kabakçı, 2009; Eraslan, 2009; Ferber & Nillas, 2010; Koç, 2012). Furthermore, in the current study, prospective teachers learned how to manage classrooms, communicate with students, gain the attention of students, and arrange lab environments through their practicum observations. In other words, all pre-service teachers, including those whose mentors did not act as role models for them, developed professionally after they observed what works and does not work in the classroom. Therefore, it can be concluded that a real classroom environment can present rich learning opportunities for prospective teachers even when mentors do not serve as role models.

In this study, participants' opinions on the relationship between theory and practice were obtained. None of the pre-service teachers saw a relationship here, mostly due to a discrepancy between the content of the courses and the needs of ICT teachers. Mentor teachers' ineffectiveness in

role modeling is another reason for the weak relationship between theory and practice, causing the pre-service teachers to feel disappointment during their first semester of school experience. In addition, teacher candidates realized that teaching methods learned during university courses were not applicable to real classroom settings due to difficulty in creating a constructivist learning environment for the classrooms observed. Moreover, it was found that student profiles in one of the practice schools differ from those mentioned in the books. Incongruence between ideal teaching environments and reality was also reported in several studies (e.g., Chiang, 2008; Fazio & Volante, 2011; Yılmaz, Şendurur, & Şendurur, 2016). Hence, it can be inferred that encountering discrepancies between expectations and reality, and having disappointment after that can be prevailing school experiences for pre-service teachers in the current teacher education contexts.

Although the pre-service teachers in the current study stated that there is a gap between theory and practice, they also stated that some courses are useful for their school experiences. It was found that developmental psychology and communication courses help pre-service teachers identify student characteristics during the practicum and help them learn how to communicate with students. Moreover, the courses that present teaching-related cases were viewed as effective in bridging the gap between theory and practice. The use of cases in teacher education allows teacher candidates to apply their knowledge of educational theories and principles into real classroom situations (Ching, 2014). The effectiveness of case-based instruction on setting theory–practice relationships was noted in related studies (e.g., Ching, 2014; Koc, Peker, & Osmanoglu, 2009). Therefore, it is advisable that pedagogy courses be enriched with teaching related cases to narrow the gap between theory and practice.

Finally, prospective ICT teachers proposed several suggestions, especially with regard to teacher education programs, to engender a stronger relationship between theory and practice. There are gaining school experience during all years of teacher education, receiving course content parallel to the needs of ICT teachers, increasing the number of pedagogical courses and practice hours of courses, and preparing course content related to administrative works. These suggestions highlight the importance of the relevance of courses in teacher education to real school experiences. Considering these suggestions, teacher education programs can be reviewed to prepare prospective teachers for real classrooms well.

To sum up, the qualities of mentor teachers and the structure and content of teacher-education programs influence pre-service teachers' school experiences. Several suggestions follow from these results. First, mentor teachers in practicums should be chosen from teachers who are successful in their professions. For this aim, cooperating teachers can be evaluated by prospective teachers based on criteria, such as role modeling and providing support to pre-service teachers, to determine their effectiveness in mentoring. Successful teachers could be mentors of future teacher candidates. Second, since classroom management is difficult for most of the novice teachers and case-based instruction is a teaching method useful to build relationship between theory and practice, instructors of classroom management course can employ this teaching method in their lessons. Finally, in relation to the suggestions of pre-service teachers, the teaching practicum in Turkey should not be limited to final-year students. Readiness for teaching can be fostered by arranging the content of courses in teacher education programs in such a way as to cover the needs of in-service teachers. In addition, the number of elective courses related to teaching and pedagogy could be increased.

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A Letter to White Women Teachers: an urgent plea for change

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Abstract

The new Progressive Education Network mission says that Progressive Education “promotes diversity, equity, and justice.” These goals cannot be met unless there are substantial changes in the way the majority of teachers in the United States, white women teachers, think and operate. This open letter to that audience from a white woman teacher lays out five important changes that must be made if public schools are to meet and teach all students in our schools. Through stories of experience and research, the letter addresses current issues and suggested practices in teacher thinking, language and action related to the safety of targeted populations and choices made in discipline and curriculum.

Key words: Progressive Education, White women teachers, think, operate

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Dear Colleagues,

It is out of love, connection and the gnawing realization that we are complicit in the miseducation and dehumanization of students that I write this call to action. Rather than taking time describing all the ills of our system, the crisis in which we find ourselves, I am going to focus on what it is we can and must do if we are to “promote diversity, equity, and justice in our schools and society” (PEN, 2016, p. 1). When I say “we” it means the white women who are the majority of educators in our country. Many of us have gone into education to change the world, to make it more fair. Certainly, I did. And yet as I did my work I have often squarely faced the conflict between what I have been required to do, trained to do, and what my gut feels is wrong. I have learned to raise questions and to search for ways of working that honor my students *and* feel right to me. I have also had to “unlearn” and continue to struggle with ways that I have been taught to understand the world. What follows is a set of five changes I believe we must make, not of and for others, but of and for ourselves. We have to do better so that we can meet our students (not needs, but them!). Since I believe we hurt our black and brown children the most, I will begin each section with issues of race and then extend the thinking and practices into the education of other targeted groups. I offer what follows knowing it is not exhaustive and that, while a work in progress, it is an earnest and urgent plea for change.

We must:

1. Know ourselves and therefore know how we are limiting others.
2. Be very intentional with our language.
3. Hear and accept what students communicate through words or actions.
4. Examine school safety.
5. Bring student experience into the classroom.

Know ourselves and therefore know how we are limiting others

That I am white causes me to notice people who are not. We see the “other.” When a brown or black person is “noticed” then there are responses. We know there are police responses; there are teacher responses as well. If it stopped at noticing and responding more often, then it would not be so bad. However, we are socialized to see danger, taught to cross the street, lock our doors and be fearful. A new report from Yale University’s Child Study Center found “racial preconceptions” in the way preschool teachers see black boys in particular. This was evidenced as a computer program tracked eye movements and found that teachers watched black boys more often and for longer durations when “looking for signs of trouble” (Editors, 10/9/16). In the classroom, unconscious acts of watching coupled with the socialized perception of threat results in racist disciplinary action (Skiba, 2011). This noticing is pervasive in our thinking, as well. For example, two years ago at an awards ceremony for college seniors who ranked the highest in their class, I heard a young woman just completing her student teaching announce in her speech, “I am working in a diverse classroom and I have learned that those students need more structure and discipline.” The number of problems in this short sentence is stunning.

A “diverse classroom” means a white person saying there are mostly brown and black students in the class. In fact, the school she referenced is a segregated school, the result of segregated neighborhoods, accepted racist social structures in which most of us live in our country. Saying “those students,” however, is perhaps the most telling and the most problematic, and has to be struck from our thinking, not just our language. “Those” is opposed to “our.” All students are our students; black and brown students are our students; transgender students are our students; students in special education are our students, our children, our babies. We have to stop, catch ourselves, and change our thinking. ALL children need and deserve a nurturing environment, a connection with adults, and an atmosphere of acceptance even as we are teaching and practicing skills. This is what the Black Lives Matter movement brings to white attention. We must recognize that black students are part of all students. And yes, all students matter.

“More structure and discipline” means that we have to be tough, not nurturing; impose more rules and punishments; impose more behavioral and objective responses. There is nothing objective in our disciplinary actions. “More structure and discipline” is about power and control, power and control over children. Underlying our need to control is the belief that the children are damaged, or worse, dangerous. Recently, I overheard a white woman who has an adopted black son ask a black mother, “At what age did your son learn that he was dangerous?” If, in our minds, students are dangerous or damaged, we limit our responses. We must fix “them” or protect ourselves. Lisa Delpit heart-wrenchingly states in the introduction to *Multiplication is for White People: raising expectations for other people’s children*:

...This perspective is so ingrained and so normalized that we all stumble through our days with eyes closed to avoid seeing it. We miss the pain in our children’s eyes when they have internalized the societal belief that they are dumb, unmotivated, and dispensable.

Nor can we see what happens to the psyches of young people, often well-meaning white people who have been told that they are the best and brightest and that they are the saviors of black children (Delpit, 2012, p. xviii).

From our deficit thinking, our perceptions of students as needing either to be controlled or fixed, we alternate between using our systemic structural power as white teachers *over* or *for* students, when our goal should be to work *with* students, families, communities. We have options in the way we think about our power (structural and unearned). We can use our power over students and assert our dominance. The absolute belief that we deserve and must get respect (compliance) no matter our actions is one way we do this. Or we can feel sorry for our students, want them to have better (more like our) lives, and we can do things *for* our students. The prepositions used are very important indicators of thinking. *Over*, *to* and *for* are related and imply the inherent good in “our” view and the problem in the “other.” The goal is to get to *with* and care about each student as they are.

When we perceive students with fear, we become threatened. We act defensively, even aggressively. We interpret actions as defiant or disrespectful. The US Department of Education Office for Civil Rights “Data Snapshot: School Discipline rates of suspension and expulsion by race and ethnicity” supports this reactive misperception (US Department of Education Office for Civil Rights, March 21, 2014). We must notice when we are becoming afraid; we have to stop, pause, and remind ourselves that this is a child to whom we have committed care and guidance. And this is how we change our thinking, intentionally.

Deficit thinking and limited responses are quite evident throughout our educational thinking. We believe economic poverty is the fault of the person even as we know that many work longer hours than those with economic wealth. We have “special education” bringing an entirely separate and parallel set of placements and goals. We have ELLs, as if students who speak another language are entirely “other” and don’t bring great strength. Since seeing the “other” and having fear is unconscious and feels “normal” and we know we have learned this, then we have the absolute responsibility to unlearn these attitudes. We must become aware when fear occurs and replace it with statements that are true. If we do not change our thinking, then we continue the pain.

“Do no harm” must be our super-mantra; the Hippocratic Oath has meaning for teachers. While medical doctors are sworn to keep people physically safe, additionally, we have the responsibility for intellectual, social and emotional health. We can, we must re-educate ourselves. We must catch our thinking before it comes out in language.

Mantra: Do no harm = stop, check your thinking

Be very intentional with language

There are many books about teacher language, but like most educational pedagogy, the recommendations avoid issues of race, class, gender, and ethnicity. *Responsive Classroom*™ (RC) teaches reinforcing, reminding and redirecting language. Never once in *The Power of Our Words*, the RC book on language, does author Paula Dentin talk about race, class or gender (Dentin, 2007). Peter Johnson, in *Choice Words*, another academically accepted and respected resource on language openly acknowledges the omission:

The bottom line is that in this small book, I do not really deal with the cultural and linguistic variation we encounter in classrooms (Johnston, 2004, p. 89).

Language is the expression of our thinking (or subconscious learning) and is value laden. Oslem Sensoy and Robin DiAngelo explain:

Language is a form of knowledge construction: the language we use to name a social group shapes the way we think about that group (Sensoy & DiAngelo, 2012, p. 42).

For instance, labeling “people of color” infers there are people without color. White is the norm, color is the “other.” White goes unsaid, unnecessary to be named because of its privileged and invisible status.

Herbert Kohl, in his essay “I Won’t Learn From You,” writes about learning from his student, Akmir, to examine his language for bias, exclusion and oppression:

I had to learn to choose my own language and learn to make the avoidance of racist reference habit. I had to think very carefully about talking about “dark intents” and “black deeds”; to avoid using comparisons like “civilized/primitive,” and “sophisticated/unsophisticated”; and to eliminate characterizations like “disadvantaged” and “deprived” (Kohl, 1994, pp. 20-21).

We must pay attention to the way we use language and understand that words, used or omitted, can devalue people, render whole groups of people invisible.

English is my first language, and the only one in which I am fluent. Therefore, it feels right to me that school is conducted in English. However, the language we choose to use has implicit norms. The fact that we recognize “standard” English only in our schools and in the ways in which we judge achievement devalues the “other” once again and limits me and my students. Because I am fluent in English alone, I am confronted often with the reality that I cannot communicate with many people in my own community. I am deeply saddened that in our schools we rarely recognize the strength of speaking any other language. Since we know that reading is anchored in language, in context and comprehension, we must have resources for students to read in their first language. Our job is to provide education. Our students should know what a strength it is to think, speak and connect in multiple languages, and understand this as an important window into culture, a culture that should provide pride. We must advocate for children to be taught to read in their first and most proficient language and advocate for bi-lingual education. For those of us who do not speak Spanish we have to learn. This has strong implications for teacher preparation and for professional development. In the meantime, we must work with people who are native speakers.

My language has changed as I have become aware of its ability to make invisible or diminish entire groups of people. Becoming aware of and critical of my language is a constant learning struggle and opportunity. It was easy for me to add the female gendered language during what is considered the woman’s movement of the 1960s. It now has become almost standard to use “she or he” or “s/he” or to alternate pronouns. As a cis gender woman, I had no idea how many people that dichotomy hurt or made invisible until I recently went to a forum on transgender youth. We need to understand it does not matter if we believe transitioning is right or not, transgender students are *our* students, and it is our job to protect the dignity of every single one of our students.

Therefore, we cannot force students, from a very young age, into making a dichotomous choice about gender or worse, tell students they are wrong in their identification or dress. “Boys and girls” cannot be used for sorting as if they are the only two options. This means rethinking lining up, assigning groups, placements in circle, choosing people for games. We must change our pronouns from he/she to they, even as a singular pronoun when we are speaking generically. Asking students to choose the pronouns they would like to use needs to become a habit. When reading books, we can notice for and with children the ways in which genders are assigned and stereotyped. And we have to really think about how people who have identities with lenses different than ours might hear what is being said.

Language that excludes or diminishes people swirls all around us. It is so commonplace we don’t even notice. The song “This Land is Your Land” makes invisible Native Americans and the colonization of land. This land was Native land. We often say we are “Americans” without even thinking about people from other countries in the Americas. The lyrics of “De America Yo Soy” by Los Tigres de Norte asserts this powerfully (Norte, 1987). We must say we are from the US or of the US. There are many Americans. Language can exclude or include.

Perhaps most common in the discussion of inclusion is the way we label and treat students with disabilities. The language of disabilities focuses only on deficits and is conscious language, purposeful in our intention of telling people and families that a student is different. We use divisive language as we provide a “special education” to this person and determine to what extent that young person can be in the company of “typical” students. The language is explicit. Learning disability means not able to learn. We know this is not true. Labels reduce our students to their deficits and limit our work to fixing them. An excerpt from a poem written by Janice Fialka in her book, *What Matters: Reflections on Disability, Community and Love*, affords some insight into the hurt that we cause:

After the case conference
I looked at my almost five-year-old son.
He seemed to have lost his golden hair.
I saw only words plastered on his face.
Words that drowned us in fear.
Words like:
Primary expressive speech and language disorder
severe visual motor delay
sensory integration dysfunction
fine and gross motor delay
developmental dyspraxia and RITALIN now.

I want my son back. That’s all.
I want him back now. Then I’ll get on with my life (Fialka, 2016, p. 37).

Earlier in the poem she tells of her son’s passions and strengths. How can we see and center education around these strengths?

Words have power. They can destroy or empower. We have to do better. We must begin to notice these affronts and change our own language proactively. Changing how we think and the language that we use changes our actions.

Mantra: Do no harm = stop, check thinking and change language

Hear and acknowledge what students communicate through words or actions

I have a working class perspective and my experience within that informs the way that I think. I learned that my education was important and offered my way “up”; doing my homework was my responsibility and my first job; the teacher was my boss. I never questioned whether or not the

assumptions about education were true, or true for everyone, I just assumed it. I never questioned whether “up” was good or what I wanted. It was simply part of my unconscious thinking. Therefore, it was natural, absolutely my right, and for the good of my student when, very early on in my teaching, I asked an eighth grade student to stay after class. I was worried that he was falling behind, doing no homework. It was the last class of the day; I had asked him quietly by his side, so I wouldn’t embarrass him. To my surprise, he got up, knocked into me hard, and yelled, “You don’t know anything about me!” This happened in 1975 and I remember it vividly. He was right. I knew it as soon as he said it. The next day I found him in the auditorium, where all students waited until the bell rang to go to homeroom. I acknowledged his statement as truth, and we began to talk. I learned that at 16 (yes, 16 in eighth grade) he was a father and lived with his son and his grandmother and needed to go home directly after school because his grandma had to get to her shift. I also learned that students should not have to scream at me and knock me over to get me to learn about them.

Students tell us a lot with their actions and their words, and we often see their gifts of communication as threats (because we are fearful) or as defiant (because we are controlling). How can we accept what students say as clumsy means of telling us thoughts and feelings? For example, where I live in New England, local school gardens are becoming a typical part of school curriculum. I have a friend who takes great pride in working with her students to become organic gardeners, raising food for the school lunch program. However, my colleague said that she wished she could get her students to engage with their school garden. Her students, mostly African American, were oppositional, in fact. When she brought students to the garden to work, they often said, “I’m not your slave.” To her, the students were defiant. It often became a power struggle and ended with disciplinary consequences.

It is important to enter a situation with a calm and open stance to be able to hear what is being said. Staying calm is work that must be visualized and practiced. We need strategies like deep breathing and muscle release that can be used on the spot. When a student says something triggering to us like “I’m not your slave,” then first we need to catch ourselves and stop. Then we need to calm down and think (Bailey, 2011). Once calm, the “defiant” thought or interpretation of student words or actions can be reframed in our thinking. We say, “this action or these words are telling me something important.” We must listen and hear the truth and perspective of our student. Our response must be to acknowledge or affirm the student’s perspective by saying, “You are right. You are not my slave.” This takes us elsewhere, to our actions; we have options here. The immediate response to students must at least be acknowledgement of what it is the student communicated, albeit clumsily (Bailey, 2011, p. 68). I believe that this response often should include an apology.

Choosing what follows requires us to continue to be calm and to keep the students’ best interests as the focus of our work. Ross Greene in his work on Collaborative and Proactive Solutions (CPS) says we have three choices. Plan A asserts your authority, taking us back to the desire for control. Plan B advocates collaboratively solving the problem either in that moment or at a later time. Plan C withdraws the request. In each, the goal is to teach lagging skills to the student (Greene, 2014). I argue for a different set of outcomes and a different frame of reference. It is we who need the skills and understandings to change the power structures that silence and oppress our students. Therefore, after the tension of the situation, we must explore the situation with the student and make changes in our thinking, our language and our actions.

Both examples, mine from 1975 and the garden assignment, gained attention by the teachers as issues of discipline, yet upon examination are better understood as issues of race, class and power. Our perceptions, our language, our interpretations direct our actions. Whether we want it to be or not, race is an underlying power issue in an unbalanced relationship of white teacher and black or brown student or community member. Class is another power issue. We must understand, acknowledge and, yes, even talk about this with our students. Power relationships are another dimension of differentiation. And yet, because of our desires for equality (treat people the same way) and our discomforts with hard, yet important conversations, we often can’t see or understand what is being played out before us.

Struggling to understand the different reactions white and black middle school boys had to her directives, a white woman who has spent her career working in urban schools offered an example. She had witnessed both white and black boys litter paper in the halls. There was a rule that was processed with all students about taking care of the environment. Yet, when she asked the male students to pick up littered paper, the white male students complied while the African American males either refused or denied that they had littered. “What is it culturally that makes that happen?” she inquired.

Culturally, white people, generally men, in the US make the laws, and hold black and brown people accountable, usually more accountable than white people. “Take care of our environment” is the rule; no littering the implication. The rule was made by the invisible white power structure, and enforced, in this case, by the white principal. We know that teachers watch black boys more often (Editors, 10/9/16) and that black boys more often receive disciplinary responses (Skiba, 2011). We know this is unfair. So do the boys through lived experience. Even if this principal does not have a bias in her responses, it does not matter. She is part of this power structure and perceived as such by our students. And how are we perceived? Now here is where I will offer some imagination, some prediction. It is likely we do not look like the students’ loving and caring mothers or grandmothers. Instead we might look like the person at the store who follows without cause. It is also likely the school experience of our black and brown students is not very nurturing (remember that young teacher- to- be who thinks “they” need more structure and discipline?). We are the face of oppression, especially when we “catch” our students. We must recognize that the outward reaction of being caught masks a fear that has been learned in order to survive (Coates, 2015). This is the context in which our children live (remember that we teach black boys they are dangerous). We confuse our children, help them develop hurtful and erroneous self-perceptions. Actions have intended and unintended consequences; they are important means of communication. What is seen is often of less consequence than what is heard or understood.

Does that mean we stop having expectations for students who are black and brown? No. It means the way we address behaviors has to be much more thoughtful and proactive and much less confrontational. This will not hurt anyone. In fact, it is the right way to operate. This takes us back to CPS as a collaborative process rejecting the deficit lens of students it proposes. Engaging Schools and RC provide strategies for morning meeting and advisories for developing relationships even as they must be examined for issues related to ethnicity, race, and gender. We cannot, however, accept punitive recommendations like time-out that are part of RC (Brady K, 2010) or continue to use detention and suspension. We can think carefully about how our power is perceived, acknowledge it, and have dialogue instead of punishment.

Acknowledging, understanding and accepting issues of race that permeate our classrooms builds relationships. How do we proactively acknowledge issues of power and race and class and begin a conversation before there is a problem? How do we get comfortable raising questions, having dialogue, having hard and necessary conversations? *This* is important professional development and we must demand it. We must see and acknowledge the ways our thinking, language and actions have been affected by the power structures which have perpetuated the dichotomy of “them and us.” We have to be willing to confront and change these structures in our classrooms and schools. Most importantly, the way we behave with our students must take into consideration and name issues of power, societal issues related to targeted groups of people. The line between teaching and punishing, listening and lecturing, planning carefully and acting habitually is often the safety of our students. We will do no harm.

Mantra: Do no harm = stop, get calm, check thinking, change language, acknowledge/affirm, engage with.

Critically examine student safety

Perhaps there is no issue as emotional and problematic as safety in our schools. I have learned when safety is really an issue, I must maintain my calm, problem solve, and work collaboratively with families. I learned this most significantly in my first year as principal/special education director of an inclusive elementary school.

Leroy was a first grader new to our school. When asked to introduce himself, he scratched his face drawing blood. His intense discomfort with attention was a safety issue for him. One time, when classmates were looking at him, he left the school. I was notified. Usually, when students leave, I can stay still on a bench or bounce a ball, and they will come to me as they become calm. Leroy kept walking, fast. He was in the street. I knew that if I chased, he would run. I observed the direction he was headed and determined he was going home. I knew this because I used to run to find where my students lived, wave at family members, and sometimes have little conversations. This was well before cell phones, and often the families did not have telephones. Running and the grocery store were my main methods of communication. I got my car, drove to his house, got his father (who I knew would be sleeping because he worked nights) and we intercepted Leroy. Leroy's father and I needed to be a united caring partnership with Leroy. At our short meeting I acknowledged Leroy's strong discomfort and we also acknowledged our fear for his safety. Together we established a place he could go when he needed to get away. He was not in trouble, did not need an additional consequence. The consequence to the action was that we needed a plan for his safety. This would not have been as successful if I did not have Leroy's father with me. We all bonded through this situation, a modified application of CPS. Leroy never left school grounds again.

There are a few times in my career in which I have considered calling the police. Leroy's leaving was one of them. I never have. The desire to call for police comes when I am afraid. When I remember that I am the adult, and must be calm and in charge of myself, I can see that the student is also afraid in this moment, and that the police will make that fear even worse. It is then that I remember that students are at the center of our work and that my job is to keep them feeling safe and cared for. We are back to our role once again. We educate in a context of care and nurturing. These are our babies. When we become calm and clear, we can think about who our students are and what will keep them safe. We can begin to notice the inconsistencies in our rhetoric, our policies.

If we are dismantling the school to prison pipeline, and we must, then we cannot empower the police officers in our schools. Police in schools do not make our black students feel more safe. When we get stuck, we must reach to the families and communities of our students. Our job, as educators is to protect our students, keep them safe and teach. We are teachers, not enforcers. And it is our job to work *with* children and families.

The complex and convoluted relationship of schools and criminal justice was exemplified at a recent presentation/conversation about policing with the local chief of police. The police chief stated that school resource officers should function as the assistant principals of schools. He has seen this work well in some high schools. As a person who has dedicated my life to education, as a teacher and principal for more than forty years, I want to note the absolute misunderstanding of the role of an educator that is communicated in that statement. Education is not about rules and punishments. It is not about limits. As teachers we are opportunity providers not limit setters. In the article "Federal Officials Urge Clear Limited Roles For Police in Schools," Evie Blad reported:

With the goal of protecting students' civil rights and limiting unnecessarily harsh school discipline, the Obama administration is calling on schools to ensure that the role of on-site police is limited and clearly defined (Blad, 2016).

We can no longer have high rates of preschool expulsion (Brasher, 2016), and allow 5 year olds to be handcuffed and escorted out of schools (Querry, 2015). We cannot have high school students restrained and arrested for yelling in the hallways (ACLU, 2016). We have to be very clear that teachers and leaders can and must have skills in de-escalation, skills offered in the mantras

already. Be calm, acknowledge, affirm. Breathe with the person. Change our thinking and reactions so that we do not continue to trigger students. Police are triggers. Police can do only what we tell them to do in a school, therefore we must limit or eliminate their presence thereby creating a safer environment for minoritized/targeted students.

As we continue to think about ways in which we change the environment to keep our students safe, we have to remember what we have already begun. We no longer see our students as threats. We see strengths, skills, desire to learn. We have changed our language and we have invited students into educational dialogue. And still we must ask how we can keep our students safe. Our actions must “do no harm.” Retribution, shaming, humiliation do not belong in schools. We are educators, opportunity makers. The “boards of shame”, whether about tests or behaviors must go. We must support practices that teach: CPS, restorative justice and conflict resolution. Students must be safe emotionally and physically. How do we create a school environment that is safe for people who are not safe in our communities? It is not by practicing drills. It is by thinking deeply about what our students need from us. Here I turn to a story about protecting a targeted group of people who have been bullied without much intervention and have a high rate of suicide: transgender youth.

About six years ago, a local school had a speaker (pronouns they/them) who was transitioning. After the speech, when asked what was most difficult, they talked about the discomfort of having to choose to go to either a boys’ bathroom or a girls’ bathroom. The students took this comment to heart and seriously studied the issue. After much consideration, the middle school students took a proposal to the principal who empowered them to make a presentation to the Board. What resulted was the utilization of a student created sign marking the bathrooms and making them gender free and a long term plan to remodel the bathrooms into single person bathrooms throughout the school. Six years later all the construction is completed. The original gender free signs remain. What is important here is the acknowledgement (without defensiveness) of the issue and the involvement of the students to develop a response. They read, wrote, presented in the service of something that was important to them and also would make a difference. There are many additional environments that have to become safe including locker rooms, hallways, lunchrooms. The environment deserves and requires dedicated study as do many traditions. This means involving students in problem-solving, exposing unfounded fears, providing avenues of dialogue, and empowering students to make real change.

It is hard to undo hurts, even unintended ones. Hurts destroy relationships, the very foundation of our educational process (Scherer, 2016). We cannot ask students to dissociate from themselves in our classrooms, whether by structure, environment, or content. We cannot deny existence or limit it to one of victimization.

Mantra: Do no harm = stop, get calm, check thinking and language, acknowledge/affirm, engage with, keep safe

Bring student experience into the classroom

As a Jew, I know what it means to be excluded, to be invisible in the calendar, the celebrations, the decorations, the vocabulary, the stories. I know I am represented as the victim in the Holocaust whose people did not fight back. Such narrow representations are also assigned to African Americans and other minoritized groups. We must begin to notice who and how our content makes invisible or limits. We can acknowledge the omissions and act; change the voices, perspectives, values and words. We have this power. It is our work, our craft.

We must learn to be proactive, unpacking the messages in the content and the way it is delivered. In the garden project, the teacher was excited. She made the plans and the students were required to do the work. This “power over” project meant something different to the African American students. How do we begin to predict that the use of power in a situation of “overseer” and unpaid worker, “slave” will emerge, and that we must be much more thoughtful and inclusive. How can we really engage our students, validate and honor lived experience?

In *Making Space for Active Learning*, the authors offer examples of how we can find the time and space in our classrooms even while we are using texts. Patricia Carini, in the introduction, states:

As contribution to the ongoing struggle for humane education, this book offers story: as bulwark against oppression, as act of resistance, as guardians of vision, as harbinger of hope (Martin, 2014, p. 6).

The choices we make for our reading, must be expansive, instructive, and offer a view of strength. Listen to the thinking of Jenerra Williams in her choice of reading the Langston Hughes poem, “Refugee in America,” to her 2nd and 3rd graders:

...his words have the ability to speak truth and reveal the honest shortcomings of humankind while simultaneously leaving behind an intentional pathway to hope. When I think about teaching our “Struggle for Justice” theme through the lens of the African American experience, this too is my intention: Speak truth, birth hope (Meier, 2015, p. 61).

We may not all have the freedom to develop units based on theme, but we can and must be intentional in the choices we do have and be clear about our goals, the ideas and questions we expect our students to explore. Ideas like “speak truth, birth hope” offer us pathways into honest conversations.

Critically looking at the materials we are given is not only pertinent to literature and history. We can ask the same questions in math and science. Whose perspectives are present? Whose are missing? What values are being promoted? What language is used? In the powerful article “The Problem with Story Problems,” Anita Bright writes:

Many teachers I queried noted that the textbooks are filled with examples that are alien to their students’ lives. The class bias is particularly troubling. For example, here’s a problem from Brooks/Cole’s *Precalculus: Mathematics for Calculus*, 5th edition: Craig is saving to buy a vacation home... (Bright, 2016, p. 16)

In this article, Bright offers multiple examples of underlying classism, racism and sexism found in math texts, elementary through high school. She also describes processes of involving the students to notice and address the issues. Certainly class and consumerism are issues in the problem to be solved for Craig. (We could ask students to describe how they see Craig and unpack this as well.) Bright makes a case for having students re-write questions using the same mathematical thinking so that the new questions reflect real experiences in the community. Students are brought into the classroom and at the same time we are acknowledging the limitations of the texts and prompting deeper conversations.

Even in the most prescribed of curricula, we can supplement. We can question. We can provide opportunities for student voice and exploration. We can take news events that students hear only bits and pieces of and decide to teach about them. Often our work means we must educate ourselves.

In “Responding to Tragedy: 2nd graders reach out to the Sikh community,” Dale Weiss, the second grade teacher, describes the need to address a killing at a Sikh temple within the community of her school and the method she uses for her planning (Weiss, 2013). The work began with a realization that she knew very little about Sikhs herself and she devised a plan of action for learning that included visiting the temple, meeting people and doing research:

As I made my usual preparations for the school year, I continued to read about Sikhism and to gather resources. I learned that nonviolence is at the core of Sikhism. I learned that many traditional Sikhs do not cut their hair of those, boys wear a *patka*, men and women wear a

turban.... Like any religion or culture, there are core beliefs and a breadth of practices (Weiss, 2013, p. 30).

Weiss guides us through the journey she took with her students. She notes that “Through learning about the Sikh community, our class became a community” (Weiss, 2013, p.36). Building a community comes from being engaged in real work together, work that is important to us all. We do not need to engage students with tricks, fun activities and technology; we must engage students by bringing them into their own education addressing important issues.

Bright and Weiss affirm the experience of the students and involve the people and issues of the community. We must work *with* our students, our families, our communities. We are not technicians for programs, teacher guides, or texts. We are teachers. We must adjust, critique, and, if we dare, create curriculum that expands the thinking of our students even as it is anchored in their experiences. As Delpit writes,

We have to cease attempting to build “teacher-proof” schools with scripted low-level instruction and instead seek to develop (and retain) perceptive, thinking teachers who challenge their students with high quality, interactive, and thoughtful instruction (Delpit, 2012, p. 34).

We can do this. When we stop and assess our books and materials for values, language, and voice, when we make changes to include the students, we are teachers. When we talk to each other, share our thinking, hold each other accountable and support each other in this work, we are teachers. There are many of us. We have power in our work and our numbers. We cannot be afraid, there is too much at stake, too many of our students are disconnected. We are not technicians nor are we enforcers. We are teachers.

Mantra: Do no harm = stop, get calm, check thinking and language, acknowledge/affirm, engage with, create safety, include = teach

A wise (white woman) superintendent I worked *with* started her meetings by saying, “We are part of the problem; we are part of the solution.” So, my colleagues, we have a lot to do, change for ourselves and our systems. We must know ourselves and therefore understand how we are limiting others. The system has endowed us with immense power as teachers. We must use it to include, not control; to work *with* and *in* community. We must be very intentional with our language; language can hurt and restrict or be empathic and inclusive. We must see, hear, and affirm what students say by words or actions. We must keep our students safe emotionally as well as physically. We must change the curriculum so that it first meets our students and validates lived experience as it extends and expands perspectives and ideas.

It is hard work to change. We have to talk to each other, remind each other of our work and support each other. We must practice having hard and honest conversations. We must learn to work with our students, families and communities. We can use the mantras; initiate dialogue about the components with our students, our families. We can use the process and we can teach it.

Stop: In order to break habits, first we stop. We need this pause to so that we can think before we act.

Get calm: In stressful situations, we must use calming strategies to regulate ourselves before we can even begin to check our thinking.

Check: We must check the thinking behind our feelings, the thinking behind our initial thoughts, the thinking behind the curriculum, posters and the environment, and make corrections to our thinking.

Change language: We must be intentional with our language, make it inclusive.

Acknowledge/Affirm: We must acknowledge when we cause pain through omission, denial, deficit thinking, control.

Engage with: In order to change relationships, understandings and practices we must engage in dialogue with students and community.

Create safety: We must examine the environment and context of our schools, understand what it means and make changes so that our students are *and* feel safe.

Include: Changes in thinking, language, interpretation, classroom content must bring our students into the center of our work. We must begin by knowing our students and having our students' experiences visible and validated by classroom experience.

We have our work cut out for us. We must be teachers, informed, caring and courageous.

With love, care and respect,

Laura

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Miscellany

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International Journal of Progressive Education (IJPE) (ISSN 1554-5210) is a peer reviewed interactive electronic journal sponsored by the International Association of Educators and in part by the Graduate School of Library and Information Science at the University of Illinois at Urbana-Champaign. IJPE is a core partner of the Community Informatics Initiative and a major user/developer of the Community Inquiry Laboratories. IJPE takes an interdisciplinary approach to its general aim of promoting an open and continuing dialogue about the current educational issues and future conceptions of educational theory and practice in an international context. In order to achieve that aim, IJPE seeks to publish thoughtful articles that present empirical research, theoretical statements, and philosophical arguments on the issues of educational theory, policy, and practice. IJPE is published three times a year in four different languages; Chinese, Turkish, Spanish and English.

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