

A Solution for Older Adults' Learning of Computer Skills: The Computer Game-Based Learning Approach

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Abstract

The purpose of this article is to introduce the computer game-based learning (CGBL) to retired older adults. This article discusses the contradiction between the benefits and appropriateness for older adults to use computers and the Internet, and the difficulties for older adults to learn to use them. This article suggests using massively multiplayer online role-playing games (MMORPGs) to solve this contradiction. A Chinese game, Mai-fang-zi, is used as an example to illustrate the possibilities of using a MMORPG to engage and motivate older adults to learn computer skills, as well as to extend their social network.

The prevalence of personal computers and the mobile devices brings the younger generation into a new communication era. On the other hand, older adults are unlikely to have experience of using the computer and the Internet for communication purposes (ONS, 2006). The different communication approaches may segregate old adulthood in their dedicated retirement communities and reduce their communication with people outside of their community, especially, the younger generation. As a result, the retired old adults are more at risk of social isolation than younger people (Lubinski, Morrison, & Rigrodsky, 1981; Revenson, 1990).

Computer-based communication may possibly change this isolated situation of retired older adults by minimizing dependence on physical fitness, communicating inexpensively over distance, various input/output modality, and overcoming ageist stereotyping (Dickinson & Hill, 2007). In addition, computer-based communication is also a means for older adults to join the wired world of the younger people.

Albeit the opportunities, computer use among older adults is still limited. The technological obstacles have been holding older adults back from the use of computers. This paper proposes using computer games, especially the modern massively multiplayer online role-playing games (MMORPGs) as a solution to this contradiction.

MMORPGs have strong motivating and engaging capabilities (Ang & Rao, 2008; Dickey, 2007). In addition, MMORPGs normally have embedded virtual interaction environments that provide their players with a safe virtual environment where they can meet, interact, collaborate, share resources, and play with other players (Cole & Griffiths, 2007; Dickey, 2007; Griffiths, Davies, & Chappell, 2004; Smyth, 2007). These virtual interaction environments are also virtual social

environments where older adults can join in naturally without less concern of age differences or generational gaps.

This article discusses the importance and necessity of facilitating older adults' learning of the computer skills, the difficulties to learn to use computers, and the possibility of using MMORPGs as an instructional methodology to solve this contraction. This paper uses a Chinese MMORPG, *Mai-fang-zi*, as an example.

Review of Literature

Computers and Older Adults

Computers have a potential to improve older adults' life quality and life satisfaction through the communicative potentials offered by their communication systems (Groves & Slack, 1994; Hawthorn, 2003). Researchers have found that the Internet can bring a number of psychosocial benefits for older adults, such as decreasing loneliness, boredom, and depressive symptoms, while increasing confidence. As a result, *wired seniors* (Fox, 2004) were less likely to report health-related limitations, and more likely to report being able to do things independently (Fox, 2004; Stark-Wroblewski, Edelbaum, & Ryan, 2007). Take e-mail for example. E-mail is one of the most commonly used Internet functions among older adults. Researchers found that e-mail users were less likely to report problems related to everyday activities as well as higher levels of independence than the non-e-mail using counterparts (Hummert, 1994; Stark-Wroblewski, et al., 2007).

Even with these benefits, the computer usage rate is low among older adults. For example, only 22% Americans older adults, 65 and above, use the Internet (Fox, 2004). Technological obstacles are the major reasons why most seniors are not wired yet. Computer-based communication systems, such as e-mail systems, typically assume that users have previous knowledge of computer system. This assumption leads to usability issues for those who have no computing experience (Dickinson & Hill, 2007), such as older adults. In addition, since the development and prevalence of the personal computers is within two decades, older adults, especially those who are in their 60s, have not received training of computer uses (ONS, 2006). Consequently, older adults may have technology anxiety. The technology anxiety also makes it more difficult for older adults to start using computers. Therefore, the computers are deemed twice as difficult to use for older adults as compared to younger people (Dickinson & Hill, 2007; Zhou, Yasuda, & Yokoi, 2007).

Putting together, to facilitate older adults' computer usage, an instructional approach that has strong motivating capabilities to engage, to motivate, and to help older adults overcome their technological anxieties is needed (Groves & Slack, 1994).

Virtual social interaction environments, such as MSN messenger, Yahoo Messenger, and Facebook are suitable for older adults' communication requirements with three distinguishing advantages. First, most of today's younger generation uses them for maintaining their social network. Therefore, using these communication tools can help older adults get involved into the younger generation's social network. Second, these communication tools can not only be used to contact friends, but also for searching and making friends with strangers who have similar interests. Third, these tools often provide real time communication, which keeps older adults feeling more accompanied.

The use of games for educational purposes can be traced to the use of war games in the 1600s (Gredler, 1996; Langton, Addinall, Ellington, & Percival, 1980). MMORPGs are modern computer games that have been gaining educators' attentions for its educational applications in recent years (Dickey, 2007).

MMORPGs are persistent online gaming worlds that incorporate role-playing and multiplayer systems with the use of instant messaging. MMORPGs allow thousands of players across the world to meet, interact, collaborate, share resources, and play together within a multi-modal environment (Cole & Griffiths, 2007; Dickey, 2007; Griffiths, et al., 2004; Smyth, 2007). The social interaction with many other people online is a defining feature of MMORPGs (Smyth, 2007). MMORPGs are appropriate for older adults to learn computer skills for three reasons.

First of all, the most distinguishing advantage of computer games is the promise of engaging and motivating players (Kiili, 2005). Computer game players are often found in the mental status of "flow". Flow indicates a mental state of deep involvement or absorption in an activity, in which people lose their sense of self consciousness and time (Csikszentmihalyi, 1990; Csikszentmihalyi & LeFevre, 1989; Schunk, Pintrich, & Meece, 2008; Wan & Chiou, 2006). In addition, many MMORPGs also integrate the simulation features in which players take the role of designers. In simulation games, players adapt roles in a mockup of selected aspects of a real- life situation (Akinsola & Animasahun, 2007). The player may design a virtual house, a virtual garden, or an outfit. Design process fosters learners' their motivation by allowing learners to find relevance to the content (Harel, 1991). Therefore, game-based learning can be designed to help people learn subject matter in an enjoyable and motivating way (Sedig, 2008).

Second, playing a computer game only requires the most fundamental computer skills such as moving the computer mouse and using the mouse to press a button. Some MMORPGs may take high gaming skills such as using composite computer keys to gain higher scores; however using the computer mouse is normally sufficient for merely playing them. This makes MMORPGs ideal for older adults who have almost no computer skills. In addition, the storylines of MMORPGs are various. Some MMORPGs, such as Mai-fang-zi are designed for a wide range of players. The game's storyline is also attractive to older adults. In addition, MMORPGs have competency levels designs; therefore, the older adult players can gradually accumulate their

computer skills while improving their gaming skills. For example, an older adult player may start with the simplest version of the game. Gradually, when the older adult players learn basic skills, they become more confident in using computers. After that, they may start to explore different functions of the game and the computer in order to perform better in the game.

Third, MMORPGs embed virtual interaction environments to support the communication and collaboration among their players. *Mai-fang-zi*, for example, integrates a Facebook familiar virtual interaction environment. Players can create their game-based community to communicate, share experiences, and collaborate with each other. The relationships built up in games can also be carried into players' real lives. Therefore, the MMORPGs embedded virtual interaction environments have the possibility to expand older adults' personal social network to compensate for the loneliness that is often caused by their ages and retirement. In addition, the MMORPGs' integrated interaction environments allow players to explore different identities and express themselves in a non-threatening environment (Hagel & Armstrong, 1997; Squire, 2007; Turkle, 1995). Therefore, in addition to communicating with people in their own age, older adults can play imaginary roles in a MMORPG. They can relive their 20s or 30s in MMORPGs. They can make friends with those who are from the younger generation and join the younger people's discussions without feeling constrained by their ages and real life identities. Consequently, older adults may feel rejuvenated through game play.

In conclusion, MMORPGs can serve as an instructional approach to engage and motivate older adult learners, as well as being an ideal platform for older adults' learning of computer skills.

Mai-fang-zi

Mai-fang-zi (purchasing a house) is one sub-game of a Chinese MMORPG named *Kaixin* (happy) Net. The storyline of this game is about buying residential properties through farming. The challenges of the game that epitomize the competitive elements of the game include: levels of farms, levels of plants, upgrading house, decorating houses, and upgrading cars and so on.

Motivational Elements

Mai-fang-zi integrates Facebook familiar virtual interaction environment, quasi-simulation, and role-playing features. Being a role-playing simulation game, *Mai-fang-zi* situates players in a certain role in the process of solving problems in a mockup of selected aspects of a real-life situation (Akinsola & Animasahun, 2007). In *Mai-fang-zi*, the player starts as a homeless poor man/woman with empty fields and a barn yard as shown in Figure 1. In order to make money, the players have to farm, raise, and eventually sell virtual plants and animals. After making enough money, the player will be able to buy residential properties and decorate them. The property information such as the city, the living area, the living complex, the size of a property, and the price is mostly based on real data (see Figure 2). The virtual furniture, appliances, and

decorations are also those that people can normally find in real-world stores such as IKEA. In addition, the players can even purchase properties in different countries that they are not able to visit in their real lives. This is a strong motivating design features that engages players in the game world.

Each player is also constrained by his/her game level as to the types of plants and the number of the fields that the player can farm. This setting is a popular challenging design in computer games. The social interaction environment of Mai-fang-zai is another important engaging element of this game. It is discussed in the social elements section.



Figure 1. The field and the barn yard.



Figure 2. The virtual property.

Using mouse is the entry level skill for starting playing Mai-fang-zi. For those older adults who are not familiar with a computer mouse, playing this game allows them to keep practicing using mouse without even noticing it, because they will be fully engaged in the game itself. While getting familiar with the game environment, the players may want to personalize their display images. Through this process, elderly players get to learn computer skills such as locating and uploading a picture from the local computer. Players may soon start to add other players to their friend list, so that they can make more “money” by “stealing” crops and animals from friends’ fields and barn yards. Refreshing the computer screen to compete more effectively with other players for getting more valuable crops and animals is another computer skill that the elderly player may pick up right away. Players may start receiving virtual gifts and messages from their game friends. In order to respond to these game friends, the older adults may start to learn to type in Chinese and send messages. Typing in Chinese is often found especially difficult among Chinese older adults since the keyboard design is based on English. Capturing, saving, and sending computer screen shots as attachments may be the next group of computer skills that the older adults may have to accomplish, so that they can save important online moments as well as share their virtual houses with other people. Other than learning computer skills, most importantly, through playing Mai-fang-zi, computers become a tool for having fun instead of a terrifying technology to the older adults. By diminishing the technology anxiety, older adults are ready to learn more computer skills.

Social Elements

The success of playing Mai-fang-zi depends largely on the number of the game friends. The more friends the player has, the more crops and animals the player can steal and more guest fields the player can farm. In addition, the game design also encourages players to help their game friends by activities such as feeding friends’ animals. The game allows players to view and comment on each other’s interior design to build the initial game community. The Facebook familiar interaction environment of the game also allows players to share things other than the game. Players can share their blogs, articles, and pictures, as well as comment on each other’s work. The interaction environment opens the window for older adults to meet strangers, know them, and make friends. Since players of Mai-fang-zi range from elementary kids to retired older adults, elderly players can make friends with a wide age scope.

By playing Mai-fang-zi, older adults may not only be motivated to learn many computer skills, including the most difficult skill-typing, but also make friends online. In other words, older adults may become more satisfied with their lives by engaging in game play.

Conclusion

This article suggests using MMORPGs as an instructional method to engage and motivate older

adults to learn computer skills. MMORGs' inherent motivational elements can engage and maintain senior learners' attention and diminish their technology anxiety. In addition, modern MMORPGs normally have integrated social interaction environments. They can extend older adults' social network by allowing them to interact with people from different areas, with different backgrounds, and at different ages. As a result, playing MMORPGs may also decrease older adults' feeling of loneliness and disconnection from society. This article used a Chinese MMORPG, Mai-fang-zi, as an example, and discusses its motivational, educational, and social elements. This article suggests that more studies should be conducted to investigate older adults' perception of computers and computer game usage, specifically MMORPGs, and how MMORPGs-BL should be integrated into senior citizens' learning of computer skills.

References

- Akinsola, M. K., & Animasahun, I. A. (2007). The effect of simulation-games environment on students achievement in and attitudes to mathematics in secondary schools. *The Turkish Online Journal of Educational Technology*, 6(3), 113-119.
- Ang, C. S., & Rao, G. S. V. R. K. (2008). Computer game theory for design motivating educational softward: A survey study. *International Journal on E-Learning*, 7(2), 181-199.
- Cole, H., & Griffiths, M. D. (2007). Social interactions in massively multiplayer online role-playing gamers. *Cyber Psychology & Behavior*, 10(4), 575-583.
- Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. New York: HarperCollins.
- Csikszentmihalyi, M., & LeFevre, J. (1989). Optimal experience in work and leisure. *Journal of Personality and Social Psychology*, 56(5), 815-822.
- Dickey, M. D. (2007). Game design and learning: A conjectural analysis of how massively multiple online role playing games (MMORPGs) foster intrinsic motivation. *Education Technology Research & Development*, 55(3), 253-273.
- Dickinson, A., & Hill, R. L. (2007). Keeping in touch: Talking to older people about computers and communication. *Educational Gerontology*, 33(8), 613-630.
- Fox, S. (2004). *Older Americans and the Internet*. Washington D. C.: Pew Internet & American Life Project.
- Gredler, M. E. (1996). Games and simulations and their relationships to learning In D. H. *Journal of Research in Education* Volume 21, Number 2

- Jonassen (Ed.), *Handbook of research for educational communications and technology* (pp. 571-581). New York: Simon and Schuster.
- Griffiths, M. D., Davies, M. N. O., & Chappell, D. (2004). Demographic factors and playing variables in on-line computer gaming. *Cyber Psychology & Behavior*, 7(4), 479-487.
- Groves, D. L., & Slack, T. (1994). Computers and their application to senior citizen therapy within a nursing home. *Journal of Instructional Psychology*, 21(3), 221-226.
- Hagel, H., & Armstrong, A. (1997). *Net Gain: Expanding markets through virtual communities*. Boston, MA: Business School Press.
- Harel, I. (1991). *Children designers: Interdisciplinary constructions for learning and knowing mathematics in a computer-rich school*. Norwood, NJ: Ablex Publishing.
- Hawthorn, D. (2003). *How universal is good design for older users?* Paper presented at the ACM Conference on Universal Usability, Vancouver, British Columbia, Canada.
- Hummert, M. L. (1994). Stereotypes of the elderly and patronizing speech. In M. L. Hummert, J. M. Weimann & J. F. Nussbaum (Eds.), *Interpersonal communication in older adulthood: Interdisciplinary theory and research* (pp. 162-184). Thousand Oaks, CA: Sage.
- Kiili, K. (2005). Digital game-based learning: Towards an experiential gaming model. *Internet and Higher Education*, 8(1), 13-24.
- Langton, N. H., Addinall, E., Ellington, H. I., & Percival, F. (1980). The value of simulations and games in the teaching of science. *European Journal of Education*, 15(3), 261-271.
- Lubinski, R., Morrison, E. B., & Rigrodsky, S. (1981). Perception of spoken communication by elderly chronically ill patients in an institutional setting. *Journal of Speech and Hearing Disorder*, 46, 405-412.
- ONS (2006). *Adults who have ever accessed the internet*. London, UK: Office for National Statistics.
- Revenson, T. A. (1990). Social support processes among chronically ill elders: Patient and provider perspectives. In H. Giles, N. Coupland & J. M. Weimann (Eds.), *Communication, health and the elderly*. Manchester, UK: Manchester University Press.
- Schunk, D. H., Pintrich, P. R., & Meece, J. L. (2008). *Motivation in education: Theory, research, and applications*. Upper Saddle River, NJ: Pearson.

- Sedig, K. (2008). From play to thoughtful learning: A design strategy to engage children with mathematical representations. *Journal of Computer in Mathematics and Science Teaching*, 21(1), 65-101.
- Smyth, J. M. (2007). Beyond self-selection in video game play: An experimental examination of the consequences of massively multiplayer online role playing game play. *CyberPsychology & Behavior*, 10(5), 7-7-721.
- Squire, K. (2007). Open-ended video games: A model for developing learning for the interactive age. In K. Salen (Ed.), *The ecology of games: Connecting youth, games, and learning* (pp. 167-198). Cambridge, MA: The MIT Press.
- Stark-Wroblewski, K., Edelbaum, J. K., & Ryan, J. J. (2007). Senior citizens who use e-mail. *Educational Gerontology*, 33(4), 293-307.
- Turkle, S. (1995). *Life on the screen: Identity in the age of the Internet*. New York: Simon & Schuster.
- Wan, C.-S., & Chiou, W.-B. (2006). Psychological motives and online games addiction: A test of flow theory and humanistic needs theory for Taiwanese adolescents. *Cyber Psychology & Behavior*, 9(3), 317-324.
- Zhou, W., Yasuda, T., & Yokoi, S. (2007). Supporting senior citizens using the Internet in China. *Research & Practice in Technology Enhanced Learning*, 2(1), 75-101.

The Use of Modeling to Promote Concept Development in College Algebra

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Abstract

A new course that focused on modeling and concept development in linear and exponential reasoning was created as an alternative to a traditional college algebra class. The new course emphasized deep conceptual thinking on a small set of ideas, while the traditional course emphasized mechanical fluency on a wide range of procedural applications. Using two separate instruments with each group, this pretest/posttest study found: a) students from the traditional class perform better on procedural tasks; b) students in both groups perform the same on a measure of conceptual achievement, and c) students in both groups showed statistically significant gain on procedural and conceptual tasks after a semester-long course.

As part of an ongoing pursuit to improve the learning of mathematics by undergraduate students, a group of researchers at a mid-size public research university in the Northeast designed a new course as an alternative to the traditional College Algebra course. The new course eventually became known as Elementary Algebraic Models in Our World. This course satisfies a “general education” requirement and is not intended for mathematics majors. It is considered a terminal course; that is, students do not take this course as deliberate preparation for pre-calculus or calculus. One overarching goal of the course is to help students become adept at thinking about the underlying concepts that support a few key topics within a typical college algebra course. The researchers posited: a) that a traditional course emphasizes procedural (symbolic/mechanical) fluency, but often to the detriment of deep reasoning, and b) that a different sort of course could promote modeling skills and conceptual understanding. Once the new course was established, a research program was enacted to answer questions that arose about the outcomes of such a course. This paper presents findings from one study that addressed student achievement.

Much discussion has occurred in the mathematics education literature around the topic of procedural and conceptual knowledge (e.g. Gordon, 2008; Ellington, 2005; Rittle-Johnson & Star, 2007). This paper does not seek to arrive at a conclusive definition of either idea, nor does it profess that one form of knowledge is more important or valuable than the other. Rather, this paper looks at the implications of a deliberate attempt to enhance the ability of college algebra students to perform tasks that are strongly conceptual in nature. Sheldon (2008) poses the concern that those researchers who attempt to demonstrate simply that an algebra course focused on modeling and conceptual understanding does not harm the students relative to a traditional college algebra class are misguided. Given the dismal results of most traditional college algebra classes, Sheldon (2008) suggests we should focus more on the potential benefits that may accrue in the arenas of concept development, communication skills, and practical skills that a modeling

approach emphasizes. Building on this idea, the current study investigates whether a learning experience can be designed and implemented specifically to produce gains in students' conceptual understanding of linear and exponential functions.

Rationale

The project began with a team of faculty deciding to create an alternative to the traditional College Algebra course that has existed, in a largely unchanged form, for decades. College Algebra was viewed as focusing primarily on algorithms, symbolic manipulations, and mechanical fluency of prescribed procedures. In addition, there was a view that many of the larger, overarching ideas that shape algebraic thinking were missing. At a minimum, faculty believed that if synthesizing and connecting ideas were present in college algebra, the students failed to grasp them due to a heavy emphasis on skill building. Rather than tweaking the existing course in small ways, with a trepidation that no significant changes would result, a new course was developed that aimed to enhance students' algebraic reasoning about linear, quadratic, and exponential functions. The new course would contain a smaller set of objectives, but would pursue each objective in greater depth, and through a modeling approach.

The Research Base

The research, as well as the premise of the new course itself, builds on the work of numerous theoreticians, who collectively build a case that the “key to improving student performance in a subject such as algebra is not to create an ever more elaborate and fine-tuned set of procedures, but rather to change the nature of instruction” (Chazan & Yerushalmy, 2003, p.133). These sorts of calls are not new, as evidenced two decades ago by Resnick (1987), who suggested that students need to work on ill-defined tasks, that have multiple solution strategies and more closely resemble the way algebraic ideas might be encountered outside school. Given years of collective, albeit anecdotal, data from the course designers, a guiding principle was that an entirely new approach was necessary to produce substantive changes in the mathematical work students generate. Prawat (1991) found that focusing on a small set of important conceptual chunks, rather than a large number of nearly identical symbolic manipulations is successful in terms of increasing learning outcomes. With this in mind, the modeling course was created such that: a) students spent considerable time on a small set of problem; b) problems were based on phenomenon from the real world, and often used data that the students collected; c) problems were often solved in a collaborative manner; and d) work emphasized the connections between different forms of representations, frequently moving between graphs, tables, and equations.

Description of the Course

In keeping with many of the most common and recurring recommendations in the reform literature (NCTM 2000, 2004), the course was designed around student engagement and communication. Some of the key features of class were: working in small groups; presenting

results of explorations in oral and written format, using both colloquial and mathematical language; incorporating a variety of technological applications (e.g. data-analysis software such as Fathom, graphing calculators, and probeware); modeling real world phenomena with mathematical processes; and translating among different forms of representations. The nature of the work itself often looked different than in a typical college algebra class. Rather than repeating a set of procedures that essentially worked the same way every time, the course followed more along what Resnick (1987), suggested, whereby students worked on ill-defined tasks, that had multiple solution strategies and more closely resembled the way algebraic ideas might be encountered outside school.

A typical class session might begin with students seeing a collection of data in chart format. Depending on the goals of the day, students might be asked to do a variety of tasks: write an explanation of what the data mean; convert the data into a graphical representation; determine a model that describes the data; find outliers in the data; notice similarities and differences from other data sets they have explored previously. In any case, the students will spend a considerable amount of time on a single, in-depth exploration, probing it for nuances and subtleties. In this way, they simulate a technique whereby concentrated focus on a small number of ideas leads to greater understanding (Prawat, 1991; Hake, 1998; and Marshall & Dorward, 2000).

From an interdisciplinary perspective, the physics education research community offered insights into additional ways to structure a course. Hake (1998) found that “traditional passive-student introductory courses, even those delivered by the most popular and talented instructors, imparted little conceptual understanding.” He writes about the success that an “interactive-engagement” model of instruction can have on student learning. Additionally, Fagen, Crouch and Mazur (2002) describe peer instruction as a way to modify the typical lecture format of large introductory courses, such that students interact with each other on specific conceptual questions. They found enhanced normalized gain under this program. Thus, the Modeling course synthesized and incorporated these techniques into its design. On a daily basis students were required to utilize the talents of each other, as sources of instruction and also as the point of “first check” for validating accuracy of mathematical work. Although not the primary focus of this manuscript, other studies (Amit & Fried, 2005; Boaler, 2003) have supported the desirable implications of minimizing the authoritative role of the teacher.

Other instructional features include many pedagogical efforts that are consistent with contemporary reform efforts. These include, to varying degrees: active learning; emphasis on student presentations; student writing; student exploration; and the use of technology. None of these features are particularly innovative in themselves; the innovation lies in the use of them in a context of teaching a variation of college algebra. Similarly, students are asked to spend considerable time interpreting information, communicating their knowledge in a variety of formats, utilizing original data collected in as part of an investigation, and translating information between multiple representations (such as graphs, tables, raw data, and equations).

Method

The purpose of this study was to determine how students would fare in attaining deep levels of understanding of algebraic concepts if they engaged in a semester course specifically designed to address that goal. However, since we were also concerned about the possibility that students might not learn the discrete skills taught in a traditional algebra course, we employed two separate instruments to measure achievement. One instrument was a commercially available test that emphasized algorithmic and mechanical fluency and was deemed “procedural” in nature; the other instrument, created by a team of researchers, emphasized multi-step reasoning and was deemed “conceptual” in nature. The “procedural” test consisted of 25 multiple choice questions. The “conceptual” test consisted of four problems, with multiple parts, with a total possible score of 16. The standardized test was machine-scored. The researcher-created test was scored by the researchers. It should be noted that tests were coded, and the scorers did not know whether any particular test came from a student in the traditional class or the reformed class. Each test was scored by two people and the results averaged. The presumption was that by using two instruments we would have a variety of question types, balancing between those demanding mechanical proficiency and those demanding qualitative reasoning.

The overarching methodology was a pre-test/posttest design. The intervention was the reformed Modeling course. The sample consisted of those students enrolled in each course willing to participate. The researchers were not the instructor for either course. Both courses satisfied general education requirements, and neither course is designed for students majoring in mathematics or sciences. Subjects in both the College Algebra course and the Modeling Course took both the standardized test and the researcher-created test on the first day of class for the semester (thus, each taking two separate pretests). Then, students in both courses took the same two tests again on the final day of the semester (each participant taking two separate posttests).

The study poses four separate research questions, and uses three separate statistical analyses.

Research Questions

The following questions guided the study:

1. How does concept attainment of students in a newly designed Algebraic Modeling Course compare to students in a traditional College Algebra course?
2. Did students in a traditional College Algebra class show greater gain than students in a reformed Algebraic Modeling course on a standardized measure of achievement?
3. Did students in a reformed Algebraic Modeling course show greater gain than students in a traditional College Algebra course on a “researcher-created” measure of achievement designed to emphasize conceptual learning?
4. Did either group demonstrate statistically significant gains on either measure after a semester of instruction?

Question 1 is answered using a construct known as “normalized gain.” This metric derives from work in the physics education community. Normalized gain (g) is a simple yet powerful model for measuring changes in student achievement. Hake (1998) is often cited as bringing normalized gain into common use as a respected method of analysis. Essentially, he defines the average normalized gain as the ratio of the actual average gain of a sample group to the maximum possible gain of the group.

$$g = (\text{posttest} - \text{pretest}) / (\text{total possible score} - \text{pretest})$$

In multiple empirical studies, Hake (1998) defines a “medium – g range” as 0.3 to 0.7. Hake’s approach has been duplicated (Fagen, et al, 2002) as providing meaningful data on changes in student achievement. A shortcoming of this framework, and its method of analysis, is that although we can compare the results to Hake’s “medium g ” range, we cannot say much about whether the differences between the groups are statistically significant or not. Thus, we present another look at the results.

Questions 2 and 3 are answered with multiple regression, an analysis that is common in educational research. This analysis determines whether the students in the experimental group (that is, the Modeling course) performed in a statistically different manner than the students in the control group at the end of the course, while accounting for any differences in the pretest scores between the two classes.

Question 4 is answered using a paired sample t -test. This test determines whether students in either course showed statistically significant gains between their pretests and corresponding posttests.

Results

Results for Question 1

As Tables 1 and 2 show, students in the College Algebra course demonstrated greater gain on the standardized algebra test, and students in the Modeling course scored greater gain on the instrument created by the researchers. This result matched the prediction by the researchers, and led them to conclude that a modified curriculum and pedagogy can produce alternate outcomes. This is consistent with an idea that Hiebert (2003) suggests, whereby “students learn what they have the opportunity to learn.”

Table 1.

Normalized Gain from Research-Created Test

	Pretest	Posttest	N	Normalized gain (g)
Traditional college algebra	5.5	8.3	32	0.27
Reformed Modeling course	5.1	9.1	28	0.37

Note: total possible points was 16.

Table 2.

Normalized Gain from Standardized Test

	Pretest	Posttest	N	Normalized gain (g)
Traditional college algebra	10.5	14.5	35	0.28
Reformed Modeling course	9.3	12.2	30	0.18

Note: total possible points was 25.

This result is based on Hake's normalized gain (g). However, one key limitation of using normalized gain is that it does not provide a firm indication of whether results are statistically significant. Thus, a second level of analysis was performed, addressing questions 2, 3 and 4.

For questions 2 and 3 the method of analysis was regression, with post-test scores as the dependent variable and pre-test scores and course as the independent variables. For question 4 the method of analysis was dependent sample t-tests.

Results for Question 2

As Table 3 shows, the answer to Question 2 is “yes.”

Table 3.

Predicting Standardized Measure of Achievement using Multiple Regression

Variable	B	s.e.	β
(constant)	6.082	1.107	
Pretest Score	.918**	.068	.841
Modeling Students	-1.227*	.511	-.149

Note: $R^2 = .77$. ** $p < .01$, two-tailed. * $p < .05$, two-tailed.

The data show that students in the college algebra course showed statistically significant greater gain than students in the modeling course on the standardized measure of achievement. To some extent the researchers expected this, as the traditional college algebra course gave greater emphasis to the type of work the standardized test measured.

Results for Question 3

As Table 4 shows, the answer to question 3 is “no.”

Table 4.

Predicting Researcher Created Assessment using Multiple Regression

Variable	B	s.e.	β
(constant)	5.727	1.031	
Pretest Score	.301**	.093	.387
Modeling Students	.922*	.562	.198

Note: $R^2 = .18$. ** $p < .01$, two-tailed.

Although students in the modeling course showed significant greater gain than the college algebra students on the researcher-created measure of achievement, again using $p < 0.05$, the data also show that this difference is not statistically significant. This result was disappointing from a “course reform” perspective. The intent of the new course was to provide deep conceptual learning that was missing from the traditional course. Although the results to not

demonstrate this yet, the researchers hope to replicate the study with a larger sample and with a refined version of the modeling curriculum.

Results for Question 4

As indicated in Table 5, the answer to Question 4 is “yes” in all cases.

Table 5.

Paired Sample T-Test Results

	Pre-Test		Post-Test		t	df	95% CI		Cohen's d
	M	SD	M	SD			LL	UL	
Researcher Assessment									
Modeling course	5.11	2.82	9.11	2.44	-8.75*	27	-4.94	-3.06	1.52
College Algebra	5.53	3.22	8.31	2.24	-4.55*	31	-4.03	-1.53	1.00
Standardized Assessment									
Modeling course	9.33	3.46	12.2	3.71	-8.48*	29	-3.56	-2.18	0.80
College algebra	10.49	4.05	14.5	4.23	-10.8*	34	-4.75	-3.25	0.96

Note: * $p < .001$.

Students in both the traditional College Algebra class and the reformed Modeling Class showed statistically significant gains on both measures of achievement at the end of a semester. This result is encouraging in the sense that both courses can be deemed successful in producing learning gains, even if the specific goal of creating an experience that enhances conceptual learning in particular is still unrealized.

Discussion and Implications

In many ways, the results of this study are consistent with what an informed observer might expect. The students in a traditional college algebra course scored better than students in an experimental, concept-driven course on a test designed to measure traditional algebra skills. Students in the experimental course scored better, although not at a statistically significant level, than students in the traditional course on a test designed to measure the concepts emphasized in the modeling course. Both of these results are confirmed by two analyses: a traditional multiple regression, widely accepted in educational research; and “normalized gain” which has strong support in the physics education research community. These results support the idea espoused

by Hiebert (2003) whereby students learned what each course gave them the opportunity to learn. While that phrase may sound obvious, the implication is robust. If we desire to see growth in particular aspects of student knowledge, then we need to design educational experiences that provide the opportunity to learn those forms of knowledge. It is all too easy to bemoan the fact that students exit particular courses having not learned certain ideas, yet a close scrutiny might reveal that students never had a true opportunity to learn the very ideas we lament not being attained.

Two strong implications for further research may be taken from this study. The first is that although the results were not as powerfully convincing as we might hope, they can be interpreted to reveal a solid first attempt at curricular and pedagogical reform. Work is underway to refine and revise the course experience, in the hopes that greater learning occurs, and can be documented in a statistically significant manner in a future study. The tremendous qualitative change in the demands on the instructor will pose smaller obstacles to success with each offering of the course. Second, we recognize the limitations of using our own “researcher-created” instrument, and will revise and strengthen it for future use. New questions can be developed, along with an enhanced scoring rubric that will further limit any element of subjectivity in scoring the multi-step conceptual problems, as well as highlight more clearly the specific mathematical outcomes. As the modeling course grows in popularity, the opportunity exists to conduct a refined replication with a much larger sample, adding power to the statistical analysis. In conclusion, the pursuit of a learning experience that enables college students to grasp the fine points of symbolic fluency while simultaneously internalizing the deep conceptual underpinnings of linear, quadratic and exponential relationships is a complex task. We recommend continued diligence in researching this vital phenomenon.

References

- Amit, M. & Fried, M. (2005). Authority and Authority Relations in Mathematics Education: A View from an 8th Grade Classroom. *Educational Studies in Mathematics*, 58(2), 145-168.
- Boaler, J. (2003). Studying and capturing the complexity of practice - the case of the 'dance of agency.' In Proceedings of the 27th Annual Conference of PME27 and PME-NA25, Pateman, N.A., Dougherty, B.J., and Joseph, T.Z. (eds.), Vol. 1, pp. 3-16, Honolulu, Hawaii: CRDG, College of Education.
- Chazan, D. & Yerushalmy, M. (2003). On appreciating the cognitive complexity of school algebra: Research on algebra learning and directions for curricular change. In *A Research companion to principles and standards for school mathematics* (pp. 123-135). Reston, VA: NCTM.

- Ellington, A. J. (2005). A modeling-based approach college algebra course and its effect on student achievement. *Problems, Resources, and Issues in Mathematics Undergraduate Studies*.
- Fagen, A. P., Crouch, C. H., & Mazur, E. (2002). Peer instruction: Results from a range of classrooms. *The Physics Teacher*, 40(5), 5-10.
- Gordon, S. (2008). What's wrong with college algebra. *Problems, Resources, and Issues in Mathematics Undergraduate Studies*, 18(6), 516-541.
- Hake, R. R. (1998). Interactive-engagement versus traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses. *American Journal of Physics*. 66(1), 64-74.
- Hiebert, J. (2003). What research says about the NCTM standards. In *A Research companion to principles and standards for school mathematics* (pp. 123-135). Reston, VA: NCTM.
- Marshall, J. & Dorward, J. (2000). Inquiry experiences as a lecture supplement for preservice elementary teachers and general education students. *American Journal of Physics*, 68(S1), S27-S36.
- National Council of Teachers of Mathematics (2000). *Principles and standards for school mathematics*. Reston, VA: Author.
- National Council of Teachers of Mathematics (2004). *A Research Companion to Principles and Standards for School Mathematics*. Reston, VA: Author.
- Prawat, R. (1991) The value of ideas: The immersion approach to the development of thinking. *Educational Researcher*, 20(2), 3-10.
- Resnick, L. B. (1987). Learning in school and out. *Educational Researcher*, 16(9), 13-20.

Classifying individuals using Q Methodology and Q Factor Analysis: Applications of Two Mixed Methodologies for Program Evaluation

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Abstract

Program evaluation is the process by which a program or project's effectiveness is determined with respect to the stakeholders, whether they are those the program serves or those who serve the program. Program evaluation is also important for improving the program's effectiveness for stakeholders. The purpose of this article is to introduce the reader to classification techniques of individuals that are useful for facilitating program evaluation and how these classifications, using Q factor analysis and Q Methodology, can provide predictor profiles that are more useful than simple variables and demographic information. We will detail how Q Methodology and Q factor analysis fit into the mixed methods framework as well as discuss specific examples of how to best utilize these techniques to better address research questions related to types (typologies) of people, especially based upon qualitative data, within program evaluation situations.

Program evaluation is an intrinsic part of any program or project because it is used to both measure the effectiveness of that program or project as well as investigate ways to increase that effectiveness. Most funding agencies, such as the National Science Foundation, require a substantial program evaluation component in their requests for proposals. Classification of individuals is useful for program evaluation because typically a program does not have the same level of effectiveness for the entire population it serves (McNeil, Newman, & Steinhauer, 2005). The purpose of this article is to demonstrate how classifications using Q factor analysis and Q Methodology can provide predictor typologies that are more useful than simple variables and demographic information for the classification of people, especially within program evaluation.

Background of the Study

Historically, in ancient times, people were classified based upon variables such as sex and other behavioral characteristics. For instance, before 200 AD, nine temperaments were assumed to be related to a person's susceptibility to diseases. In the twentieth century, Cyril Burt (1941) and William Stephenson (1935; 1953) were among those who first developed numerical classification techniques to group people. Although they use numerical classification, both of Q Methodology and Q factor analysis are mixed methods because they also use qualitative research techniques (I. Newman & Ramlo,

2010; Stenner & Stainton-Rogers, 2004). In mixed methods research, this type of classification is often referred to as typology development (Caracelli & Greene, 1993; Leech & Onwuegbuzie, 2009; Onwuegbuzie & Teddlie, 2003). Conceptually, this is similar to performing a theme analysis in qualitative research (I. Newman & Ramlo, 2010).

Caracelli and Greene (1993) describe typology development as mixed methods research where the analysis of one type of data yields categories that are then used as the framework for the contrasting profiles of people. Their examples include factor analysis of quantitative data to create a set of conceptual dimensions that are then used to categorize qualitative data. Similarly, we will discuss ways to effectively reduce the huge amount of qualitative variables into profiles to better investigate research questions in program evaluation. Thus, the methods we discuss will allow researchers to classify people based upon themes determined quantitatively using Q Methodology or Q factor analysis. In this paper, we will detail how Q Methodology and Q factor analysis fit into the mixed methods paradigm as well as discuss specific examples of how to best utilize these techniques to better address research questions where grouping people, especially in relation to program evaluation.

Introduction to Data Reduction

A common form of data reduction, most typically found in quantitative research, is factor analysis. Factor analysis takes a large amount of information, which can consist of either quantitative or qualitative data, and reduces them into groupings using constructs. In R factor analysis, items are grouped together based upon their levels of correlation, called factor loadings. A factor is made up of only those items that are highly correlated with that factor, based upon these factor loadings (I. Newman & Newman, 1994; Stevens, 2002). This type of analysis is common in psychometrics in social and behavioral research, such as determining construct validity of an instrument such as that performed by Ramlo (2008). This type of analysis is also used to reduce data to solve chemical problems (Malinowski, 2002).

Factor analysis can also be used to group people. In Q factor analysis and Q Methodology, factor loadings are calculated and used to group people into similar profiles or views. However, the data used in these techniques is not the objective data from a concept inventory where there are correct and incorrect answers (Ramlo, 2008) nor the type of data that may emerge from chemical analyses (Malinowski, 2002) used in R factor analysis to group items. Instead, the data used in Q factor analysis and Q Methodology often come from qualitative techniques such as focus groups and interviews (I. Newman & Ramlo, 2010).

As Stainton-Rogers (1995) explains, compared to typical qualitative research, Q Methodology maintains the relationship among themes within the data as it minimizes the impact of the researcher's frame of reference. It minimizes this impact through complex statistical analysis including correlation and factor analysis (Brown, 1980; Stephenson, 1955). Similarly, Q factor analysis uses sophisticated mathematics to find profiles that

represent different patterns in data. Thus, both Q factor analysis and Q Methodology are data reduction techniques that exist within the mixed methods continuum (I. Newman & Ramlo, 2010).

Existing Data Reduction Methods for Mixed Methods Research

Creswell (2010) calls for the development of new techniques and procedures to be used in mixed methods research but there are two mixed methods techniques that have existed for decades. As already mentioned, both Q factor analysis and Q Methodology use sophisticated statistical techniques to reduce large amounts of data. Yet the data often used in Q Methodology and Q factor analysis studies originate as qualitative. Although described as mixed methods, both Q Methodology and Q factor analysis remain uncommon in behavioral and social science research even though neither are new techniques (I. Newman & Ramlo, 2010).

For example, Q Methodology will celebrate its 75th year of existence in 2010; 75 years after Stephenson first published an article describing Q Methodology in *Nature* (Stephenson, 1935). Certainly, this technique was not originally identified as a mixed method since, as Creswell (2010) states, mixed method research began around 1988. Perhaps this is why, as Brown (1998) described Q Methodology as holding a controversial position in social science research that has led to its relatively small following. It is only recently that Q Methodology has become more widely accepted in journals in a variety of disciplines (Wolf, 4/29/2009) possibly due to the greater acceptance of mixed methods research.

Other publications have described Q Methodology in detail (Brown, 1980, 2010; McKeown & Thomas, 1988; I. Newman & Ramlo, 2010; Stephenson, 1953). Because Q Methodology is not well known to most education researchers, we will give an overview of the methodology here and then expand that discussion by discussing an application of Q Methodology in an evaluation of a bioinformatics course (Ramlo, McConnell, Duan, & Moore, 2008) developed with support from the National Science Foundation. Likewise we will present a brief overview of Q factor analysis before presenting an example where Q factor analysis was used in program evaluation.

A Q Methodology study often commences with the development of a concourse which is a collection of items. Concourse items most typically consist of statements related to the topic that have been collected from interviews, focus groups, free writing, etc. In another Q Methodology study by Ramlo (2005), faculty wrote down strengths and weaknesses related to the potential creation of a new School of Technology (SOT) on the campus of a large, urban, public university. Although 59 statements were collected, the researcher selected 50 statements to be sorted by the participants; these statements selected for sorting are referred to as the Q sample. Participants in a Q study then sort the Q-sample into a grid provided by the researcher based upon a condition of instruction which is related to the purpose of the study. For instance, in the School of Technology study, faculty participants were asked to sort the statements based upon their views about the creation of the SOT. The grid used in the SOT study is presented in Figure 1.

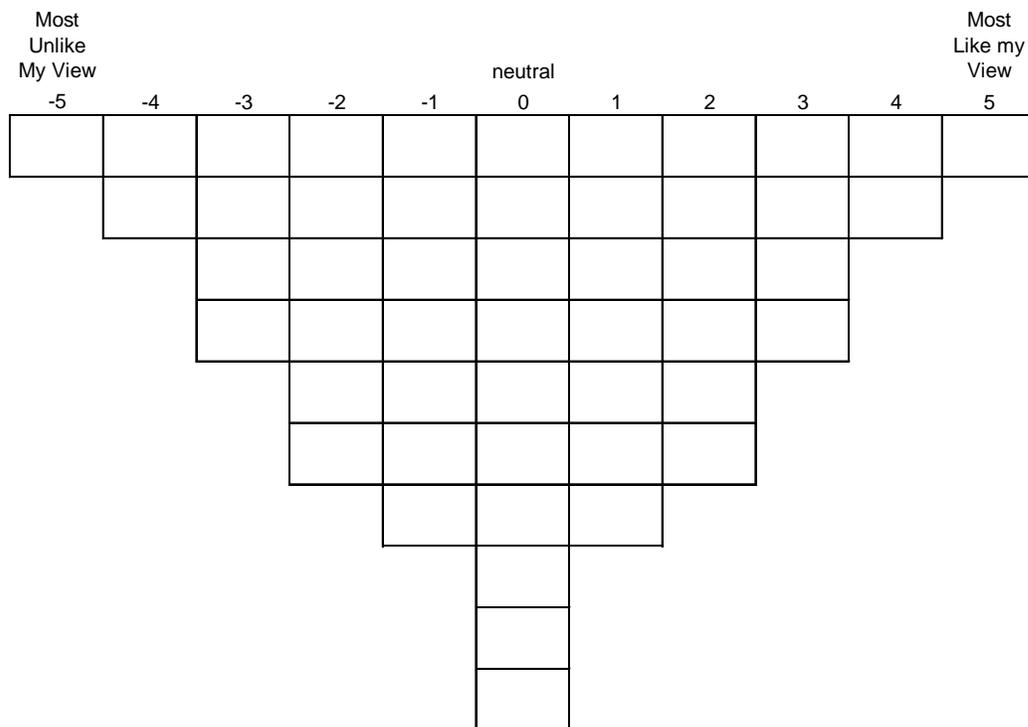


Figure 1.

Sorting grid for School of Technology study (Ramlo, 2005)

The analysis of the Q sorts is essentially a correlation, using factor analysis. The factor analysis involves factor extraction and rotation. After rotation, persons with significant loadings on the factors that emerge are selected. In other words, those with similar sorts are represented by the same factor because they have similar views about the topic. The tables that emerge from the analyses richly describe each of the factor views, as we will demonstrate here using tables from a study by Ramlo (2005) where faculty opinions about the creation of a new School of Technology (SOT) on the campus of a large public university in the Midwest were determined using Q Methodology. This study was, in effect, a needs assessment such as that which often takes place within program evaluation (McNeil et al., 2005).

Table 1 shows the top six “most like my view” and “most unlike my view” statements for Factor 1, from the Ramlo (2005)SOT study. The distinguishing statements for Factor 1 are contained in Table 2 and list the statements that distinguish this factor from the other two factors found in the study. Like this study, the researcher typically interprets the factors / views based upon these tables produced by the analyses of the Q sort along with other information such as demographics, pre or post-sort interviews, written comments by the sorters, etc. In the SOT study, Factor 1 was named “It’s a good thing” because of the positive attitude of those represented by this factor toward the creation of the SOT.

Table 1.

Factor 1 Top Six (6) Statements From the School of Technology study

No.	Statement	Grid Position
5	School of Technology will be perceived better than our current college. Image.	5
4	I am hoping this will encourage more thinking out of the box...new ideas and innovation...a more open College ...some change in thinking!	4
9	Easier to market our Bachelor degrees.	4
40	It's a problem that our ssociate degree costs more than those from other community colleges.	3
13	Easier articulation between our programs and others outside of our college.	3
22	Concerned about no new funding for new/better labs.	3
29	What about service courses, including non-gen-ed, where do they go?	-3
1	Separate schools / centers makes it easier administratively to set a pay schedule for associate and bachelor degrees	-3
42	Verbiage of "School" might seem vocational.	-3
48	Redundant use of Summit - drop the use of "Summit" from the "sub entities" (name suggested by administration)	-4
44	Concerned about where is it located.	-4
46	Will we (SOT) get an honorable mention during the next Super Bowl? (e.g. Need to spend major advertising \$).	-5

Note: +5 is the position most like the sorter's view and -5 is the position most unlike the sorter's view. This table is adapted from a study by Ramlo (2005).

Table 2.

Statements that Distinguish Factor 1 from Other Factors in the School of Technology Study

No.	Statement	Factor 1 Grid Position	Factor 2 Grid Position	Factor 3 Grid Position
4	I am hoping this will encourage more thinking out of the box...new ideas and innovation...a more open College ...some change in thinking!	4	-1	-3
15	Provides a channel for our associate degree programs.	3	-1	-1
7	Easier to market a School of Technology (than current situation)	2	-1	5
11	SOT will encourage proposals for more bachelor degrees (in technology).	2	-3	-1
30	SOT would allow for direct admits to certain programs (and non-direct admits) based on standards.	1	-2	-2
38	We need student input on this concept of an SOT	-1	1	3
27	Concerned that the suggested "graduate school structure" will work with our programs	-2	3	-4
45	Concerned that the suggested virtual SOT structure will that make it more difficult to get outside funding and donations of equipment	-2	0	2
19	Concerned that the suggested virtual SOT structure will be confusing for students, transfers, faculty and staff	-3	4	1
44	Concerned about the physical location of the SOT	-4	2	0
46	SOT honorable mention during the next Super Bowl (big advertising \$).	-5	0	1

Note: +5 is the position most like the sorter's view and -5 is the position most unlike the sorter's view. This table is adapted from a study by Ramlo (2005).

A table of consensus statements is also produced from the analyses. These are the statements that do not discriminate among the pairs of factors. For instance, in the Ramlo (2005) study, all three views (factors) agreed that a feedback plan that would allow for change to the SOT to improve its operation was important to the SOT's success. The consensus statements found as well as the three views determined about the SOT were used to develop a plan for creating a new SOT, based upon this needs analysis. A study using Q Methodology that included evaluating the effectiveness of a newly developed course in bioinformatics (Ramlo et al., 2008) will be discussed in a later section along with an example of a Q factor analysis study used for program evaluation.

Unlike Q Methodology which groups people based upon sorting of items into a grid, Cattell (1978) described Q factor analysis as a way to determine dimensions or patterns that exist within responses and other data from the participants. In other words, Q factor analysis is a type of profile analysis that identifies groups of people using by-person factor-analysis. The data related to the participants can come from a variety of sources including interviews, observations, surveys, and demographic information. Note that Q factor analysis alone does not involve the Q-sort of Q Methodology. Other differences, both methodological and philosophical, between Q Methodology and Q factor analysis are discussed in detail by their respective creators elsewhere (Stephenson & Burt, 1939). However, it is important to note that both of these techniques to group people are identified as types of mixed methods research because they mix both qualitative and quantitative research as described in detail in Newman and Ramlo (2010).

In addition, a Q Methodology study could be used to determine the distinguishing ideas among different views and then that information can be used, in turn, to develop a survey that would focus on these distinguishing ideas which can be used in a Q factor analysis study. In other words, Q Methodology can be used to focus future research using another technique such as Q factor analysis.

Applications of Q Factor Analysis and Q Methodology in Program Evaluation

The ability to group people, whether based upon similarities of Q sorts or based upon patterns of data, allow researchers to better investigate situations including those related to program evaluation. Such profiles may be more stable than individual variables and may be more helpful. In program evaluation, it is frequently important to address the various stakeholder groups differently to ascertain their needs; more effectively addressing stakeholder needs improves the effectiveness of the program and makes the recommendations more likely to be implemented (McNeil et al., 2005). Grouping people based upon characteristics or views, rather than demographic characteristics such as ethnicity or socio-economic status, is a more appropriate way to group people (I. Newman & Ramlo, 2010). For instance, in medicine, different drugs affect people differently but these differences are not based upon patient age or sex. Instead, medications may be more effective for different types of people where types consist of a combination of variables. Q factor analysis and Q Methodology can not only be used to perform such groupings but has been used in a variety of program evaluation situations which we will briefly discuss here.

For instance, Waechter, Newman, and Nolte (1998) investigated injured worker characteristics and their relationship with screening applications for vocational training programs. In their study, Waechter et al classified injured workers using data from interviews, the Apticom Aptitude Test Battery, and demographic information. Two profiles (factors) emerged from the data. However, these profiles consisted of several defining characteristics in combination, not simply one demographic variable, such as sex, nor some specific measure such as a level above a cut-score on the Apticom Aptitude Test Battery. Instead, scores with the Apticom instrument along with age, sex, type and

number of injuries were used to group injured workers into types based upon the shapes of these variables (Waechter, et al., 1998).

The Q factor analysis of this data determined that there were two types of injured workers where one type was a better candidate for receiving vocational training. These Q factor analysis results may allow vocational evaluations to be better informed about the types of injured workers. Interpreting the two profiles provided information that may be used to improve decision making about screening applications for vocational training (Waechter et al., 1998).

Similarly, Q Methodology was used in a study to evaluate aspects of a bioinformatics course created as part of a National Science Foundation grant (Ramlo et al., 2008). Bioinformatics is, essentially, the application of computational tools to biological data. Thus one of the challenges to creating such an interdisciplinary course was serving the needs and backgrounds of a diverse set of students. In the study, students were predominantly either computer science or biology students at either the undergraduate or graduate level. Although students could have been studied based upon one of these characteristics, Q Methodology was used to group them based upon their views of the course.

In this study, students sorted 29 statements about the course which was designed to be inquiry-based. The two courses, one spring 2005 and the other spring 2006, were evaluated separately because of changes made to the 2005 course based upon student feedback. Table 3 shows the students from the first semester that the bioinformatics course was offered. Two factors emerged for this group and they are designed in this table with X's indicating which students are represented by Factor 1 and which are represented by Factor 2. In both factor groups there is a mixture of majors (e.g. biology and computer science) as well as a mix of undergraduates and graduate students.. Thus, the views that emerged about the course and the study of bioinformatics were not similar among those with the same major or student status (undergraduate versus graduate) (Ramlo et al., 2008). This is important to note for program evaluation, as discussed earlier.

Table 3.

Sorter Demographics and Identification with Factors /Views for First Semester Bioinformatics Course

Sorter #	Sex	Major	Level	Factor Loadings	
				1	2
1	Male	Biology	Senior	0.25	0.48 X
2	Male	Biology	Senior	-0.03	0.52 X
3	Male	Biology	Senior	0.39 X	0.31
4	Male	Anthropology	Senior	0.69 X	-0.01
5	Male	Computer science	Graduate	0.66 X	-0.26
6	Male	Biology	Senior	0.33 X	0.04
7	Male	Computer science	Senior	0.51	-0.52
8	Male	Computer science	Graduate	0.36 X	-0.36
9	Female	Biology	Senior	0.21	0.31
10	Male	Computer science	Graduate	0.20	-0.56 X
11	Male	Computer science	Junior	0.72 X	0.11
12	Male	Computer science	Junior	0.61 X	0.43
13	Female	Computer science	Graduate	0.43 X	-0.14
14	Female	Biology	Graduate	0.35 X	0.02
% expl.Var.				21%	12%

Note: Table adapted from study by Ramlo (2008). X's designate which factor each sorter is represented by. Sorters without an X for either Factor 1 or 2 are not represented by one of these views.

The Q Methodology results indicated that changes made to the course after 2005 eliminated some students concerns about their learning, primarily related to the computer programming aspects of the course. These changes, along with improved activities related to researching bioinformatics within the course, also appeared to promote a more a positive view of bioinformatics both academically and as a potential field of study for the students. This type of information may be helpful for others creating bioinformatics courses or programs as well as other inherently interdisciplinary academic opportunities (Ramlo et al., 2008).

Conclusions

Classifying individuals into profiles is helpful in various research situations especially in applications within program evaluation where different groups may be affected differently by programs (McNeil et al., 2005). Specifically in this article we have stressed the usefulness of grouping people for program evaluation by discussing studies involving both Q Methodology and Q factor analysis.

Q Methodology was introduced with reference to a study investigating faculty views about the creation of a School of Technology (Ramlo, 2005) in a needs-analysis type of situation. This study demonstrated how different views can be described using the types of tables produced from the analyses of the Q sorts as well as the importance of determining consensus. We followed this discussion by demonstrating how another study, which used Q Methodology to investigate students' views about a newly developed bioinformatics course, assisted stakeholders in improving the course to better address students' needs and improve their view of careers in bioinformatics (Ramlo et al., 2008). Within our discussion about the bioinformatics course, we also demonstrated how using surface characteristics such as academic major may not be an effective way to group people.

Similarly, we described a study that investigated screening applicants for vocational training after work sustained injuries using Q factor analysis (Waechter et al., 1998). This study demonstrated how Q factor analysis could be used to profile applicants for training in order to improve program effectiveness. Again, this is important for program evaluation as well as for improving programs to better serve stakeholders. Like the Q Methodology study on the bioinformatics course, individual demographic variables and scores on aptitude test alone did not define these groups but, instead, a profile consisting of several variables allowed researchers to describe the type of injured worker that is best suited for vocational training. Other Q factor analysis studies such as the study by Kormos (1999) also support these findings of using profiles in program evaluation instead of individual characteristics.

Thus, Q Methodology and Q factor analysis offer opportunities to better group people based on similarity of responses (sorts and profiles, respectively). The development of such profiles is necessary for effective program evaluation and allows researchers to better inform stakeholders about group differences. More effective program evaluation and better informing stakeholders about group differences are important for the improvement of programs (McNeil et al., 2005). We therefore suggest that more researchers involved with program evaluation consider classifying individuals using Q factor analysis or Q Methodology whether they are evaluating program effectiveness for different stakeholders or performing needs assessments or other aspects of program evaluation.

References

- Brown, S. R. (1980). *Political subjectivity: Applications of Q methodology in political science*. New Haven, CT: Yale University Press.
- Brown, S. R. (1998). *The history and principles of Q methodology in psychology and the social sciences*. Unpublished manuscript. Retrieved 5/5/2009, from <http://facstaff.uww.edu/cottlec/QArchive/Bps.htm>
- Brown, S. R. (2010 / in press). Q methodology. In N. J. Salkind (Ed.), *Encyclopedia of research design*. Thousand Oaks, CA: Sage.
- Burt, C. L. (1941). *The factors of the mind; an introduction to factor-analysis in psychology*. New York: The Macmillan Company.
- Caracelli, V. J., & Greene, J. C. (1993). Data analysis strategies for mixed-method evaluation designs. *Educational Evaluation and Policy Analysis*, 15(2), 195-207.
- Cattell, R. B. (1978). *The scientific use of factor analysis in behavioral and life sciences*. New York: Plenum Press.
- Creswell, J. W. (2010). Mapping the field of mixed methods research. In A. Tashakkori, & C. Teddlie (Eds.), *Handbook of mixed methods in social & behavioral research* (Second ed., pp. TBD). Thousand Oaks, Calif.: SAGE Publications.
- Kormos, K. C. (1999). Adolescent suicide: An investigation of low-risk, high-risk and attempter youth in regard to personality styles and personality profiles using the millon adolescent personality inventory. (Ph.D., The University of Akron). , 218.
- Leech, N. L., & Onwuegbuzie, A. J. (2009). A typology of mixed methods research designs. *Quality & Quantity*, 43(2), 265-275.
- Malinowski, E. R. (2002). *Factor analysis in chemistry* (3rd ed.). New York: Wiley.
- McKeown, B., & Thomas, D. (1988). *Q methodology*. Newbury Park, CA: Sage Publications.
- McNeil, K. A., Newman, I., & Steinhauser, J. (2005). *How to be involved in program evaluation : What every administrator needs to know*. Lanham, Maryland: Scarecrow Education.
- Newman, I., & Newman, C. (1994). *Conceptual statistics for beginners* (2nd ed.). Lanham, Md.: University Press of America.
- Newman, I., & Ramlo, S. (2010). Using Q methodology and Q factor analysis to facilitate mixed methods research. In A. Tashakkori, & C. Teddlie (Eds.), *Handbook of mixed*

methods in social & behavioral research (2nd ed., pp. 505-530). Thousand Oaks, CA: Sage Publications.

- Onwuegbuzie, A. J., & Teddlie, C. (2003). A framework for analyzing data in mixed methods research. In A. Tashakkori, & C. Teddlie (Eds.), *Handbook of mixed methods in social & behavioral research* (pp. 351-384). Thousand Oaks, CA: SAGE Publications.
- Ramlo, S. (2005). An application of Q methodology: Determining college faculty perspectives and consensus regarding the creation of a school of technology. *Journal of Research in Education*, 15(1), 52-69.
- Ramlo, S. (2008). Validity and reliability of the force and motion conceptual evaluation. *American Journal of Physics*, 76(9), 882-886.
- Ramlo, S., McConnell, D., Duan, Z., & Moore, F. (2008). Evaluating an inquiry-based bioinformatics course using Q methodology. *Journal of Science Education and Technology*, 17(3), 219-225.
- Stainton-Rogers, R. (1995). Q methodology. In J. A. Smith, R. Harré & L. van Langenhove (Eds.), *Rethinking methods in psychology* (pp. 178-192). London ; Thousand Oaks, Calif.: Sage Publications.
- Stenner, P., & Stainton-Rogers, R. (2004). Q methodology and qualiquantology: The example of discriminating between emotions. In Z. Todd, B. Nerlich, S. McKeown & D. D. Clarke (Eds.), *Mixing methods in psychology* (pp. 101-120). Hove, NY: Psychology Press.
- Stephenson, W. (1935). Technique of factor analysis. *Nature*, 136, 297.
- Stephenson, W. (1953). *The study of behavior: Q-technique and its methodology*. Chicago: University of Chicago Press.
- Stephenson, W., & Burt, C. (1939). Alternative views on correlations between persons. *Psychometrika*, 4, 269-281.
- Stevens, J. (2002). *Applied multivariate statistics for the social sciences* (4th ed.). Mahwah, N.J.: Lawrence Erlbaum Associates.
- Waechter, D., Newman, I., & Nolte, D. (1998). Q-factor analysis: The first step in developing typology classifications based upon the apticom. *Vocational Evaluation and Work Adjustment Journal*, Fall and Winter, 61-66.
- Wolf, A. (4/29/2009). In Ramlo S. (Ed.), *Personal communication re: Operant subjectivity*

Preservice Teachers' Beliefs about Mathematics and Science Content and Teaching

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Abstract

This study explored early childhood preservice teachers' beliefs about mathematics and science. Using a qualitative approach, preservice teachers' beliefs were analyzed before and after taking integrated mathematics and science methods courses. Major perceptions that emerged from the study concerned the qualities of effective teachers, teachers' influence on their students' learning and perceptions of the subjects, and the time and effort required to teach mathematics and science. Changes in the pre-service teachers' perceptions were also observed.

Preservice teachers enter teacher education programs with well-established beliefs about the teaching profession that are shaped by their experiences as students, and these beliefs typically remain stable throughout their teacher preparation program and into the early years of teaching. In addition to general teaching beliefs, preservice teachers who are prepared to teach all subject areas may have more precise and varying beliefs in particular subject areas, such as mathematics and science (Book, Byers, & Freeman, 1983; Buchmann, 1984; Fajet, Bello, Leftwich, Mesler, & Shaver, 2005; Feiman-Nemser, McDiarmid, Melnick, & Parker, 1988; Taylor & Sobel, 2001; Weinstein, 1989). Therefore, examining preservice teachers' perceptions in these areas is important in order to enhance their understandings of teaching strategies and content in mathematics and science. To this end, we explored early childhood preservice teachers' perceptions of teaching and content of mathematics and science. In doing so we sought to determine the influence of attending and participating in an integrated mathematics and science methods course on their mathematics and science teaching perceptions.

Teachers' Beliefs

Teachers' beliefs are "implicit assumptions about students, learning, classrooms, and the subject matter to be taught" (Kagan, 1992, p. 66). In her meta-analysis, Kagan concluded that teachers' beliefs about their profession fell into two categories: teaching self-efficacy and content-specific beliefs. Self-efficacy is the ability to produce the intended influence on students and has two facets: personal teaching efficacy and general or outcome teaching efficacy. Personal teaching efficacy refers to the belief teachers have in themselves as effective teachers. General teaching

efficacy deals with outcomes expectancy, such as the ability to improve students' achievement. Learning and knowing the field to be taught are considered content-specific beliefs (Ashton, 1884; Hoy & Woolfolk, 1990; Riggs, & Enochs, 1990).

Although a *causal* relationship between teachers' beliefs and classroom behaviors should not be assumed (Cobb, Wood & Yackel, 1990; Santagata, 2005), research suggests that teachers' beliefs influence their classroom practices (Mulholland & Wallace, 2001; Plourde, 2002; Schoeneberger & Russell, 1986), which in turn affect their students' learning (Carter & Norwood, 1997; Kagan, 1992; Pajares, 1992; Plourde, 2002; Raymond, 1997) and their students' perceptions of the subjects (Carter & Norwood, 1997). However, these beliefs usually remain unrecognized by the teachers (Kagan, 1992).

As Pajares summarized in his review of 16 studies, "beliefs must be inferred, and this inference must take into account the congruence among individual belief statements, the intentionality to behave in a predisposed manner, and the behavior related to the belief in question" (1992, p. 326). Thus, helping teachers to confront their beliefs and possibly facilitating changes in the ones that impact teaching practices negatively is vital to creating changes in classroom practices (Kagan, 1992). To do so, the first step is to examine teachers' beliefs in specific subject areas, such as mathematics and science. Indeed, a large body of research exists on elementary or middle grade teachers' and preservice teachers' beliefs about mathematics and science (e.g., Cakiroglu, & Boone, 2002; Kiviet & Mji, 2003; Tosun, 2000). However, few studies have examined similar beliefs amongst early childhood preservice teachers (i.e., Tsitouridou, 1999; Watters & Ginns, 1997).

Changing Preservice Teachers' Beliefs

Preservice teachers usually enter teacher education programs with firm beliefs about what it takes to be an effective teacher (Book, Byers, & Freeman, 1983; Buchmann, 1984; Fajet, Bello, Leftwich, Mesler, & Shaver, 2005; Feiman-Nemser, McDiarmid, Melnick, & Parker, 1988; Taylor & Sobel, 2001; Weinstein, 1989). The mathematics and science teaching beliefs held by preservice teachers are often mixed with anxiety, hesitancy, and feeling of incompetent (Cheng, 2002; Hart, 2002; Kiviet & Mji, 2003; Sottile, Carter, Murphy, 2002; Tosun, 2000; Watters, & Ginns, 1997). Frequently, these beliefs do not surface until new teachers start teaching in their own classrooms (Doolittle, Dodds, & Placek, 1993; Zeichner & Tabacknick, 1981). Therefore, teacher education programs must challenge preservice teachers' beliefs in order to create a substantial paradigm shift (Pajares, 1992).

A recurring theme in the teacher education literature is that teacher education programs do little to change preservice teachers' beliefs (i.e., Bandura, 1997; Cakiroglu, & Boone, 2002; Hart, 2002; Jesky-Smith, 2002; Kelly, 2001; Kiviet & Mji, 2003; Plourde & Alawiye, 2003; Tosun, 2000). Yet, it is well established that preservice teachers' beliefs can be enhanced and/or changed through participating in appropriate methods courses (i.e., Bandura, 1997; Cakiroglu, &

Boone, 2002; Hart, 2002; Jesky- Smith, 2002; Kelly, 2001; Kiviet & Mji, 2003; Plourde & Alawiye, 2003; Tosun, 2000) that are taught by teacher educators who scaffold the students in confronting their beliefs (Kiviet & Mji, 2003). Furthermore, several studies have reported that preservice teachers' beliefs are influenced by their university professors and mentor teachers during their practicum (Calderhead, 1988; Hoy & Woolfolk, 1989). The goals embedded within methods courses include developing positive beliefs systems with preservice teachers (Finson, et al., 2002) and convincing them that mathematics and science are interesting (Crowther, 1998). Therefore, science and mathematics methods courses provide invaluable opportunities for teacher educators to change preservice teachers' beliefs.

Integrated Mathematics and Science Methods Courses as a Means for Change

Integrating mathematics and science is a common sense approach, which has high "face validity" (Czerniak, Weber, Sandmann and Ahern (1999; p.421) since these two subject areas are connected in real life. "As teachers and teacher educators, we should help our students see the connection between content and concept, rather than their separation" (Francis, 1996, p. 75) Mathematics and science integration has also been recommended for all grades in order to increase student learning (Berlin & Lee, 2005; Breadkamp & Copple, 1997; Czernak, Weber, & Sandman, 1999; Lonning & DeFranco, 1997; National Council of Teachers of Mathematics [NCTM], 2000; National Science Teacher Association [NSTA], 1996; Pang & Good, 2000), and improve students' perceptions toward mathematics and science (Berlin & Lee, 2005; Czernak, Weber, & Sandman, 1999; Haigh, & Rehfeld 1995; Koirala & Bowman, 2003; Lonning & DeFranco, 1994; Pang & Good, 2000).

Integrated courses are also an effective means of augmenting preservice teachers' beliefs about mathematics and science (i.e., Berlin & White, 2002; Foss & Pinchbach, 1998; Haigh, & Rehfeld, 1995; Hart, 2002; Kelly, 2001; Koirala & Bowman, 2003). A small body of research has suggested that teacher educators utilize an integrated approach to help early childhood preservice teachers overcome their feelings of anxiety (Cady & Rearden, 2007; Lake, Jones, & Dagli, 2004). If preservice teachers experience an integrated approach in their teacher education program, they are more likely to integrate mathematics and science into their own classrooms (Basista & Mathews, 2002).

Framing Integrated Mathematics and Science Methods Courses

Defining the integration of mathematics and science. Although integration of mathematics and science is strongly encouraged in early childhood classrooms and teacher education programs, there is some debate concerning the precise definition of integration (Jones, Lake, & Dagli, 2005). Among several researchers who have defined integration (e.g., Berlin & White, 1994; Davison, Miller & Metheny, 1995; Huntley, 1998; Lonning, DeFranco, & Weinland, 1998; Miller & Davidson, 1999), Davison and colleagues (1995) provide the most useful definition for this study. These researchers classified integration into five types: discipline specific integration,

content specific integration, process integration, methodological integration, and thematic integration. Thematic integration is particularly applicable in early childhood classrooms, where the teaching activity begins with a theme and then becomes a medium through which all the disciplines interact.

Constructivist methodology is recommended when integrating mathematics and science methods courses. Davison et al. (1995) state that “[c]onstructivist teaching and learning advocates building initial understanding and a development of meaning that is individual generated” (p. 9). Potential academic benefits to preservice teachers’ being taught using the constructivist approach is well documented in the research (i.e., Carter & Sottile, 2002; Cheng, 2002; Groves & Pugh, 2002; Riggs & Kimbrough, 2002; Taylor & Coll, 2002). This approach is also aligned with the study of the beliefs of early childhood preservice teachers about the subjects from a social cognitive theoretical perspective.

Incorporating social cognitive theory and a constructivist approach.

Much of the research that has examined teachers’ beliefs towards science and mathematics is based on the social cognitive theory of Alfred Bandura. He defines self-efficacy as “beliefs in one’s capabilities to organize and execute the courses of action required to produce given attainments” (1997, p. 3), and believes that self-efficacy is shaped by four influential sources. First is the *enactive mastery experience*, which refers to actively performing the actions. The second source, *vicarious experience*, is when a person sees similar individuals performing the same actions. *Verbal persuasion* involves verbal feedback, such as encouraging words. Finally, *physiological and affective states* are the sources of self-efficacy. Methods courses for preservice teachers that include all four influential sources would enhance positive beliefs and self-efficacy (Bandura, 1997).

In the present study, preservice teachers experienced Bandura’s (1997) four sources. First, they were actively engaged in hands-on activities, such as conducting science experiments and using mathematics manipulatives, which provided them with science and mathematics enactive mastery experiences. Second, they obtained vicarious experiences by watching their classmates and professors being actively engaged with the content, observing how to manage the activities, and connecting the mathematics and science content to a variety of teaching strategies. Additionally, the professors modeled how to teach mathematics and science to young children. Third, preservice teachers received positive reinforcement, or verbal persuasion, in the form of encouragement and praise, which helped them increase their efficacy both in the teaching and in the mastery of the content. Finally, experiencing the positive atmosphere and successful completion of the classroom activities helped to reduce their stress, increase their confidence, and assisted them in reaching a positive physiological and affective state. Arguably, such activities should help preservice teachers reconsider their views about teaching and learning mathematics and science. In turn, as preservice teacher reflect on their experiences in the

methods courses they should adopt more positive beliefs about teaching mathematics and science.

Our goal in the current study was to contribute to the mathematics and science knowledge base by examining whether integrated methods courses could enhance early childhood preservice teachers' beliefs towards mathematics and science. The approach we adopted emphasized thematic integration through collaboration and modeling. Collaborative teaching in methods courses has been recommended as a viable integration model in higher education (Nevin, Thousand, & Villa, 2009). One kind of collaborative teaching is "team teaching, where educators are partners who share responsibilities for planning, teaching, and assessing" (p. 570).

In our study, the methods courses were taught in separate sections. However, the *what* and *how* to teach were integrated, and a team-teaching approach was adopted. We developed course syllabi jointly, used the same text, had combined assignments, met regularly during the semester, and conducted 12 hours of team-teaching. Additionally, we approached the integrated mathematics and science courses using constructivist and socio-constructivist foundations, which included modeling correct content and appropriate early childhood strategies.

Given the above framework we designed the study around the following two research questions:

1. What are the beliefs and perceptions of early childhood preservice teachers towards mathematics and science content and teaching?
2. How do integrated mathematics and science method courses influence or change preservice teachers' perceptions and beliefs towards mathematics and science teaching and content?

Methods

Study Site, Participants, and Data Collection

Participating in the study was a cohort of 26 female undergraduate students enrolled in a large university in the southeastern United States. The students were in the final year of an undergraduate degree program in early childhood education. The participants were all enrolled in an early childhood mathematics methods course, an early childhood science methods course, and a practicum course. The two methods courses met twice a week, and the practicum course met once a week, with two days a week in a field placement. Classroom activities included team teaching, experiential lessons, the use of cooperative learning, and scaffolding strategies specifically targeted to teaching young children. Preservice teachers were assigned to one of the local elementary schools in a prekindergarten, kindergarten, first, or multi-age K/1 classroom. They participated fully in their assigned classrooms and conducted lessons in cooperation with their professors and mentor teachers.

The requirement for their methods and practicum classes was to design and implement a two-week thematic unit that demonstrated their ability to integrate mathematics and science content and teaching methodology. Of the 26 students enrolled in the three courses, 24 volunteered to participate in the current study. To protect confidentiality, pseudonyms were assigned to or selected by the preservice teachers.

As part of the two method courses the preservice teachers responded to 10 prompts provided by the professors via email, collectively referred to as e-journals. Journal reflections are a recommended assessment approach that can be used to monitor students' learning and development (Kovalchick, Milman & Elizabeth, 1998). The first and last e-journals concerned their mathematics and science beliefs. Specifically, the students were asked to reflect on the question, "*What are your perceptions of the teaching and content of mathematics and science?*" The open-ended responses in their e-journals were analyzed to gain a clearer understanding of the preservice teachers' in-depth perceptions. Then, for the purpose of triangulation (Patton, 2002) several focus group interviews were conducted. These interviews were held at the end of the semester with two groups of four or five preservice teachers.

Results

The two e-journal responses were coded by a doctoral student using a starter list of codes (Miles & Huberman, 1994) that emerged directly from the prompts. These codes included perceptions/beliefs of mathematics, perceptions/beliefs of science, perceptions/beliefs of teaching mathematics, and perceptions/beliefs of teaching science. Next, each of the four coded areas was further analyzed and like responses grouped together and new codes were formed when the data revealed information not related to the start codes. Once this process was completed, the doctoral student and the two researchers met to discuss the process, analyze the data within each of the categories, and arrive at 100% agreement on the final categories (Hatch, 2002). Each category was then interpreted based on the research questions.

Beginning of Semester

The preservice teachers' beliefs and perceptions were shaped by their experiences as students. The majority of the preservice teachers expressed that mathematics and science had never been their favorite or most-liked subjects while they were in school. This findings seems to reinforce previous research that suggest that preservice teachers' beliefs are shaped by their experiences as students (Fajet et, al., 2005; Feiman-Nemser & Buchmann, 1984; Kagan, 1992; Pajares, 1992; Tabachnick & Zeichner, 1984). Hannah, for example, explained that "... mathematics is not my strongest area, but I always enjoyed it because of my teachers." Likewise, Molly stated "I have never liked mathematics because I was always doing paper and pencil operations and it was always boring for me". Nonetheless, the preservice teacher seemed excited to learn both the content and how to teach it (e.g., Alicia, Hannah). For example, Piper said, "I have not had the best math[ematics] experience in school, but it should be the crucial part I have a positive

attitude and hope to love it.” Only a few students stated that they were confident in their ability to teach the two subjects.

The preservice teachers appeared more concerned about teaching mathematics in comparison to teaching science. They also talked more about mathematics than science in their e-journals, and indicated that teaching mathematics was of more concern than teaching science.

Qualities of an effective teacher. By summarizing studies of preservice teachers’ beliefs about the characteristics of effective teachers, Fajet et al. (2005) identified two of the most commonly cited qualities: professional competence and affective qualities. Professional competencies are content-specific knowledge, or knowledge in the content area, and pedagogical skills are imparting the knowledge to students, getting students interested in the subject, promoting students’ creativity, and providing experiments or hands-on activities. Affective qualities include kindness, supportiveness, caring, patience, approachability, ability to entertain and friendliness.

Consistent with the literature, the preservice teachers’ in this study exhibited various levels of teaching efficacy. Concerning the professional competence of an effective teacher who teaches mathematics and science to young children, the preservice teachers’ indicated that teachers must spark students’ interests and enthusiasm in mathematics and science, and provide students with hands-on experiences. Expanding on this theme, Hannah said, “If the teacher makes the subject area fun, the students will want to learn even boring or difficult materials.” Alicia stated that “If the lessons are interesting and taught in a fun way the children will pay attention and therefore, learn the material”

Savannah said that “I want to be available for my students” and “If I make science interesting, then children will want to learn.” Alexandra indicated that “It can be as interesting as you make them interesting.” Alexis expressed that “being enthusiastic is difficult.”

They also worried about their pedagogical effectiveness, their ability to impart the knowledge to their students, and the skills needed to simplify mathematics and science concepts appropriately for young children. The majority of the preservice teachers indicated that their biggest concern was breaking the subjects down to the children’s level and making lessons meaningful for them. Alicia wrote, “I am not sure about what is appropriate to the grade level. The K-1 class is a little bit harder.” Alexis raised a similar concern by indicating that it was “sometimes difficult to explain science questions and science is hard to teach someone else especially who is in low level.” Several preservice teachers also expressed concern about making the lessons interesting for children. Examples here include “Challenge is to find the many ways to cultivate student’s interests in science and math[ematics] and learning the why of how children understand what they are experiencing” (Alexandra); “the children will not think the lesson is interesting” (Cheree); and “I am worried about the children will not enjoy her lessons and the lessons will not run smoothly” (Kami).

Teachers' influence on their students' learning and perceptions. The data supported previous research findings indicating that teachers' beliefs influence their students' learning and perceptions towards subject areas (Carter & Norwood, 1997). For example, one student wrote that "The teacher has to be enthusiastic in order for the students to be enthusiastic" (Kami & Alexis); and another said that "The teacher's attitude toward math[ematics] greatly influences a child's attitude toward learning. I have not had the best math[ematics] experience in school, but I think it should be the crucial part of the curriculum" (Piper). Other comments were that "A good teacher makes the subject interesting. Teachers are the most important factor whether the students like or are good at the subject or not" (Savannah), and "I want to make the children's perceptions of both subject be enthusiastic and eager to learn (Krystal)"

End of Semester

Meaning and challenge of integration. Regrettably, only a small number of preservice teachers used the term *integration* in their final e-journals. Krystal said that, "I feel like the two subjects are so related" and Vanessa indicated that "content areas overlap and they can be integrated" ; yet neither of them stated that they planned to combine them in their classrooms. " Alicia stated that "Math[ematics] can be made fun and used in combinations with other curricular areas." Maria appeared to expand the integration of mathematics and science with other subject areas.

I learned that many math[ematics] activities involve science and it is nice because it makes things easier. Math[ematics] and science had so much common. It is easy to place math[ematics] and science concepts in other subject areas. I want to incorporate the subjects and make a better-rounded class.

For others, integration referred to incorporating those two subjects in the daily schedule. For example, Leila said, "Mathematics and science both are important and should be integrated and involved every day." Then, Olivia stated that she found time to integrate mathematics and science in her teaching schedule. Skyler, on the other hand, articulated that mathematics and science "should be integrated" but she was not specific about what she meant by integration.

Several preservice teachers expressed concern about the time and effort required in order to teach mathematics and science lessons through experiential and constructivist approaches. Vivian commented on how "time consuming," the preparation was and Alexis said, "There is probably not always enough time for an experiment," reflecting the challenge of integrating hands-on science lessons into the daily school schedule.

Mathematics and science courses as a means for change. The preservice teachers stated in their final e-journals that the methods courses had helped them learn the subject content, strategies to teach mathematics and science content to young children; thus, increasing their confidence in their ability to understand and master the content and. By the end of the semester, their ability to

teach children mathematics and science had also improved. Taylor for example described her experience by stating the following:

I was hesitant but I learned so much about using manipulatives and exploration with science through the courses and my mentor. I feel that I can use these tools and the knowledge that I gained to have a successful math[ematics] and science learning in the classroom. I have gained so much knowledge through the courses. The ideas and different methods have given me the confidence and assurance.

Likewise, Leila affirmed, “I learned so many things about math[ematics] and science through readings and hands-on activities that made me fully competent to teach math[ematics] and science.” Olivia commented that the class was “very resourceful,” and Skylar expanded on that by stating, “I have learned how to approach both the math[ematics] and science curriculums, where to find resources, how to teach math[ematics] and science in a hands-on constructivist way, and how to engage children in facilitating their own learning.” Alexis indicated that her perceptions had changed and continued that “At first I was apprehensive, now I feel more prepared.”

Other students were slightly more cautious, “I do not feel I know the way to teach everything, but I have the resources to look back” (Alexandra). The preservice teachers’ statements seemed to demonstrate a clear and reasonable confidence in mathematics and science content and teaching at the end of the semester.

The use of experiential learning or hands-on activities was the most commonly referred to benefit of the methods courses. The preservice teachers expressed that the hands-on opportunities provided during the methods courses had helped them to understand and learn the subject content. These activities also demonstrated how mathematics and science content were both learnable and teachable. They were able to transform their own hands-on, constructivist learning experiences into lessons with their students in their field placements. Savannah reported, “I learned using hands-on activities, and I used them in my unit and found them to be very helpful.” Similarly, Alicia indicated that “I keep in mind that teaching them is hands-on and minds-on.” Then, Olivia stated that she learned how to make mathematics more fun for the students using manipulatives and games. Thus, it seems that the preservice teachers taught their students using the same strategies they learned in the methods courses.

The majority of the preservice teachers expressed improvement in their perceptions and self-efficacy related mathematics and science by the end of the semester. They iterated that they felt more confident in the teaching and content of the mathematics and science after completing the methods courses and their two-week unit. “I have become more comfortable with mathematics after the two-weeks teaching” (Alicia). On the other hand, a few preservice teachers reported an increased anxiety regarding mathematics and science teaching and content. “I did not realize how

simple I needed to make things for the children. I think teaching math[ematics] is harder” (Diana).

Discussion and Conclusion

In the current study, we explored early childhood preservice teachers’ perceptions of the teaching and content of mathematics and science. In doing so we examined whether attending and participating in integrated mathematics and science methods courses led to changes in their overall perceptions. Our findings support and extend previous research in the following areas: 1) preservice teachers’ bring their belief systems along with them as they enter teacher education programs (i.e., Halpin, 1999; Hunker & Madison, 1997); 2) preservice teachers’ beliefs have been shaped by their experiences as students in both elementary and secondary school years and these beliefs are often negative towards science and mathematics content areas (Kiviet & Mji, 2003; Sottile, et al., 2002; Tosun, 2000); 3) preservice teachers need support in order to change their perceptions (Bandura, 1997; Kiviet & Mji, 2003; Plourde & Alawiye, 2003); and 4) carefully structured methods courses can change or alter preservice teachers’ perceptions and beliefs (e.g., Cakiroglu, & Boone, 2002; Kiviet & Mji, 2003). Additionally, the findings contribute to the research by specifically studying early childhood preservice teachers, a largely underrepresented population.

Participating in the integrated methods courses challenged the early childhood preservice teachers to confront their content bias and anxieties. The integrated nature of the courses required the students to reflect on their beliefs and practices, and allowed them to take part in scaffolding experiences with their teacher educators and mentors. In turn, these activities seemed to have altered the preservice teachers’ beliefs and attitudes by the end of the semester. This finding is consistent with previous studies that have found that an integrated methodology improves preservice teachers’ beliefs about mathematics and science content (i.e., Berlin & White, 2002; Foss & Pinchbach, 1998; Haigh, & Rehfeld, 1995; Hart, 2002; Kelly, 2001; Koirala & Bowman, 2003), and decreases levels of anxiety (Cady & Rearden, 2007; Lake, Jones, & Dagli, 2004). The content of the preservice teachers’ e-journals revealed that their perceptions and beliefs about mathematics and science content and teaching had improved during the semester.

Citing beliefs rooted in their student years and prior positive and negative experiences related to mathematics and science, the preservice teachers worked throughout the semester to reconcile their old beliefs with their growing perceptions of themselves as effective teachers. These preservice teachers stated that an effective teacher was one who was enthusiastic to teach, and one that ignited students’ enthusiasm to learn. Moreover, they believed that the effective teacher is one who engages students so that they are interested in the various subject areas. At the same time, the preservice teachers felt that a teacher should be entertaining and creative, use hands-on approaches, and incorporate experiments. Other preservice teachers maintained that the qualities of an effective teacher include the ability to impart knowledge to very young children and have

sufficient knowledge in the subject area, particularly in the area of science. These qualities lend support to the consensus of opinion reported in recent literature addressing this topic (e.g., Fajet et al., 2005; Ng et al., 2009).

When analyzed more closely, the preservice teachers' examples implied that they gave greater importance to, and had greater self-efficacy in, the affective qualities of an effective teacher, as opposed to developing subject area competence. At the same time, they cited that one of their main concerns was breaking the subjects down to a child's level, and to make lessons meaningful for them. Such findings are encouraging, particularly for teacher educators. Oftentimes, early childhood preservice *and* inservice teachers do not have adequate subject area training and/or knowledge, yet are thoroughly skilled in affective teaching (Cochran-Smith & Lytle, 1999). Our goal in the two methods courses was to scaffold the preservice teachers purposely in both areas. What others might see as contradictory, we view as positive evidence of our success.

Overall, the early childhood preservice teachers in this study expressed negative beliefs towards the content areas of mathematics and science before they entered the methods courses. Possibly, these beliefs stemmed from years of negative interactions with the subjects and teachers who taught them. However, after completing the methods courses and two-week teaching unit, the early childhood preservice teachers' perceptions and beliefs towards mathematics and science improved (i.e., Erickson, 1995; Foss & Pinchbach, 1998; Haigh, & Rehfeld, 1995; Hart, 2002; Kelly, 2001). In order for teacher educators to impact, change, and improve the well established beliefs of their preservice teachers, methods courses must be carefully analyzed to meet the needs of the students. As revealed in the final e-journals, our preservice teachers felt that the hands-on experiences and strategies utilized in the methods classes were critical elements that contributed to their growth. The mathematics and science methods courses were designed to balance content and teaching strategies using both theory and hands-on experiences. Equally important was having the preservice teachers' reflect, via their e-journals, on both the content and strategies and the two-week unit that required our students to teach their lessons in the field. For early childhood teacher education, all of these elements are necessary components for methods classes in order to change preservice teachers' perceptions and beliefs.

As with any research endeavor, our study had several limitations. All preservice teachers enrolled in the early childhood education program were females; thus, we were not able to study gender differences. Future research that explores preservice teachers' concerns and challenges, in addition to the factors that influence their' perceptions should shed more light on this topic. Follow-up studies that explore how preservice teachers teach mathematics and science after graduating from a teacher education program, could yield information on the effects of their preparation program on their beliefs and teaching strategies. Finally, a quantitative pre-post research design with explicit emphasis on self-efficacy beliefs in mathematics and science could provide more precise findings.

References

- Ashton, P. (1984). Teacher efficacy: a motivational paradigm for effective teacher education. *Journal of Teacher Education*, 35(5), 28–32.
- Bandura, A. (1994). Self-efficacy. In V. S. Ramachaudran (Ed.), *Encyclopedia of human behavior* (Vol. 4, pp. 71-81). New York: Academic Press. (Reprinted in H. Friedman [Ed.], *Encyclopedia of mental health*.) San Diego: Academic Press.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.
- Bandura, A. (1999). A social cognitive theory of personality. In L. Pervin & O. John (Eds.), *Handbook of personality* (2nd ed., pp. 154-196). New York: Guilford Publications. (Reprinted in D. Cervone & Y. Shoda [Eds.], *The coherence of personality*. New York: Guilford Press.
- Basista, B., & Mathews, S. (2002). Integrated mathematics and science professional development programs. *School Science and Mathematics*, 102(7), 359-370.
- Berlin, D. F., & Lee, H. (2005). Integrating science and mathematics education: Historical analysis. *School Science and Mathematics*, 105(1), 15-24.
- Berlin, D. F., & White, L. A. (1994). *Mathematics and science together: Establishing the relationship for the 21st century classrooms*. Retrieved March 14, 2002, from <http://math.unipa.it/~grim/EBerlin&White57-67>.
- Berlin, D. F., & White, A. L. (2002). Attitudes toward integration as perceived by preservice teachers enrolled in an integrated mathematics, science, and technology Teacher Education Program. *Science Educator*, 11(1), 32-40.
- Cady, J. A., & Rearden, K. (2007). Preservice teachers' beliefs about knowledge, mathematics and science. *School Science and Mathematics*, 107(6), 237.
- Cakiroglu, J., & Boone, W.J. (2002). Preservice elementary teachers' self-efficacy beliefs and their conceptions of photosynthesis and inheritance. *Journal of Elementary Science Education*, 14(1), 1-14.
- Calderhead, J. (1988). The contribution of field experience to primary student teachers' professional learning. *Research in Education*, 40, 33-49.
- Carter, G., & Norwood, K. S. (1997). The relationship between teacher and student beliefs about mathematics. *School Science and Mathematics*, 97(2), 62-67.

- Carter, W., & Sottile, J. M. Jr., (2002). *Changing the "Ecosystem" of preservice math and science methods classes to enhance students' social, cognitive, and emotional development.* (ERIC Reproduction Service Number: ED465523).
- Cheng, M. H. (2002). *Becoming confident teachers of science: Changes of science teaching efficacy beliefs.* (ERIC Reproduction Service Number: ED463977).
- Cobb, P., Wood, T., & Yackel, E. (1990). Classrooms as learning environments for teachers and researchers. In R. Davis, C. Maher, & N. Noddings (Eds.), *Constructivist views on the teaching and learning of mathematics.* (Journal for Research in Mathematics Education Monograph) (pp. 125–146). Reston, VA: National Council of Teachers of Mathematics.
- Cochran-Smith, M., & Lytle, S. (1999). Relationships of knowledge and practice: Teacher learning in communities. In A. Iran-Nejar and P. D. Pearson (Eds.). *Review of Research in Education* (Vol. 24, pp. 249-305). (Washington DC: American Educational Research Association.
- Copple, C., & Bredekamp, S. (2009). *Developmentally appropriate practice in early childhood programs (3rd ed.)*. Washington, D. C: National Association for Education of Young Children.
- Crowther, D. T. (1998). Metamorphosis of preservice teachers. *Electronic Journal of Science Education*, 2(4). Retrieved January 2, 2004, from <http://unr.edu/homepage/jcannon/ejse/crowv2n4.htm>.
- Czernak, C. M., Weber, W.B., & Sandman, A. (1999). A literature review of science and mathematics integration. *School Science and Mathematics*, 99, 421-30.
- Davison, D. M., Miller, K. W., & Metheny, D.L. (1995). What does integration of mathematics and science really mean? *School Science and Mathematics*, 95, 226-30.
- Erickson, D. K. (1995). Preservice mathematics and science teachers' case studies of a diverse population of workers. *School Science and Mathematics*, 95, 170-74.
- Fajet, W., Bello, M., Leftwich, S. A., Mesler, J.L., & Shaver, A.N. (2005). Pre-service teachers' perceptions in beginning education classes. *Teaching and Teacher Education*, 21(6), 717-727.
- Feiman-Nemser, S., & Buchmann, M. (1987). When is student teaching teacher education? *Teacher and Teacher Education*, 3(4), 255-273.

- Foss, D. H., & Pinchbach, C. L. (1998). An Interdisciplinary Approach to Science, Mathematics, and Reading: Learning as Children Learn. *School Science and Mathematics*, 98(3), 149-55.
- Francis, R. W. (1996). Connecting the curriculum through the national mathematics and science standards. *Journal of Science Teacher Education*, 7(1), 75-81.
- Groves, F. H., & Pugh, A. F. (2002). Cognitive Illusions as Hindrances to Learning Complex Environmental Issues. *Journal of Science Education and Technology*, 11(4), 381-90.
- Haigh, W., & Rehfeld, D. (1995). Integration of secondary mathematics and science methods courses: A Model. *School Science and Mathematics*, 95, 240-47.
- Halpin, R. (1999). Breaking the rote memorization mindset of preservice teachers standards-based instruction: An integrated preservice teacher education model. *Research in the Schools*, 6(2), 45-54.
- Hart, L. C. (2002). Preservice teachers' beliefs and practice after participating in an integrated content/methods course. *School Science and Mathematics*, 102(1), 4-14.
- Hatch, A. (2000). Assessing the quality of early childhood qualitative research. *Early Childhood Qualitative Research*. New York, NY: Routledge.
- Hoy, W. K., & Woolfolk, A. E. (1989). Supervising student teachers. In A. E. Woolfolk (Ed.), *Research perspectives on the graduate education of teachers* (pp. 108-131). Englewood Cliffs, NJ: Prentice-Hall.
- Hoy, W., & Woolfolk, A. (1990). Socialization of student teachers. *American Educational Research Journal*, 27(2), 279-300.
- Hunker, D., & Madison, S. K. (1997). Preparing efficacious elementary teachers in science and mathematics: the influence of methods courses. *Journal of Science Teacher Education*, 8(2), 107-26.
- Huntley, M. A. (1998). Design and implementation of a framework for defining integrated mathematics and science education. *School Science and Mathematics*, 98(6), 320-327.
- Jesky-Smith, R. (2002). Me, teach science? *Science and Children*, 39(6), 26-30.
- Jones, I., Lake, V. E., & Dagli, U. (2005). Integration of science and mathematics methods and preservice teachers' understanding of constructivism. *Journal of Early Childhood Teacher Education*, 25, 165-172.

- Kagan, D. M. (1992). Implication of research on teacher belief. *Educational Psychologist*, 27(10), 65-90.
- Kelly, C. (2001). Creating advocates: Building preservice teachers' confidence using an integrated, spiral-based, inquiry approach in mathematics and science methods instruction. *Action in Teacher Education*, 23(3), 75-83.
- Kiviet A.M., & Mji A. (2003). Sex differences in self-efficacy beliefs of elementary science teachers. *Psychol Rep.* 92(1), 333-338.
- Koirala, H. P., & Bowman, J.K. (2003). Preparing middle level preservice teachers to integrate mathematics and science: Problems and possibilities. *School Science and Mathematics*, 103(3), 145-154.
- Kovalchick, A., Milman, N.B., & Elizabeth, M. (1998). *Instructional strategies for integrating technology: electronic journals and technology portfolios as facilitators for self-efficacy and reflection in preservice teachers.* (ERIC Reproduction Service No: ED 42115).
- Lake, V. E., Jones, I., & Dagli, U. (2004). Handle with care: Integrating caring content in mathematics and science methods classes. *Journal of Research in Childhood Education*, 19(1), 5-17.
- Lonning, R. A., & DeFranco, T. C. (1994). Development and implementation of an integrated mathematics/science preservice elementary methods course. *School Science and Mathematics*, 94(1), 18-25.
- Lonning, R.A., & DeFranco, T.C. (1997). Integration of science and mathematics: A theoretical model. *School Science and Mathematics*, 97(4), 212-215.
- Lonning, R.A., DeFranco, T.C., & Weinland, T. P. (1998). Development of theme-based interdisciplinary, integrated curriculum: A theoretical model. *School Science and Mathematics*, 98(6), 312-319.
- Miles, M. B., & Huberman, M. A. (1994). *Qualitative data analysis: An expanded sourcebook.* London: Sage.
- Miller, K. W., & Davison, D. M. (1999). Paradigms and praxis: The role of science and mathematics integration. *Science Educator*, 8(1), 25-29.
- Mulholland, J., & Wallace, J. (2001) Teacher induction and elementary science teaching: enhancing self-efficacy. *Teaching and Teacher Education*, 17(2), 243-261.

- National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics*. Reston, VA: NCTM.
- National Science Teachers Association (1993). *Scope, sequence, and coordination of secondary school science: The content core*. Washington, DC: National Science Teachers Association.
- Nevin, N.I., Thousand, J.S., & Villa, R. A. (2009). Collaborative teaching for teacher educators- What does the research say? *Teacher and Teaching Education*, 25(4), 569-574.
- Pajares, M. F. (1992). Teachers' beliefs and educational research: cleaning up a messy construct. *Review of Educational Research*, 62(3), 307-332.
- Pang, J., & Good, R. (2000). A review of the integration of science and mathematics: implications for further research. *School Science and Mathematics*, 100(2), 73-82.
- Plourde, L.A. (2002). The influence of students teaching on preservice elementary teachers' science self-efficacy and outcome expectancy beliefs. *Journal of Instructional Psychology*, 29(4), 245-249.
- Plourde, L.A., & Alawiye, O. (2003). Constructivism and elementary preservice science teacher preparation: knowledge to application, *College student journal*, 37(3), 334-342.
- Raymond, A. M. (1997). Inconsistency between a beginning elementary school teacher's mathematics beliefs and teaching practice. *Journal for Research in Mathematics Education*, 28(5), 550-576.
- Riggs, E. M., & Kimbrough, D.L. (2002). Implementation of constructivist pedagogy in a geoscience course designed for pre-service k-6 teachers: progress, pitfalls, and lessons learned. *Journal of Geoscience Education*, 50(1), 49-55.
- Santagata, R. (2005). Practices and beliefs in mistake-handling activities: A video study of Italian and US mathematics lessons. *Teaching and Teacher Education*, 21(5), 491-508.
- Schoeneberger, M. M., & Russell, T. L. (1986). Elementary science as a little added frill: a report of two case studies. *Science Education*, 70(5), 519-38.
- Tabachnick, B. R., & Zeichner, K. (1984). The impact of the student teaching experience on the development of teacher perspectives. *Journal of Teacher Education*, 35(6), 28-36.
- Taylor, N., & Coll, R. (2002). Constructivist-informed pedagogy in teacher education: an overview of a year-long study in Fiji. *Asia-Pacific Journal of Teacher Education & Development* 5(1), 47-76.

- Tosun, T. (2000). The beliefs of preservice elementary teachers toward science and science teaching. *School Science and Mathematics, 100*(7), 374-79.
- Tsitouridou, M. (1999). Concepts of science in the early years: teachers' perceptions towards a "transformational field. *European Early Childhood Education Research Journal, 7*(1), 83-93.
- Watters, J. J., & Ginns, I. S. (1997). *Peer assisted learning: impact on self-efficacy and achievement*. (ERIC Reproduction Service Number: ED409324).

A Study on Job Satisfaction Factors of Faculty Members at the University of Balochistan

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Abstract

The purpose of this descriptive-correlational study was to examine factors affecting job satisfaction of faculty members of University of Balochistan as explained by Herzberg job motivator and hygiene factors. A random sample of 120 faculty members of Balochistan University was selected as a statistical sample. Employing a descriptive-correlative survey method and data were collected through questionnaire. The faculty members were generally satisfied with their jobs. However, male faculty members were less satisfied than female faculty members. The factor "work itself" was the most motivating aspect for faculty. The least motivating aspect was "working conditions." The demographic characteristics were negligibly related to overall job satisfaction. The factors "work itself," and "advancement" explained 60% of the variance among faculty members' overall level of job satisfaction. The demographic characteristics (age, years of experience, academic rank, degree) were negligibly related to overall job satisfaction.

The extensive research that has been done on levels of job satisfaction may have distinctive applications to academic faculty. This is especially true when the separation between satisfaction and dissatisfaction is viewed in relation to the intrinsic and extrinsic characteristics of academic employment.

In his well known motivational model, Herzberg (1987) makes some basic distinctions between intrinsic and extrinsic factors. The differentiations are founded on needs related to prime human characteristics, the ability to achieve and through that achievement to experience psychological growth. The dual factors arise from alternate needs that spring from basic animal nature, a drive to avoid pain from the environment and all the learned drives that are built on those basic needs. For example, an extrinsic factor, the drive to earn a good salary, is built upon the basic need of hunger. However, intrinsic factors such as responsibility and the satisfaction with work itself arise from the human ability to personally advance and grow. In the educational setting, intrinsic factors involve a direct link between faculty and their day to day routine, the actual performance of the job itself. "Intrinsic to the job are: the work itself, responsibility, and growth or achievement (Herzberg, 1987)." Herzberg's extrinsic or dissatisfaction-avoidance factors include organizational policy, status, pay, benefits, and overall work conditions. These factors comprise the background of one's work, the environment setting. Extrinsic factors less immediately affect the day to day job but are always in the background.

Job satisfaction is an elusive, even mythical, concept that has been increasingly challenged and refined particularly since the Herzberg, Mauser and Snyderman study in 1959. The job satisfaction of an employee is a topic that has received considerable attention by researchers and managers alike (Gautam; Mandal and Dalal, 2006). The

most important information to have regarding an employee in an organization is a validated measure of his/her level of job satisfaction (Roznowski and Hulin, 1992).

Behavioral and social science research suggests that job satisfaction and job performance are positively correlated (Bowran and Todd, 1999). A better understanding of job satisfaction and factors associated with it helps managers guide employees' activities in a desired direction. The morale of employees is a deciding factor in the organization's efficiency (Chaudhary and Banerjee, 2004). Thus, it is fruitful to say that managers, supervisors, human resource specialists, employees, and citizens in general are concerned with ways of improving job satisfaction (Cranny et al 1992). The foundation of job satisfaction or job motivation theory was introduced by Maslow. He (1943, 1954) asserts that human motives emerge sequentially to satisfy a hierarchy of five needs: physiological (food, clothing, shelter, sex), safety (physical protection), social (opportunities to develop close associations with other persons), and achievement/esteem (prestige received from others), and self-actualization (opportunities for self-fulfillment and accomplishment through personal growth). Individual need satisfaction is influenced both by the importance attached to various needs and the degree to which each individual perceives that different aspects of his or her life should, and actually do, fulfill these needs. Porter (1961) argues that within the work environment, individuals develop attitudes concerning their jobs based upon their perception of the presence or absence of positively-valued job characteristics that address specific needs. Thus, a person's job satisfaction is contingent on that individual's expectations of and actual need fulfillment from his or her position. Job dissonance results when job-related expectations and needs remain unfulfilled.

Herzberg, Mausner and Snyderman (1959) posited the view that job satisfaction is not a unidimensional concept, but rather that work-related variables which contribute to job satisfaction are separate and distinct from those factors which contribute to job dissatisfaction. By 1968 Herzberg had advanced the dual factor theory, which held that to not have job satisfaction does not imply dissatisfaction, but rather no satisfaction, whereas the absence of job dissatisfaction does not imply satisfaction with the job, but only no dissatisfaction. Looked at in terms of 'opposites', the 'opposite' of job satisfaction is no satisfaction rather than dissatisfaction and the 'opposite' of job dissatisfaction is no job dissatisfaction, rather than satisfaction. According to Herzberg (1959), intrinsic elements of the job are related to the actual content of work, such as achievement, recognition, the work itself, responsibilities, and advancement. These were referred to as 'motivational' factors and are significant elements in job satisfaction. By contrast, Herzberg described extrinsic factors as elements associated with the work environment, such as working conditions, salary, working conditions, supervision, company policy, and interpersonal relationships. These were referred to as 'context' or 'hygiene' factors which are related to job dissatisfaction. Herzberg concluded that satisfaction and dissatisfaction are not on the same continuum. As a result, he argued that income, and that such decisions are influenced by intrinsic motives, such as seeking opportunities for professional growth through compatible work activities and colleagues. Manger and Eikeland (1990) also examined factors that impact on academics' intentions to leave the university, and found that relations with colleagues were the largest predictor of intention to leave. They also found that general job satisfaction was a further strong predictor of intention to leave. In short, academics who found their work less intrinsically

satisfying than others, more commonly intended to leave the university. Salary or economic resources as such did not appear to influence intentions to stay or go. Such studies indicate that the 'climate' or 'culture' of the environment in which academics work has a large influence on their feelings of satisfaction with the job as a whole, and their commitment to stay in the job rather than seeking to fulfill intrinsic needs elsewhere. The motivation to investigate the degree of job satisfaction arises from the fact that a better understanding of employee satisfaction is desirable to achieve a higher level of motivation which is directly associated with student achievement. Recently, the assessment of employees' attitude such as job satisfaction has become a common activity in organizations in which management is concerned with the physical and psychological well being of people (Spector, 1997).

The relationship between the individual and the factors determining job satisfaction has been extensively researched in developed countries. In 1992, it was estimated that over 5,000 articles and dissertations have examined the topic of job satisfaction (Cranny et al., 1992), and this is a continuing topic for research. An early assumption can be made that interest in the subject illustrates the significance that employee satisfaction seriously influences the total operation of an organization. Staples et al. (1998) suggest that the reason for this interest is that work takes up such a significant amount of a person's life, and by increasing an individual's overall satisfaction with his or her work life improves the overall well-being of the individual, the organization, and the society where both the individual and the organization reside.

Purpose and Objectives

The purpose of study was to examine factors affecting job satisfaction of faculty members of University of Balochistan that explained by Herzberg job motivator and hygiene factors. In addition, this study sought to determine the overall job satisfaction of faculty members. To understand about this study the following research objectives were formulated.

- To describe selected demographic characteristics of Balochistan University teachers.
- To describe the overall level of job satisfaction among University faculty members.
- To describe the University of Balochistan faculty member's level of satisfaction with the job motivator factors (achievement, advancement, recognition, responsibility, and work itself).
- To describe the University faculty member's level of satisfaction with job hygiene factors (pay, working conditions, supervision, policy and administration, and interpersonal relations).
- To describe relationships between faculty members' level of job satisfaction and demographic characteristics.
- To describe relationships between selected job satisfier factors (achievement, advancement, recognition, responsibility, and the work itself) and the overall job satisfaction of faculty members.
- To describe the relationships between selected jobs dissatisfied factors (interpersonal relations, policy and administration, salary, supervision, and working conditions) and the overall job satisfaction of faculty members.

The population for this study was all faculty members of University of Balochistan (N=450). A random sample of 120 faculty members was selected as a statistical sample. The sample comprised of 100 male and 20 female faculty members. Employing a descriptive-correlative survey method and data were collected through questionnaire

Methodology

The research design was descriptive-correlative survey method and data were collected through a questionnaire that Castillo and Cano (2004) developed. Section one of the questionnaire consisted of the Faculty job Satisfaction/Dissatisfaction scale (Wood, 1973) which assessed the dimensions of the Herzberg motivator-hygiene theory. This Section consisted of a 75-item five-point Likert type scale with responses varying from 1 (very dissatisfied) to 5 (very satisfied). Section two consisted of the Job Satisfaction Index. The Job Satisfaction Index considered all facets of the job when measuring job satisfaction, utilizing an 18-item, five-point Likert type scale, with responses ranging from 1 (strongly disagree) to 5 (strongly agree). The final section of the questionnaire consisted of questions pertaining to the demographic characteristics. Content and face validity were established by a panel of experts consisting of faculty members at University of Balochistan. A pilot test was conducted with 16 faculty members not included in the sample. Questionnaire reliability was estimated by calculating Cronbach's alpha. Reliability for the overall instrument was .83. The reliability coefficient for section one of the questionnaire was .81, while the coefficients for the ten subscales of Part II were: achievement, .72; advancement, .76; interpersonal relations, .64; policy and administration, .85; recognition, .77; responsibility, .80; salary, .86; supervision, .79; work itself, .66; and, conditions, .88. The reliability coefficient for Section two of the questionnaire was .85.

Results

The mean age of respondents was 45 years. Respondents consisted of 85% (n =102) male and 15% (n =18) female faculty. The 25% faculty had attained a doctorate degree. Almost 2.5% of the respondents were professor, 6.5% associate professor, 57% assistant professor, and 34% lecturers. The mean number of years teaching experience faculty was 11.5 years. The majority of the respondents (n = 102 or 85%) are permanently employed. The contract faculty comprise eighteen or (15%) respondents.

Based on a five point Likert type scale with responses ranging from strongly disagree (1) to strongly agree (5), the overall level of job satisfaction was 3.48 (SD=.78). In terms of Table 1 the results indicate that there is a significant mean difference in the levels of job satisfaction experienced by male and female employees. Females reported lower levels of job satisfaction (Mean = 4.2, SD = .65) relative to male faculty (Mean = 3.7, SD= .87). Cognizance must however, be taken of the fact that the number of the females who participated in the study made up only 8% of the sample. Thus, drawing conclusions from the results will have little substance.

Table 1.

Means and Standard Deviations for Overall Job Satisfaction

Variable	All Faculty		Female		Male		t-test	Prob
	Mean	SD	Mean	SD	Mean	SD		
Overall Job Satisfaction	3.47	0.77	4.3	0.66	3.8	0.88	-2.27	0.03

Based on a five point Likert-type scale with responses ranging from very dissatisfied (1) to very satisfied (5), faculty members provided the following mean satisfaction scores with the job motivator and hygiene factors: achievement, 3.2; advancement, 3.28; recognition, 2.78; responsibility, 3.3; work itself, 3.62; interpersonal relations, 3.26; policy and administration, 2.86; salary, 2.75; supervision, 2.88; and working conditions, 2.67 (Table 2)

Table 2.

Means and Standard Deviations for Job Motivator and Hygiene Factors

Motivator Factors	Mean	SD	Hygiene Factors	Mean	SD
Achievement	3.2	0.8	Relationships	3.25	0.92
Advancement	3.28	0.75	Policy	2.87	0.93
Recognition	2.78	1.0	Salary	2.74	0.69
Responsibility	3.3	0.83	Supervision	2.87	1.0
Work itself	6.62	0.84	Work Conditions	2.66	0.68

Correlations were calculated to describe the relationships between faculty member's overall level of job satisfaction and the job motivator and hygiene factors (Table 3). Correlation coefficients were as follows: advancement, $r = .24$; achievement, $r = .43$; recognition, $r = .20$; responsibility, $r = .36$; work itself, $r = .45$; working conditions, $r = .36$; salary, $r = .07$; supervision, $r = .32$; policy and administration, $r = .30$; and interpersonal relations, $r = .32$.

Table 3.

Relationships between Overall Job satisfaction and Job Motivator and Hygiene Factors

Motivator Factors	r	P	Hygiene	r	P
Achievement	0.43	0.000	Relationships	0.32	0.001
Achievement	0.24	0.023	Policy and Administration	0.30	0.004
Recognition	0.20	0.071	Salary	0.07	0.540
Responsibility	0.36	0.000	Supervision	0.32	0.002
Work itself	0.45	0.000	Work Conditions	0.31	0.004

Correlations were calculated to describe the relationships between faculty member's overall level of job satisfaction and selected demographic variables (Table 4). The coefficients were as follows: age, $r = -.13$; total years teaching, $r = -.01$; highest earned degree, $r = .17$, and academic rank, $r = -.02$.

Table 4.

Relationship between Overall Job Satisfaction and Selected Demographic Variables

Variable	r	Probability
Age	-.13	0.21
Total Years Teaching	-.01	0.90
Degree	0.17	0.10
Academic rank	-.02	0.99

The multiple regressions revealed that three distinct factors could explain the variability among overall job satisfaction. The multiple regression analysis revealed that work itself accounted for 63% of the variance in the level of overall job satisfaction. When advancement was added to the regression equation, 64% of the variance in overall job satisfaction could be accounted for (Table 5).

Table 5.

*Regression of Overall Job Satisfaction on Selected Independent Variables
(Stepwise Entry)*

Variable	R²	b
Work itself	0.63	0.44
Advancement	0.64	0.23
Constant		1.71

Conclusions/Recommendations

The survey reveals that demographic factors such as age, academic rank, and degree no significant impact on job satisfaction; which implies that based upon age, total years teaching, and academic rank faculty are stable with regard to their overall level of job satisfaction. Nonetheless, demographic characteristics facilitated the discovery of differences in overall job satisfaction by gender. Faculty members in University of Balochistan were generally satisfied with their jobs. However, male faculty members were less satisfied than female male faculty in the current study. In the Study the factor “work itself” was the most motivating aspect. The least motivating aspect of faculty member’s jobs was the “working conditions.” The findings imply those faculties were most satisfied with the *content* of their job and least satisfied with the *context* in which their job was performed. Individual department heads should conduct a job analysis for each position and seek innovative ways to enhance the work faculty members actually perform. Conversely, the environment in which faculty member’s work is performed should be reviewed to improve the context. Concern about the context was clearly evidenced in the comment portion of the instrument where female respondents, in particular, indicated that they wanted to participate in the study but were concerned about their perceptions being made public and retribution following.

All of the job motivator and hygiene characteristics were moderately or substantially related to overall job satisfaction. Unfortunately, this conclusion implies that the basic tenants of the motivation-hygiene theory may not hold true for faculty in the University. In this regard, factor analysis should be employed on the motivator-hygiene factors to derive a more parsimonious set of factors which serve as independent variables in facet-satisfaction investigations. Moreover, a lesser amount of items on a measure would possibly decrease non-response error and increase the percentage of usable responses.

Stepwise multiple regression analysis revealed that the factors work itself and advancement explained the variability among faculty member’s overall job satisfaction scores which implies, that to elevate the collective overall level of job satisfaction among faculty members, college administrators must focus on improving the work Itself and advancement aspects of a faculty member’s job.

The findings reported in this study make a valuable contribution to the awareness of understanding the concept of job satisfaction and the effect the motivator and hygiene factors on job satisfaction. However, additional research is needed to further investigate the potential relationship and effect these variables and other variables have on job satisfaction.

It is hoped that the barrier to the faculty members' job satisfaction are found in this research can contribute to a great extent to improve the level of faculty members as well as academic education level in University. It is the desire of the society that the faculty members are to give such input those can make them happy as well as satisfied. This satisfaction will then be infused to the students and next to the nation.

References

- Bowen, B. E. (1980). *Job satisfaction of teacher educators in agriculture*. Unpublished doctoral dissertation, The Ohio State University.
- Bowran, J., & Todd, K. (1999). Job stressor and job satisfaction in a major metropolitan public EMS service. *Pre hospital and disaster medicine* 14(4), 236-239.
- Castillo, J. X., & Cano, J. (2004). Factors explaining job satisfaction among faculty. *Journal of Agricultural Education* 45(3), 65-74.
- Castillo, J. X., Cano, J., & Conklin, E. A. (1999). Job satisfaction of Ohio agricultural education teachers. *Journal of Agricultural Education* 45(2), 19-27.
- Chaudhury, S. & Banerjee, A. (2004). Correlates of job satisfaction in medical officers. *MJAFI*,60(4), 329-332.
- Cranny, C. J., Smith, P. C., & Stone, E. F. (1992). *Job satisfaction: How people feel about their jobs and how it affects their performance*. Lexington Books: New York.
- Finkelstein, M. J. (1984). *The American profession. A synthesis of social inquiry since World War II*. Columbus: Ohio State University.
- Flowers, V.S., & Hughes, C. L. (1973). 'Why employees stay'. *Harvard Business Review*, 51(4), 49-60.
- Gautam, M., Mandal, K., & Dalal, R.S. (2006). Job satisfaction of faculty members of veterinary sciences: an analysis. *Livestock Research for Rural Development* 18 (7), 29-40.
- Herzberg, F., Mausner, B., & Snyderman, B. B. (1959, 1987). *The motivation to work*. New York: John Wiley & Sons.
- Lacy, F. J., & Sheehan, B. A. (1997). Job satisfaction among academic staff: An international perspective. *Higher Education* 34, 305-322.

- Lawler, E. E., III (1973). *Motivation in work organizations*. Monterrey, CA: Brooks/Cole Publishing.
- Manger, T., & Eikeland, O. (1990). Factors predicting staff's intentions to leave the university. *Higher Education, 19*, 281-291.
- Maslow, A.H. (1954). *Motivation and personality*. New York: Harper.
- Moses, I. (1986). 'Promotion of academic staff'. *Higher Education, 15*, 33-37.
- Moxley, L. S. (1977). *Job satisfaction of faculty teaching higher education: An examination of Herzberg's dual factor theory and Porter's need satisfaction research*. (ERIC Document Service No. ED 139 349).
- Niehouse, O.L. (1986, Fall). Job satisfaction: How to motivate today's worker. *Supervisory Management, 8-11*.
- Padilla-Velez, D. (1993). *Job satisfaction of vocational teachers in Puerto Rico* Unpublished doctoral dissertation, The Ohio State University, Columbus
- Pearson, D. A., & Seiler, R. E. (1983). 'Environmental satisfiers in academe' *Higher Education, 12*, 35-47
- Poling, R. L., (1990). *Factors associated with job satisfaction of faculty members at a land grant university*. Unpublished doctoral dissertation, The Ohio State University, Columbus.
- Rosnowski, M., & Hulin, C. (1992). The scientific merit of valid measures of general constructs with special reference to job satisfaction and job withdrawal. In C. J. *their jobs and how it affects their performance*. Lexington Books: New York.
- Sorcinelli, M. D., & Near, J. B. (1989). Relations between work and life away from work among university faculty. *Journal of Higher Education, 60*(1), 59-81
- Saeed Factors Affecting Job Satisfaction of Faculty Members of Bu-Ali Sina University, Hamedan, Iran Spector, P.E. (1997). *Job Satisfaction: Application, assessment, causes and consequences*. Thousand Oaks, CA: Sage Publications.
- Steers, R. M., & L. W. Porter (1992). *Motivation and work behavior*. McGraw Hill: New York.

The portrayal of teachers in children's popular fiction

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Abstract

This study explores cultural messages about teachers and teaching, as delivered by current children's literature. Our findings confirmed that teachers are still portrayed, in text and picture, as White, kind, conservative, women who teach for the love of children. More surprisingly, we also found that: 1) the stories conveyed strong themes of students acting as agents of teachers' identity work, 2) that students often position teachers as sex objects, and 3) that teachers' social class is characterized as working class. The results imply ambivalence about teachers' identities and suggest that the teaching profession keeps women in a powerless and objectified job.

Since its re-emergence after WWII as a popular medium of entertainment in the United States (Meigs, 1953) researchers have analyzed children's fiction as a possible tool for cultural dissemination (Adams, 1953; Fraser, 1978; Jan, 1974; Kohl, 1995; Sadker & Sadker, 1977). Apart from general inquiries about the nature and content of these stories, researchers have looked at how the disabled are portrayed (Baskin & Harris, 1977), how race and ethnic diversity are represented (Fox, 1993), and frequently, how gender is portrayed in children's fiction (Creany, 1995; Diekman & Murnen, 2004; Fox, 1993; Heintz, 1987; Lehr, 2001; Narahara, 1998; Singh, 1998; Temple, 1993; Turner, 1998; Weitzmann et al., 1972).

Investigating the school story as conveyed in children's popular fiction has also been a subject of inquiry (Barone, Meyerson & Mallette, 1995; Sandefur & Moore, 2004; Triplett & Ash, 2000), although often as a subset of gender investigations of the literature (e.g. Fox, 1993; Sadker & Sadker, 1977). Because almost everyone has a ready-made image of a classroom, children's popular fiction draws on a common mental template, creating school scenarios that draw from a near-universal Western experience. Authors have successfully capitalized on the telling and retelling of the school story and its various elements – the lunchroom, homework, friendships – with one character almost always a constant: the teacher.

Interestingly, few studies investigate the portrayal of teachers in children's fiction. Those studies that do exist have so far focused on picture images (Barone, Meyerson & Mallette, 1995; Sandefur & Moore, 2004; Turner, 1998), relationships with students (Triplett & Ash, 2000), or as part of a discussion of women's occupational representations (Creany, 1995; Heintz, 1987). As with broader analyses of school stories, research on the portrayal of teachers in children's fiction focuses on the child as the recipient of the authors' messages. That is, the analyses call into question the effects of literature on children's socialization, moral development, gender identity, and attitudes about school. There is ample evidence that children's literature transmits cultural attitudes and morals (Baskin & Harris, 1977; Lehr, 2001), and acts as one of many cultural conveyors to children about expected social, emotional, and intellectual behavior (Diekman & Mummen, 2004; Kohl, 1995). However, to focus mostly on children's reactions to literature omits a significant point in the inquisition of popular media and its effect on society: how the portrayal of teachers in children's popular fiction reflects *adults'* relationships to and thoughts about schooling and teachers in contemporary culture.

In this study, we investigate the portrayal of teachers in children's popular fiction. Specifically, we investigate how authors write about teachers and how illustrators visually conceive them in their stories. This study explores common characteristics presented about teachers, as well as the cultural messages about teachers and teaching delivered by children's literature authors and illustrators. Overall, we examine what these stories imply about adults' social relationships to schooling: are the stories reflections of past experiences and/or are they current opinions of what school should be? Since books are significant vehicles for social messages, shaped by and shapers of readers' beliefs, it is vital that we who are teachers ask, "How are we portrayed?" and eventually, "How does this portrayal affect the way in which society regards our work?"

We relate the authors' and illustrators' portrayals of teachers to cultural practices and the power relations that structure them (Weedon, 1997). We frame our study using critical theory as we investigate the portrayal of teachers through the socio-cultural artifact of children's fiction. Denzin & Lincoln (1994) note the evolution of critical theory to include discourse; textual analysis, we feel, is representative of one kind of discourse between writers and society. And, as Kohl states, "power relationships in literature reveal the politics of both the story and, frequently, the author" (1995, p. 4). We suggest that the analysis of text as part of the larger context of writing and consuming children's fiction carries with it significant, ongoing questions about societies' conflicting conceptions of teachers and ultimately education.

Methods

Data sources/evidence

The initial inquiry phase consisted of an exhaustive search for children's fiction in which teachers are a main or significant supporting character. Using the *Children's Literature Comprehensive Database* (an on-line source whose mission it is to "provide reliable one search access to all important and relevant information about Pre K-12 media of all types ... [and] to connect...[to] subscribers with information about books, authors and illustrators around the world..." (www.childrenslit.com)), we first selected books for ages 13 or younger, and then selected fiction books that contained the word "teacher" in any field - title, description, or review. This process established a list of 4,098 books. We then crossed this list against both the library standard *Children's Catalog* (2001) and the sales rankings of children's fiction about teachers from *Amazon.com* to establish a "popularity" metric. Combining these, we used a random number generator to sample a representative but manageable list of books. Finally, we cross-selected titles that appeared in either the *A to zoo: Subject access to children's picture books* (Lima & Lima, 2006) index of children's literature under the section identifying a focus on teachers or on schools, or the *Norton Anthology of Children's Literature* (Zipes et al., 2005), again focusing on school or teacher stories. These final selection cuts eliminated books which appeared on the list because of a reference to the book as a "teaching tool" or a "valuable resource for teachers," but contained no teacher as either a central or peripheral character. As a result, we were able to establish a list of 74 titles that represent the available children's books that include teachers as a character in the story, with an emphasis towards those to which children have the greatest access (as reflected by library and purchase popularity).

Analytic Perspective

In this study, we used critical narrative analysis as the analytic framework of the study. The unit of analysis is the narrative (story) of the teacher. Narrative analysis has been used in a number of different analytic forms (Manning & Cullum-Swan, 1994) and this study combines critical theory's focus on power relations with textual analysis. Using critical narrative analysis as an analytic framework allows us to take multiple contexts of text into account in a way that content analyses do not (Manning & Cullum-Swan, 1994, p. 464).

By treating the narrative of the teacher – as created by authors – as the unit of analysis, we analyze it through several lenses. First, we analyze it as a cultural artifact, namely, a book in which the teacher is the main character or theme. The majority of studies of children's literature have followed this line of thought, using content analyses of books as a way to indicate quantitatively what images appear in which books (e.g. Narahara, 1998; Sandefur & Moore, 2004; Weitzman et al., 1972). While some of our analyses initially

compared content of the books, the focus was on the story of the teacher, which we believed could have had little to do with the content of the books themselves.

The second lens through which we have analyzed these data is through the socio-cultural contexts in which these teacher stories are situated. “Texts never exist separately from context,” states Dalton (2004). “When a reader engages ... a text, the act is never separated from that reader’s own lived experience...” (p. 10). Popular texts require a “double [analytic] focus” according to Fiske (1992), meaning that we must look at deeper structures of texts as well as the meanings that people already bring to those structures. In this analysis, we defined context as the underlying meanings and subtexts that the authors and illustrators bring with them to the writing of the teacher story, as well as the readers’ individual contexts.

This focus on authors’ and illustrators’ contexts as well as on the words and pictures themselves was necessary for several reasons: writers’ contexts and influences are under-examined in children’s literature analyses, and, doing so more thoroughly investigates the possible origins of the Western teacher narrative. “Literature is only part of the cultural media available to our children, but ...they learn to read in close relationships with adults, we teachers, parents, and writers ...” (Fox, 1993, p. 88). Children, particularly young children, are at the mercy of adults’ guidance and they quickly learn what adult culture wants them to know. “Books provide role models; from books, children learn what behavior is acceptable for them, for their peers, and for adults around them...” (Kohl, 1995, p. 4). Surely authors and illustrators understand more than most cultural arbiters that language is power, and that it can be used to influence children. What we want to understand, then, is what messages authors and illustrators want children to receive about teachers.

Louie (2001), in one of the few articles that partly addresses children’s literature authors, writes that, “Authors have an undeniable responsibility in creating gender balance since they are the creators of images in text” (p. 143). She postulates that some of the reasons children’s authors use stereotypes include: motivating male readers by using archetypal characters, the easy availability of male historical figures about which to write, and the sheer difficulty of eliminating gender stereotypes (pp. 143 – 145). Only the last of these reasons seems a plausible explanation for the portrayal of teachers in children’s fiction. Nonetheless, the lack of study surrounding authors’ and illustrators’ socio-cultural contexts is one of the compelling reasons to investigate the contexts in which the stories of teachers are situated.

After collecting the representative texts, we searched for common themes in teacher characterization, depiction, story line, and in pictures where appropriate. We gathered and sorted these themes according to commonality and difference, as well as by other emerging similarities. While we expected to find distinctions in teacher portrayal according to teachers’ gender, ethnicity, and race, we also left ample room for completely unexpected teacher portrayals.

Initial orientation. We originally suspected that our findings regarding content of children's fiction about teachers would echo those findings of Sandefur & Moore (2004) and Dalton (2004), as well as the more general findings of Weitzman et al. (1972) and Diekman & Murnen (2004). Specifically, we expected to find that:

- Gender/sex is an important organizing category in children's fiction about teachers;
- There would be significantly more women than men depicted as teachers in books; most of the teachers would be white; most would embody middle class characteristics;
- Teachers would be portrayed as women who do not reflect the characteristics of "normal" women: they would not have outside lives, they would be considered 'strange' by their colleagues and students, they would be uncharacteristically (for American society) independent;
- Male teachers would be portrayed as effeminate;
- There would be a great deal of emphasis on discipline and behavior;
- An idealistic and conservative view of schooling and schools would be realized.

However, we did not maintain these findings as pre-existing conceptions concerning what the contexts of these narratives might imply about writers, teachers, and parents' beliefs about schooling. We allowed the texts to reveal a contested and conflicted view of schooling, reflecting, we suspected, both adults' idealized memories and long-held resentments of their own childhoods, as well as their hopes for their own and future children's experiences in school.

Emergent coding. In addition to the teacher characteristics portrayed in the literature, we also coded for ways in which the act of teaching or the actions of teachers were characterized. These codes included the nature and type of interactions described/depicted between the teacher and other adults (teachers or parents) as well as between teachers and students; the instructional activity described/depicted; non-instructional activity (including discipline as well as support or nurturing); and finally any evidence of the teacher's knowledge or skills (content knowledge as well as pedagogical evidence).

Findings

Our findings about teachers' physical characteristics, as we initially suspected, reflect prior content analyses of children's fiction (e.g. Dalton, 2004; Sandefur & Moore, 2004) and, as well as the more general findings of Weitzman et al. (1972) and Diekman & Murnen (2004). Specifically, we found that:

- Gender/sex is a central theme in children’s fiction about teachers;
- There were significantly more women than men depicted as teachers in books; in our sample of 74 books, 56 were women, 18 were men.
- Most of the teachers in our sample were white (70% identifiable as white);
- Most of the teachers were human (10 out of 74 were animals or aliens).

Additionally, we found that

- None of the teachers were portrayed in either text or picture as disabled;
- Teachers’ general appearances were characterized as young and beautiful, old and ugly, or inhuman;
- Teachers’ clothing was portrayed consistently across many of the texts; males were dressed in child-friendly clothing (i.e. soccer ball ties, brightly colored striped shirts) while females were dressed conservatively (drab dresses, hair in buns). The majority of the young, pretty female teachers were blond.
- In the 32 texts in which a principal is named (either in passing or as a character), most (80%) were male.

These findings are consistent with the content analyses of previous studies, including the most recent study by Hamilton et al. (2006), which found that occupational stereotyping in children’s books “has not gone underground [and that] men were seen in more than nine times as many traditional as nontraditional jobs, and women were portrayed in traditional jobs over ten times as often as they were portrayed in nontraditional jobs” (p. 764).

Yet as we originally believed, we found that the texts in our sample – the descriptive and spoken language used by the characters and narrators of these stories in which teachers figure prominently – communicated messages about teachers not found in content analyses. Specifically, we found:

- These stories conveyed strong themes of students acting as agents in teachers’ identity work. We found that in the texts of children’s literature, it is the children’s objective to reveal or “unmask” teachers, to see who they “really are.”
- In some of the stories in our sample, children position teachers as objects of heterosexual desire. The result of this process is that teachers’ and students’ power becomes equalized, or that teachers’ adult power is diminished.
- Evidence that teachers’ social class, as reflected in the texts’ descriptions of teachers’ actions in and outside the school, is characterized as working class, and not professional or white collar.

We elaborate on each of these findings in the following section.

The unmasking of teachers, or, who teachers really are

In 18% of the books in our sample, teachers are literally or figuratively “unmasked;” that is, through the course of the story, someone, almost always a student, tries to discover the “true identity” of the teacher. This process is displayed with several variations:

- A student (or students), suspicious of the teacher’s unorthodox behavior, investigates the teacher’s outside-of-school life and discovers that the teacher is really an alien, masquerading as a teacher;
- A student sees evidence that his/her teacher interacts with the outside-of-school world (see her in a store or other public place), and tries to reconcile his/her belief that the teacher lived in the school all the time;
- A student, or students, greatly dislikes her/his teacher. Something happens in the course of the story to the student, the teacher, or both (in interaction with each other or separately), the result of which is that the student likes or even admires the teacher.

In 13 of the 74 books in our sample, the students discover throughout the course of the study that their teacher is an alien, and by the end of each story, they literally “unmask” him or her. In all of these cases, the children encounter disbelief from the human adults, both in and out of school, when they reveal that their teacher is an alien; in *Troll Teacher* (Vande Velde, 2000), the student Elizabeth even expects the adults’ reactions: “Elizabeth could see right away that her new teacher was a troll...But her parents didn’t see. Parents never do” (p. 5). The students in each story, regardless of age or grade level, work to unmask their teacher and when they do, at the end of each book, the alien teacher leaves the school, in some cases replaced by a new human teacher and in others by another alien teacher.

Also common to all of the “alien” teachers in these stories are their unorthodox teaching methods. In approximately two-thirds of the “alien” teacher stories, the alien’s unorthodox teaching methods are portrayed as significantly better than the regular teacher’s methods; in about one-third of the cases, the teaching methods are portrayed as bad, wrong, or menacing.

In the stories where the alien teacher uses teaching methods that are better than the original teacher’s methods, the alien teacher almost always requires the students to think, and this requirement is presented clearly as *not* what the students are used to doing for themselves. For example, in *Mister Fred* (Pinkwater, 1994), Mr. Fred gives the students a five-question test:

1. Why do you, personally, come to school every day?
2. If you didn’t come to school, what would you do with your time?
3. If you could go anywhere in the world, or out of it, where would you be?
Why?

4. If you could be anything in the world, what would you be? Why?
5. If you had a choice between Miss Cintron coming back to school to please you or staying in South America to do what she has always wanted to do, which would you choose? Why? (pp. 43- 44).

One of the students, upon seeing the questions, complains, “What kind of test is this? You don’t have to know anything.” Mr. Fred replies, “On the contrary, you have to know yourselves” (p. 44). Alien teachers are also invoked to teach “proper” behavior. In three of the stories, it required an alien to instill “appropriate” behavior (usually meant as discipline) in students who are overstepping the bounds of what regular teachers can possibly handle. Miss Swamp, teaches students to behave using fear, rude remarks, and physical threats in the popular “Miss Nelson” series.

In approximately one-third of the alien teacher stories, though, the teacher is simply teaching incorrect information. In *Troll Teacher* (Vande Velde, 2000), Miss Turtledove says, “2+2=17, except on Tuesdays” and in *Mister Fred* (Pinkwater, 1994), Mr. Fred alphabetizes the students’ names by their first names. In *Apple Island, or the Truth about Teachers* (Evans, 1998), Mrs. Gross explains that,

Teachers have made spelling easier for you. Dictionaries are incorrect. All those nasty silent letters in words are preposterous! From now on you can leave off the silly *e* at the end of come, give, and have. Forget that idiotic *i* in the middle of friend. Why bother putting the dumb *b* at the end of climb? And never write phone with a *ph* or laugh with a *gh* again. Enough already! If you hear and *f*, just put an *f*! (pp. 17 – 18).

The alien teachers in *Apple Island* are dictatorial as well, displaying classroom rules as a long list of “no” rules.

The second kind of unmasking story is that of a figurative revelation – the student attempts to discover where his/her teacher “really” lives, thereby unmasking the identity of teacher as someone who exists only in school to reveal a teacher who lives in the “real” world. The young student in *My teacher’s secret life* (Krensky, 1996) is “suspicious” of his teacher, Mrs. Isabelle, when he sees her both in the store and in roller skating in the park. After seeing her “hold hands with a man,” he decides to watch her “extra carefully” to see if her behavior continues. In *Miss Malarkey doesn’t live in room 10* (Finchler, 1995), the boy is alarmed when he sees his teacher in the student’s own apartment building; he spies on her as she takes out the garbage, paints her toenails red, and has dinner parties. In neither case is the student happy about these revelations; both books end with the student’s ambivalence about his teacher’s “new” life and his vow to watch the teacher very carefully. Both stories describe male students who are convinced that their female teachers live in their schools with all the other teachers. In each case, the student accidentally sees his teacher outside the school – in his apartment building, or in the park, roller skating – and begins to question his belief.

The third way in which a teacher is “unmasked” is when a student discovers or reveals a different, and almost always nicer or more human (oddly enough) part of her personality. The most direct way authors achieve this revelation is through the device of the “mean teacher” becoming nicer as the result of a traumatic event and/or from the help of an understanding student. In *The incredible shrinking teacher* (Passen, 2002) and *The abominable snow teacher* (Passen, 2004), author Passen characterizes the gray-haired, portly, Miss Irma Birnbaum as the “toughest teacher in town.” In both books, her class dislikes her and considers her very mean; when she is accidentally shrunken in the first book and turned into a snow person in the second, Miss Birnbaum gains perspective on what it is like to be small or to have fun as a small child, and when she returns to her regular appearance, she becomes, at least for the day, a “nice” teacher.

In *The Landry News* (Clements, 1999), Mr. Larson is the “kind of teacher parents write letters to the principal about, letters like, ‘Dear Dr. Barnes, We know our child is only in second grade this year, but please be sure that he [or she] is NOT put into Mr. Larson’s class for fifth grade’” [original italics and caps] (pp. 2 -3). Cara Landry, as a new student, challenges Mr. Larson’s neglectful teaching and, though initially angering him, ends up reinvigorating him and helping him to restore himself to the excellent teacher he once was. Jerome Brooks’ *Knee Holes* (1992) mirrors this theme: Hope Gallagher believes that her teacher, Dr. Everett Rogers, can do no wrong, while her teacher Dr. Bialek is, to Hope, unjustifiably mean. Through the course of a school year, and the actions of a special group of students, Hope realizes that Dr. Rogers is not perfect and that Dr. Bialek has reasons for being so angry.

In another story entitled *The Library Dragon* (Deedy, 1994), a little girl is the change agent in turning the mean librarian dragon into a warm, beautiful, young blonde woman. We learn through the little girl in *The Library Dragon* that the teacher is lonely. The little girl disregards the dragon’s tough exterior, disobeys the library rules, and crawls into the dragon/librarian’s lap. The little girl connects emotionally to the librarian, and her scales melt away revealing the beautiful, young, blonde teacher. However, the librarian keeps her tail; we speculate that the author intended this as an implication that a certain amount of discipline is needed when one is an authority figure in school.

A teacher can also be “unmasked” by having her/his humanity revealed, as is the case with 12 books in our sample. Finchler & O’Malley (2004) illustrate a teacher’s limits in *Miss Malarkey’s Field Trip*, wherein the first person narrator/student notices that his teacher “holds her head a lot” during their class trip to the science museum. Mel Glenn unmasks Mr. Chippendale posthumously in his novel, *Who killed Mr. Chippendale?* (1996) by providing multiple students’ first-person perspectives on their now-dead teacher, essentially revealing numerous identities and yet no complete picture.

In *Keep Mrs. Sugarman in the fourth grade* (Levy, 1992), Jackie comes to like, respect, and trust her teacher, Mrs. Sugarman, though Mrs. Sugarman, as with Mr. Larson (from *The Landry News*, 1999), does not have a good reputation among the school children.

In the story *I remember Miss Perry* (2006), Pat Brisson and illustrator Stephanie Jorich unmask the feelings and memories of a well-loved teacher as seen through one little boy's eyes. The brilliant Miss Perry is in an accident on the way to school and dies. The little boy portrays for the reader that his teacher is a professional, in every aspect of the word. He comments on the how Miss Perry was loved by the other teachers and parents. The African-American female principal (one of two in our sample) cries as she explains to the children that their beloved teacher is gone forever. It seems that one way that "good" human teachers get unmasked is by leaving the class by transfer or death.

Students positioning teachers as objects of heterosexual desire

Prior content analyses (e.g. Fox, 1993; Sadker & Sadker, 1977) suggested that most of the teachers portrayed in our sample would be women (76%); this statistic alone makes the data gendered in the most basic sense. But we were surprised to find that in part of our sample (about 20%), interactions between students and teachers were also gendered in that the expected power differentials that rightly occur between student and teacher were, in many cases, negated by the students' positioning of their opposite-sexed teacher as an object of heterosexual gaze.

Students in our sample accomplished this interaction largely through language, through students' third person descriptions of teachers' actions or through one-to-one conversations between teacher and student. Young boys, for example, were able to position their female teachers as objects of their gaze by using language of control in their descriptions of their teachers' actions. In *My teacher's secret life* (Krensky, 1996), the elementary school boy of the story is determined to find out what the teacher's "secret" life is. He describes Mrs. Isabelle Quirk's actions as "suspicious" and, when he learns that she "likes" a man, by watching his teacher hold the man's hand, he vows to "watch her extra carefully" in the future. Likewise in *Miss Malarkey doesn't live in room 10* (Finchler, 1995), the first grade boy in Miss Malarkey's class decides to spy on her when he sees her in his apartment building. By secretly following her, he finds that she also goes to parties, paints her toenails red, and goes shopping.

Marvin, the third grade protagonist in *Marvin Redpost: Alone in his teacher's house* (Sachar, 1994), actually spends time in his teacher's house alone, as the title indicates, because Mrs. North asks him to watch her dog while she is away. While in her house, his friends urge him to snoop through her things and are vicariously thrilled when Marvin tells them he used her bathroom. Cases where the student is female and the teacher is male happened less frequently in our sample ($n = 4$), but occur primarily in books written for older children. In these cases, the female student clearly notices that her teacher is male and that this awareness has a sexual component; the students in these books also position the teacher as being watched or under surveillance. For example, in *My teacher is an alien* (Coville, 1989), sixth grader Susan describes the human face of her teacher as "handsome – a strong, lean face, long nose, and cheekbones to die for" (p. 6). But, as

with the young boy characters who want to find out who their female teachers really are, so too, do the female characters position their male teachers as objects of suspicion; Susan suspects that her teacher is not who he pretends to be, and follows him home, breaks into his house, and spies on him in his bedroom. Anya, the sixth grade student in *Mister Fred* (Pinkwater, 1994), also surreptitiously follows her teacher, Mr. Fred, as he does errands after school, hoping to discover where he goes and if he has other aliens with him.

In both *The Landry News* (Clements, 1999) and *Knee Holes* (Brooks, 1992), the main female characters do not follow their male teachers, but in both cases develop deep feelings for them and subsequently turn their gazes on them as a way of being close to their objects of affection:

His voice reaches out to me over my shoulder and snares me with this. "Hold on there, won't you? I've got a question." I've stepped only two or three feet toward the door.

My heart fibrillates. But I turn anyway. Since I'm a good head shorter than he, I focus on the blue and red rhombohedrons lying tip to tip on his tie. They are like stained-glass church windows shot through by golden sunlight on a summer day (Brooks, pp. 6 – 7).

Since neither girl can admit that she has romantic or sexual feelings for her teacher, both achieve nearness by constantly talking about their teacher, or by putting themselves physically near them while possible, positioning them with internal monologue and external dialogue as objects of their desire.

Teachers as "pink" collar workers

Knapp and Woolverton (2004) define social class as more than just economic wealth; they also include in their definition the less tangible components of political power, status prestige, and cultural power (p. 658). Acknowledging social classes as social constructions, they state that social class in relation to schooling is "an attribute of all individuals engaged in the enterprise of schooling, of educators as well as learners" (p. 658). Yet educators' social class is rarely a topic of research on schooling. Not surprisingly, then, its existence is not often found in studies of children's literature: researchers cannot see what they do not acknowledge is there. In our study, however, we found that teachers are portrayed as having a social class. As reflected in descriptions of teachers' actions in and outside of school, we found evidence that authors characterize teachers as working class, and not, as we had expected, as professional or white collar.

We used several different measures to define social class as it is portrayed in teachers. Knapp and Woolverton (2004) define teachers' social class as partly deriving from their class of origin, partly from the professional lives, and partly from their patterns of association outside of school (p. 665). Metz (1990) adds to this definition: "While

teachers have formally similar educational credentials, ... they not only come from a range of social class backgrounds but participate as adults in networks that vary significantly in their social class" (p. 94). While teachers might do the same job, they are not all of the same social class.

The authors of children's books, then, are free to color their characters' social class as they decide. Given the freedom to characterize their teachers as professionals or as workers, we found that the authors in our sample colored their teachers pink – female education workers. As social class in teaching is as much a gendered issue as it is an economic one (e.g. Weiler, 1988), noting the components of these stories that indicate teachers' socio-economic statuses reveals how subtle messages about teachers may go undetected in children's fiction. We found the following working class aspects of many of the teachers in our study to include:

- Limited access to power within the school (almost always a male principal who tells the teacher what to do, even if the principal is characterized as not very smart)
- Modest indicators of economic wealth – teachers have small homes or apartments
- Teachers find wealth meaningless when measured against their job fulfillment.
- Students' economic means are modest or limited (indicative of school community). For example, in *My great aunt Arizona*, the student does not have the money to travel. However she does not mind; she travels in her imagination.
- Teachers' linguistic patterns are consistent with working class speech – use of commands in classroom, slang, limited academic vocabulary
- Clothing is modest and conservative; the teachers' collars are high on their necks, their dresses are below the knee, and their jewelry is small
- Teaching responsibilities are conscientiously completed and superiors obeyed
- Nature of teaching and learning is narrow; knowledge is held by the teacher, to be given out to the students.

There were notable exceptions to this theme – some teachers in our study defied the expectations of their superiors and the culture of the school. When this exception happened, though, they were cast as radical and more often than not, were literally written out of the classroom.

Not surprisingly, the nature of the job of teaching is represented differently for male and female teachers. With the exception of one text, female teachers do not interact with subject matter. If they are described/depicted as young and beautiful, then they are described as patient, kind, helpful, and liking children, but not described in the act of teaching. Even in stories where male teachers are teaching, this pattern is consistent. In *Sparks*, a chapter book about a fifth grader with learning difficulties, the special education teacher is a pretty white female. The boy describes her as kind, patient and fun. This description is contrasted to the students' new general education classroom teacher,

an African American male, who works with mathematics, discusses *Charlotte's Web*, explains equations, and is academically challenging. The boy learns from the male teacher, while he only has fun with and is helped by the female.

In each portrayal of male teachers, they are shown as actively engaged in making academics accessible to children. This depiction was done in warm, wonderful, creative ways, but always in the context of the act of teaching. Males were depicted as doing the real work of teachers with both strong, affective demeanors and strong cognitive abilities, while the vast majority of females were shown only performing the affective qualities of teachers. For example, in *Thank you, Mr. Falker* (Polacco, 2001), the male teacher promises “We’re going to change all that, girl. You’re going to read—I promise you that.” We are privy to the best practice methods Mr. Falker employs to teach the young student to read. This instruction is done after school on Mr. Falker’s own time. The male teacher described in the text *I don’t want to go back to school* (Russo, 1994) teaches a geography lesson as a small group activity, reads stories in a “good story voice,” and introduces the students to the class pets. The pattern indicates an underlying message of the work of teachers -- male teachers provide instruction, female teachers provide nurturance and support. The gender divide of the work corresponds with work conceptions underlying a ‘pink collar’ divide in social status.

Discussion

The surface content of the books in our sample reveals nothing new about the portrayal of teachers in current children’s fiction: as it has for over 50 years in the United States and the United Kingdom, children’s fiction characterizes teachers as female, White, straight, and non-disabled. These findings reflect other researchers’ conclusions about the content of children’s fiction regarding teachers (Sandefur & Moore, 2004; Weber & Mitchell, 1995; Weitzman et al., 1972) and we have not found any significant differences in even the most recent books about teachers.

Whether this literal picture of teachers is due to authors’ desire to reflect the reality of Western teaching forces – teachers are in fact overwhelming White, female, straight, and non-disabled – or whether it reflects authors’ childhood reminiscences or even their hopes that the teaching force will stay as it is, we cannot say. Yet we know children’s literature transmits cultural attitudes and morals (Baskin & Harris, 1977), and acts as a conveyor of messages to children about social behavior (Kohl, 1995), and so what we can say about the unchanged demographic content is that it cannot yet be considered a source to help children to imagine teachers differently.

Although our findings regarding the typical demographic profile of teachers were not a surprise, our data did reveal that authors of children’s fiction display deep ambivalence about whom and even what teachers are. On the surface we can say that teachers are literally what authors say and draw them to be: White women. But the overwhelming evidence from our study -- teachers’ identities are something to be uncovered, teachers

are objects to be watched, and they are workers to be controlled -- suggests that the “real” identities of teachers are to be denied, hidden, and even feared.

Most striking was the overwhelming number of works that dealt with revealing teachers’ identities. Whether the teachers were aliens in teacher-masquerade, or whether their non-school lives or personalities were in question, students in most of the texts were tremendously concerned with finding out who their teachers “really” were. This theme was by far the most compelling of those we discovered. What is so taboo, we wonder, about teachers revealing their real selves to their students?

Dalton (2004), studying teachers’ portrayal in commercial films, notes this bifurcation between school and private life, stating that, “undercutting all of the other categories [of women as teachers] are the divided lives that are imposed on female teachers.... We must consider the ways in which female teachers are asked to deny their experience as women in their teaching” (p. 97). If the teachers in children’s fiction are not supposed to have other lives, why then are students written as anxious to discover them?

A reason may be that students fear losing an authority figure whom they have constructed as ideal. The main teacher character from *The Landry News* (Clements, 1999) suggests that the fear of the loss of a “perfect” teacher may be, in fact, damaging to a student:

Mr. Larson remembered his own fifth-grade teacher, Mrs. Spellman. She had been perfect. Her clothes and hair and lipstick were always just so. Her classroom was always quiet and orderly. She never raised her voice – she never had to. She wrote in that flawless cursive, and a little gold star from Mrs. Spellman was like a treasure, even for the toughest boys. Then young Karl Larson saw Mrs. Spellman at the beach on Memorial Day with her family. She was sitting under an umbrella, and she wore a black swimsuit that did not hide any of her midriff bulges or the purple veins on her legs. Her hair was all straggly from swimming, and without any makeup or lipstick she looked washed out, tired. She had two kids, a girl and a boy, and she yelled at them as they wrestled and got sand all over the beach towels. Her husband lay flat on his back in the sun, a large man with lots of hair on his stomach, and it wasn’t a small stomach. As Karl stood there staring, Mrs. Spellman’s husband lifted his head off the sand, turned toward his wife, pointed at the cooler, and said, ‘Hey Mabel, hand me another cold one, would you?’ (pp. 20-21).

It is the now-adult teacher’s reaction to *his* ideal childhood teacher that offers insight as to what authors imagine students may feel when they see their teacher as real:

Karl was thunderstruck, and he turned and stumbled back to where his own family had set up their picnic on the beach. This big, hairy guy had looked at *his* Mrs. Spellman and said, ‘Hey Mabel.’ At that moment, Karl Larson realized that the Mrs. Spellman he knew at school was mostly a fictional character, partly created

by him, and partly created by Mrs. Spellman herself. The students and ...and *Mabel* created Mrs. Spellman together in order to do the job of schooling [Original italics.] (p. 21).

Clements does not allow Mr. Larson the teacher to explain what it is about “the job of schooling,” though, that requires teachers to be fictional characters. What can “perfect” teachers do that imperfect – real – teachers cannot? What is gained – by students, teachers, and society – by having “perfect” teachers? According to Clements’ little-boy-turned-teacher, teachers are socially constructed fictions who exist to do what real women apparently are not allowed or able to do.

Moreover, the sexual overtone in Mr. Larson’s fifth grade reflection suggests that only a made-up, perfectly-coiffed woman can be a teacher and that ugly teachers cannot really exist. Such reasoning might explain the preponderance of aliens, trolls, and vampires masquerading as teachers – students are immediately suspicious of such teachers’ humanness for the simple reason that they are ugly.

It may also be that it is somehow dangerous for students to acknowledge that female teachers are “real” women. “[Teachers] negotiating between their public and private selves amid the constraints imposed upon them from their supervisors and their communities has historically been a balancing act for women teachers” writes Dalton (2004, p. 93). If students, particularly elementary and middle school aged children, are supposed to see their teachers as transitional objects between mother and outside worlds as Grumet (1988) suggests, then to see their teachers as something other than “substitute mother” is to be subject to the realities of the outside world. If students gain the knowledge that their teachers are not perfect, all-knowing, beautiful, nurturing creatures, then perhaps their mothers are not perfect either. For teachers and mothers to be human means that they have economic, sexual, intellectual, and social needs that neither children nor Western culture may be ready to acknowledge.

The student gaze that positions teachers as objects of students’ heterosexual desire can be read on the surface as merely school crushes – students’ transfer of affection from parent to teacher, the nascent development of human sexual desire. Yet the number of instances within the sample texts where the student, through his discourse with the teacher, positions her as powerless – calls into question any simple reading of these relationships. Walkerdine (1990) cautions against reading any interchange as ‘simple,’ noting that “a particular individual has the potential to be ‘read’ within a variety of discourses” (p. 5). In the cases of these texts, many students hold simultaneous dual positions as powerless student and powerful male; “an individual can be powerful or powerless, depending on the terms in which her/his subjectivity is constituted” (Walkerdine, 1990, p. 5).

Most of the young boy students in our sample who engage in direct or third person positioning of their teachers do so in an adult context; they are young boys (as young as first grade, in some cases) and yet they are spying on their teachers who are painting their

toenails, shopping, having dinner parties, and holding hands with others; they are writing to nominate their teacher for president, taking care of their pets in absence of a husband or partner, and critiquing their face make-up or lack thereof. As individuals are produced, in the process of discourse, into relations of power (Walkerdine, 1990), it is possible to see these boys as both powerless (students) and powerful (male). The boys' power is gained when they refuse the powerless student role and recast the teachers as powerless in their discourse, even if that discourse is a third person narrative.

There are a few instances in our sample where girl students position male teachers as well, but in these cases the power differential remains in place – male teachers, though objects of girl students' desire, remain adults, likely because the girl students accept the student (powerless) role even as they also position their male teacher as an object of desire:

“Please forgive me,” he [Dr. Rogers] suddenly blurts out. “I shouldn't have let this go so far, forcing *you* to have to bring it to my -- ”
 Damn, but I'd like to kick myself! Now I'm beginning to churn in the old direction wildly. *His* blasted pain's completely mine again.
Italics original (Brooks, 1992, p. 106)

Reaffirmed in our data analysis is Grumet's (1988) assertion that even in a profession where women dominate, the teaching profession brings little power to women.

Lastly, our findings of teachers portrayed as working class suggest that current children's fiction may reflect the existing push to “teacher-proof” school curricula and routines, to make education a collection of common beliefs and rituals, as opposed to a place where teachers and children are free to think for themselves. The teachers in our study who leave their regular positions – the aliens, those who leave and are replaced by aliens or other substitutes, those who are threatened with being fired or being ostracized by their peers – are those teachers who challenge the thinking of their students. The teachers who stay are those who do not challenge the system, the ones who do what they are told and do a good job within the confines of the job. Casey & Apple (1989) note this trend in *non-fictional* teaching positions, explaining how “jobs filled by women are structured so that there are greater attempts to control the content of the job and how that job is performed” (pp. 179 – 180).

The class position of teachers is also infused with gender in the way that fictional teacher characters, mostly female, are told what to do by almost exclusively male principals. The schools within these stories, as with real schools, exist in communities where teachers are further controlled, and caught, between the expectations of families, (mostly left to mothers) and expectations of the state (mostly left to men, in the form of patriarchal expectations). It seems no wonder that even little boys in the stories we analyzed felt empowered to tell their teachers what to do. “Helpless to raise our own class status through our work,” Grumet (1988) writes, “female teachers may be the least-equipped

persons in our society to show students how to bridge the distance between effort and social class status” (pp. 56 - 57). The sheer numbers of women in the profession are contradicted ironically by the lack of power that the teachers in these texts display – teaching is a feminized profession displaying few indicators of feminism.

We began this study investigating the portrayal of teachers in children’s popular fiction suspecting that there was more to be found than demographics reflective of the current Western teaching force. What we found surprised us though perhaps it should not have: these stories imply that the cultural aesthetic surrounding teachers and teaching remains as unchanged in fiction as it does in reality. Ambivalent and hopeless about our contradictory positions as women, teachers, and professionals, children’s fiction tells us that we teachers are female workers who should take care of children, do what we’re told, and keep the masks of teacher identity intact. Quinn (1996) states that “real secrets can be kept by publishing them on billboards” (p. 188). In the case of how Western society regards teachers’ work, perhaps we should say that if we want to hide society’s feelings about teachers, we should publish the message in children’s storybooks.

References

- Adams, B. (1953). *About books and children. Historical survey of children’s literature.* New York: Henry Holt and Company.
- Baskin, B. & Harris, K. (1977). *Notes from a different drummer. A guide to juvenile fiction portraying the handicapped.* New York: R.R. Bowker Co.
- Casey, K. & M. Apple. (1989). Gender and the conditions of teachers’ work: The development of understanding in America. In S. Acker (Ed.) *Teachers, gender, and careers* (pp. 171-186). New York: Falmer Press.
- Clark, B. L. (1996). *Regendering the school story: Sassy sissies and tattling tomboys.* New York: Garland Publishing.
- Couch, R. A. (1994, October). *Gender equity & visual literacy: Schools can help change perceptions.* Paper presented at the 26th Annual Conference of the International Visual Literacy Association, Tempe, AZ.
- Creany, A. D. (1995, October). *The appearance of gender in award-winning children’s books.* Paper presented at the 27th Annual Conference of the International Visual Literacy Association, Chicago, IL.
- Dalton, M. M. (2004). *The Hollywood curriculum. Teachers in the movies.* New York: Peter Lang.
- Denzin, N. K. & Lincoln, Y. S. (Eds.). (1994). *Handbook of qualitative research.*
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Thousand Oaks, CA: Sage Publications.

- Diekman, A. B. & Murnen, S.K. (2004). Learning to be little women and men: the inequitable gender equality of nonsexist children's literature. *Sex Roles*, 50(5/6), 373-385.
- Fiske, J. (1992). Cultural studies and the culture of everyday life. In L. Grossberg, C. Nelson & P. Treichler (Eds.) *Cultural Studies* (pp. 154-173). New York: Routledge.
- Fox, M. (1993). Men who weep, boys who dance: The gender agenda between the lines in children's literature. *Language Arts*, 70(2), 84 - 93.
- Fox, M. (1993). Politics and literature: Chasing the "isms" from children's books. *The Reading Teacher*, 46(8), 654-658.
- Fraser, J. H. (Ed.). (1978). *Society & children's literature*. Boston: David B. Godine.
- Grumet, M. (1988). *Bitter milk. Women and teaching*. Amherst: University of Massachusetts Press.
- Guarino, C. M., Santibañez, L., Daley, G. A. (2006). Teacher recruitment and retention: A review of the recent empirical literature. *Review of Educational Research* 76(2), 173- 208.
- Hamilton, M.C., Anderson, D., Broaddus, M & Young, K. (2006). Gender stereotyping and under-representation of female characters in 200 popular children's picture books: A twenty-first century update. *Sex Roles* 55: 757-765.
- Heintz, K. E. (1987). An examination of sex and occupational role presentations of female characters in children's picture books. *Women's studies in communication* 11, 67-78.
- Henne, F. (1978). American society as reflected in children's literature. In J. H. Fraser (Ed.) *Society & children's literature* (pp. 1 – 9). Boston: David B. Godine.
- Jan, I. (1974). *On children's literature*. New York: Schocken Books.
- Jett-Simpson, M. & Masland, S. (1993). Girls are not dodo birds! Exploring gender equity issues in the language arts classroom. *Language Arts* 70, 104 – 108.
- Johnson, C. (1963). *Old-time schools and school-books*. New York: Dover Publications.

- Kohl, H. (1995). *Should we burn Babar? Essays on children's literature and the power of stories*. New York: The New Press.
- Knapp, M.S. & Woolverton, S. (2004). Social class and schooling. In J.A. Banks and C.A. Banks (Eds.) *Handbook of research on multicultural education, 2nd Edition* (pp. 656-681).
- Lehr, S. (2001). The hidden curriculum: Are we teaching young girls to wait for the prince? In Lehr, S. (Ed.) *Beauty, brains, and brawn: The construction of gender in children's literature* (pp. 1 – 20). Portsmouth, NH.: Heinemann.
- Lehr, S. (Ed.) (2001). *Beauty, brains, and brawn: The construction of gender in children's literature*. Portsmouth, NH.: Heinemann.
- Lima, C. W. & Lima, J. A. (Eds.). (2001). *A to Zoo. Subject access of children's picture books*. (6th ed.). Westport, CT: Bowker-Greenwood.
- Lombard, N. (1944). *Looking at life through American literature*. Stanford, CA: Stanford University Press.
- Louie, B. Y. (2001). Why gender stereotypes still persist in contemporary children's literature. In Lehr, S. (Ed.) *Beauty, brains, and brawn: The construction of gender in children's literature* (pp. 142 -151). Portsmouth, NH.: Heinemann.
- Lukens, R. J. (1990). *A critical handbook of children's literature*. New York: Harper Collins.
- Meigs, C., Eaton, A., Nebitt, E. & Viguers, R. H. (1953). *A critical history of children's Literature*. New York: Macmillan Company.
- Metz, M. H. (1990). How social class differences shape teachers' work. In M.W. Mc Laughlin, J.E. Talbert & N. Bascia (Eds.), *The context of teaching in secondary schools: Teachers' realities* (pp. 40 – 107). New York: Teachers College Press.
- Narahara, M. M. (1998). *Gender stereotypes in children's picture books*. (Exit project EDEL 570). Long Beach: University of CA, Long Beach. (ERIC Document Reproduction Service No. ED419248).
- Price, A. & Yaakov, J. (Eds.). (2001). *Children's catalog*. New York: H. H. Wilson Company.
- Quinn, D. (1996). *The story of B. An adventure of the mind and spirit*. New York: Bantam Books.

- Sadker, M. P. & Sadker, D. M. (1977). *Now upon a time. A contemporary view of children's literature*. New York: Harper & Row.
- Sandefur, S. & Moore, L. (2004). The nuts and dolts of teacher images in children's Picture storybooks: A content analysis. *Education* 125(1), 41-55.
- Singh, M. (1998). *Gender issues in children's literature*. Bloomington, IN: ERIC Clearinghouse on Reading English and Communication. (ERIC Document Reproduction Service No. ED 424 591).
- Temple, C. (1993). What if Beauty had been ugly? Reading against the grain of gender bias in children's books. *Language Arts* 70(2), 89 – 93.
- Turner-Bowker, D. (1998). Picture images of girls and women in children's literature. *Dissertation Abstracts International*. (UMI No. 9902582)
- Walkerdine, V. (1990). *Schoolgirl fictions*. London: Verso.
- Weber, S. & Mitchell, C. (1995). *That's funny, you don't look like a teacher! Interrogating images and identity in popular culture*. London: Falmer Press.
- Weedon, C. (1997). *Feminist practice and poststructural theory*. (2nd ed.). Oxford, UK: Blackwell Publishers.
- Weiler, K. (1988). *Women teaching for change: Gender, class and power*. New York: Bergin & Garvey.
- Weitzman, L. J., Eifler, D, Hokada, E. & Ross, C. (1972). Sex role socialization in picture books for preschool children. *American Journal of Sociology* 77(6), 1125 – 1150.
- Wing, A. (1997). How can children be taught to read differently? "Bill's new frock" and the "Hidden Curriculum." *Gender and education* 9(4), 491-504.
- Zipes, J., Paul, L., Vallone, L., Hunt, P., & Avery, G. (2005). *Norton Anthology of Children's Literature*. New York, NY: W.W. Norton Publishing.

Appendix
List of Books Included in Content Analysis

- Allard, Harry, (1977) *Miss Nelson is missing!*
 Allard, Harry (1986) *Miss Nelson is Back*
 Allard, Harry (1988) *Miss Nelson Has a Field Day*
 Ames, Mildred (1985) *Cassandra-Jamie*
 Borden, Louise (1999) *Good luck, Mrs. K.!*
 Bosse, Malcomb (1996) *The Examination*
 Brandt, Amy (2000) *When Katie was our teacher*
 Brenner, Emily (2004) *On the first day of grade school*
 Brillhart, Julie (1990) *Anna's Goodbye Apron*
 Brisson, Pat (2006) *I Remember Miss Perry*
 Brooks, Jerome (1992) *Knee holes*
 Brown, Marc Tolon (2000) *Arthur's teacher moves in*
 Bunting, Eve (1992) *Our teacher's having a baby*
 Calmenson, Stephanie(1998) *The Teeny tiny teacher*
 Chardiet, Bernice (1990) *The Best teacher in the world*
 Choi, Sook Nyul & Dugan, Karen (1993) *Halmoni and the Picnic*
 Clavell, James (1998) *The Children's Story*
 Clements, Andrew (2002) *Jake Drake. class clown*
 Clements, Andrew (1999) *The Landry News*
 Clements, Andrew (2001) *Jake Drake, teacher's pet*
 Clements, Andrew (2004) *The Last holiday concert*
 Codell, Esme Raji (2003) *Sahara Special*
 Cohen, Barbara (1998) *Molly's Pilgrim*
 Coville, Bruce (1989) *My teacher is an alien*
 Coville, Bruce (1991) *My teacher fried my brains*
 Coville, Bruce (1991) *My teacher glows in the dark*
 Creech, Sharon (2001) *Love that dog*
 Crews, Donald (1993) *School Bus*
 Dahl, Roald (1988) *Matilda*
 Danneberg, Julie (2003) *First year letters*
 Danziger, Paula (1974) *The Cat ate my gymsuit*
 Deedy, Carmen (1994) *The Library Dragon*
 Evans, Douglas (1998) *Apple Island, or, the truth about teachers*
 Evans, Douglas (1997) *So what do you do?*
 Finchler, Judy (1995) *Miss Malarkey doesn't live in room 10*
 Finchler, Judy (1998) *Miss Malarkey won't be in today*
 Gelman, Rita Golden (2004) *Doodler doodling*
 Getz, David (2000) *Floating Home*
 Glenn, Mel (1996) *Who Killed Mr. Chippendale?*
 Glenn, Mel (1997) *The Taking of Room 114*
 Granger, Michele (1995) *Fifth grade fever*

Greenburg, Dan (2002) *My teacher ate my homework*
 Greene, Stephanie (1998) *Show and tell*
 Guest, Elissa Haden (2004) *Iris and Walter and the substitute teacher*
 Gutman, Dan (2004) *Ms. Hannah is Bananas*
 Gutman, Dan (2004) *Ms. Small is off the Wall*
 Hahn, Mary Downing (1990) *December Stillness*
 Havill, Juanita (1999) *Jamaica and the substitute teacher*
 Henkes, Kevin (1996) *Lilly's purple plastic purse*
 Houston, Gloria (1997) *My Great Aunt Arizona*
 Hurwitz, Johanna (1988) *Teacher's pet*
 Howe, James (2003) *The Misfits*
 James, Simon (1991) *Dear Mr. Blueberry*
 Johnson, Doug (2002) *Substitute teacher plans*
 Johnston, Janet (1991) *Ellie Brader hates Mr. G*
 Kiesel, Stanley (1980) *The War between the pitiful teachers and the splendid kids*
 Kinerk, Robert (2005) *Timothy Cox will not Change His Socks*
 Klass, Sheila Solomon (1991) *Kool Ada*
 Krensky, Stephen (1996) *My teacher's secret life*
 Laminack, Lester (2006) *Jake's 100th Day of School*
 Langreuter, Jutta (1997) *Little Bear goes to Kindergarten*
 Levy, Elizabeth (1992) *Keep Ms. Sugarman in the fourth grade*
 MacDonald, Amy (2001) *No more nasty*
 McCully, Emily Arnold (1996) *The Bobbin Girl*
 McNamee, Graham (2003) *Sparks*
 Meyer, Carolyn (2007) *White Lilacs*
 Mills, Claudia (2005) *Makeovers by Marcia*
 Morgenstern, Susie (2001) *A Book of coupons*
 Murphy, Jim (2001) *My face to the wind: the diary of Sarah Jane Price. a prairie teacher*
 Nastick, Sharon (1981) *Mr. Radadast makes an unexpected journey*
 Nikola-Lisa, W.(2004) *MY teacher can teach--anyone!*
 Passen, Lisa (2004) *The Abominable snow teacher*
 Passen, Lisa (2000) *Attack of the fifty-foot teacher*
 Passen, Lisa(2002) *The Incredible shrinking teacher*
 Pinkwater, Jill (1994) *Mister Fred*
 Plourde, Lynn(2003) *Teacher Appreciation Day*
 Polacco, Patricia (1998) *Thank you. Mr. Falker*
 Polacco, Patricia (2001) *Thank You, Mr. Falker*
 Priceman, Marjorie (1999) *Emeline at the circus*
 Reynolds, Peter (2003) *The Dot*
 Russo, Marisabina (1994) *I Don't Want to Go Back to School*
 Sachar, Louis (1993) *Marvin Redpost: alone in his teacher's house*
 Sachar, Louis (1995) *Wayside School gets a little stranger*
 Smothers, Ethel Footman (2003) *The Hard-Times Jar*
 Spiller, Robert (2006) *The Witch of Agnesi*

- Tada, Joni Eareckson (2001) *The Meanest teacher*
Thaler, Mike (1994) *The Gym teacher from the Black Lagoon*
Vande Velde, Vivian (2000) *Troll teacher*
Viorst, Judith (1987) *Alexander and the Terrible, Horrible, No Good, Very Bad Day*
Wardlaw, Lee (2004) *101 ways to bug your teacher*
Willner-Pardo, Gina (1997) *Spider Storch's teacher torture*
Winters, Kay (2004) *My teacher for President*
Wood, Douglas (2002) *What teachers can't do*

The Calibration Accuracy of Middle School Students in Math Classes

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Abstract

Calibration reflects a metacognitive process generally defined as the ability to judge how well one will perform on a task (prediction) and performance once the task has been completed (postdiction). The current study investigated calibration accuracy among 77 middle school math students, whether accuracy was correlated with achievement, and to what these students attribute their calibration accuracy. Results showed that higher-performing students demonstrated greater calibration accuracy, whereas lower-performing students were less accurate and overconfident. All students attributed calibration accuracy to their ability to estimate the number of items answered correctly and to attributions such as study time, effort, and expectations of test difficulty.

“A major function of thought is to enable people to predict the occurrence of events and to create the means for exercising control over those that affect their daily lives” (Bandura, 1989, p.176). Prediction, or the ability to judge one’s future performance is a metacognitive process, and research indicates that metacognitive processes such as calibration and self-assessment are linked to achievement (Maki, Shields, Easton-Wheeler, & Zacchilli, 2005; McMillan & Hearn, 2009). Calibration, or absolute metacognitive accuracy, refers to how accurately individuals can predict how well they will do on a task prior to starting it and how well they judge their performance after completion. Often the task is an exam. For example, a student who predicts that she will score an 80 on an exam but who actually scores a 50 is grossly inaccurate and overconfident. In contrast, a student who predicts that he will get a 90 but actually scores a 95 is much more accurate but underconfident. Calibration judgments are metacognitive, self-regulatory processes linked to student achievement (Bol, Hacker, & O’Shea, & Allen, 2005; Butler & Winne, 1995; Hacker, Bol, Horgan, & Rakow, 2000). We first will discuss the importance of student self-regulation through calibration, will move to calibration accuracy as a function of achievement, and finally, will focus on calibration research with school-age children, an area that has received little research attention.

Student Self-Regulation through Calibration

Test performance predictions require students to self-assess what they know or do not know about to-be-tested material. Such self-assessments may help them manage their study time more effectively (Hacker et al., 2000). McMillan and Hearn (2009) assert that, “Correctly implemented, student self-assessment can promote intrinsic motivation, internally controlled effort, a mastery goal orientation, and more meaningful learning” (p.39). Barkley’s (2006) results showed significant correlations between student self-efficacy beliefs and reading comprehension achievement. They concluded that self-efficacy beliefs and outcome expectancies may be important predictors of academic achievement.

If self-regulated learners are more effective learners, it seems plausible then that a treatment that requires students to calibrate their own performance would lead to further self-regulation and monitoring. Butler and Winne (1995) argued that feedback could help students consider conditions that may require more monitoring of their level of learning and they hypothesized that problems arise because student misperceptions of prior knowledge is or is not monitored. They investigated different feedback methods, including functional validity feedback which “in general, describes the relation between the learner’s estimates of achievement and his or her actual performance” (p. 252). They determined that feedback from validity-related information was more effective than feedback providing outcome information only. Outcome information documents achievement results in terms of right and wrong answers, without consideration of learner attitudes or perceptions. The authors theorized that outcome feedback is less effective because it provides the least guidance as to how to self-regulate, whereas functional validity feedback may be used to require the learner to reconcile their actual performance with their predicted performance. They concluded that this self-monitoring and reconciliation of predicted and actual performance may explain the effectiveness of this strategy over outcome-based feedback.

Similarly, Hacker and Bol (2001), suggested that a postdictive judgment (i.e., a self-evaluation after performance) is also valuable, as it is equivalent to a self-evaluation, which can provide valuable feedback on which to base future self-assessments. It may be reasonably expected that students would have more knowledge about how they did after taking a test than before and be better able to determine their knowledge of the subject. This may not be true however, if students are facing “complex memory demands,” as may happen when students are faced with multiple tests of different subjects at the same time. Hacker et al. (2000) suggested that students dealing with such cognitive constraints may rely on their predictions when making postdictions.

Consequently, it seems likely that validity-related feedback strategies requiring students to calibrate and reflect on their performance can support students while scaffolding their self-regulated involvement in tasks. Students that are overconfident in their calibration may fail a test because they do not feel the need to study, or they may not understand which topics they need further help with versus which topics they have mastered. This inability to predict test accuracy may result in test underpreparation (Maki et al., 2005), but asking students to predict, postdict, and reflect upon their achievement on assessments may motivate them to try to understand why they were inaccurate in their calibrations. It has also been suggested that performance correlates highly with the extent to which students search for evidence when considering questions on

multiple-choice questions. Students who are overconfident may mistakenly choose one answer that they believe is correct just because they feel they know it, without examining other answers, resulting in poor performance (Koku & Qureshi, 2004). Attempts to increase calibration accuracy may result in enhanced performance because students would learn from their overconfidence errors when viewing results that are inconsistent with their beliefs. Koku and Qureshi also found some evidence to suggest that overconfidence decreases when students are required to provide reasons supporting their multiple-choice answers. Their hypothesis was "...marginally supported by the results. Our results show that critical analyses of questions apparently helped students appreciate the true import of questions" (p. 6).

Accuracy as a Function of Achievement

Prior research indicates that higher-achieving students tend to be more accurate but underconfident in their predictions, while lower-achieving students are less accurate but overconfident (Bol et al., 2005; Koku & Qureshi, 2004). This seems contradictory at first because one might expect that students who typically do not perform well would calibrate their scores accordingly low. However this pattern of results may be linked to explanatory style, which is a "habitual way of explaining events that is a cognitive characteristic of the individual" (Pintrich & Schunk, 2002, p. 108). Some literature on explanatory style suggests that this contradiction may occur as a result of lower-achieving students' protection of self-worth and image or their desire to appear as good students (Bol & Hacker, 2001; Bol et al., 2005; Butler & Winne, 1995; Dembo & Eaton, 2000).

Hacker et al. (2000) conducted a study about students' ability to predict and postdict test performance when the relation between self-assessment and performance was stressed in the classroom setting. Consistent with prior research, they found higher-achieving students were better at calibration but underconfident, while lower-achieving students were less accurate and overconfident. They also suggested in their discussion that, "To help low-performing students become better self-regulators of their test preparation behaviors; their attributions may need as much attention as their knowledge deficits" (p. 168).

This pattern of results was replicated in Bol et al.'s (2005) study. They found a statistically significant difference between higher and lower achievers on prediction accuracy, but not on postdiction accuracy. The study revealed that higher-achieving students were more accurate and underconfident in predictions, with an average of about 1 percentage point difference between their prediction and actual score; whereas, lower-achieving students were overconfident but inaccurate by an average of 8 percentage points above their predicted scores (2005). Furthermore, a link between calibration accuracy and explanatory style was reported.

Hacker, Bol, and Bahabani (2008) investigated the impact of extrinsic incentives and reflection on college students' calibration judgments and accuracy on exam performance, as well as relationships among explanatory style and calibration. Their results again indicated that achievement level dictated calibration accuracy. High achieving students were very accurate in their calibrations and were less affected by incentives and reflection. Their explanatory style did not contribute significantly to calibration. Lower-achieving students were less accurate in calibration but showed significant improvement in accuracy when incentives were offered.

Explanatory style was also found to be a reliable predictor of calibration judgment among lower-achieving students.

Koku and Qureshi's (2004) research further supports the findings related to calibration accuracy and achievement. They assert that high-performing students are more likely to recognize the extent and limitation of their knowledge, while low-performing students have limited insight into their performance. They suggest using an intervention that requires students to respond to and justify each question response, theorizing that this will increase student metacognitive processes and thereby result in increased calibration accuracy and improved performance.

Calibration Research with School-Age Students

Most research that has been conducted on calibration strategies has been limited and focused on college age students (Barnett & Hixon, 1997; Bol et al., 2005; Carvalho Filho & Yuzawa, 2001; Hacker & Bol, 2004; Hacker et al., 2008; Lin & Zabrocky, 1998). College students have years of experience taking exams and should recognize when they are not prepared (Hacker & Bol, 2004), although that often does not seem to be the case. In contrast, little research has been conducted on calibration accuracy and its link to achievement among K-12 students enrolled in urban, public schools. This is surprising considering that this group of students may stand to benefit most from strategies that encourage self-reflection and self-regulation. Middle school students especially face a transition that, "for many represents the beginning of a general deterioration in academic performance, motivation, self-perceptions of ability, and relationships with peers and teachers" (Dembo & Eaton, 2000, p.8). Calibration assessments also may benefit these students by helping to shape a more adaptive explanatory style from an early age. "Regular classroom assessments give students the information they use to form their conceptions of achievement and learning in every discipline, their conceptions of themselves as learners, and their choices about future learning" (Brookhart, Walsh, & Zientarski, pp.151-152).

Successful students are usually cognizant of how they have done on a test, before they even get it back, a skill that seems to be lacking in less successful students, and one that illustrates the importance of self-monitoring of performance (Dembo & Eaton, 2000). This may be particularly applicable to middle-school students in urban settings, who may be susceptible to social factors, such as public self-concept, and beginning to form conceptions of themselves as learners. By encouraging younger students to consider metacognitive strategies, such as calibration, it may be possible to alter their self-efficacy beliefs and enhance academic performance.

Studies that have been conducted with school-age children have had varied outcomes. A study conducted by Barnett and Hixon (1997) focused on a sample of second, fourth, and sixth graders who were asked to predict test scores. Findings showed that the accuracy of self-assessment was largely dependent upon the context such as teacher, subject or task. The authors suggested future research to determine if young children can benefit from classroom instruction in metacognition. Also, Brookhart, Andolina, Zuza, and Furman (2004) conducted a study with third grade students who were learning multiplication tables. Students were asked to predict how they would do on weekly tests, and graph their predictions. They also were required to graph their actual results on the same chart. At the end of 10 weeks, the researchers found that student predictions became more accurate with time, although student prediction accuracy varied widely. The

authors concluded that in general, self-assessment strategies were beneficial to these students, although they also found it was context dependent.

The purpose of the present research was to explore the calibration accuracy of middle school math students. In addition, we investigated calibration accuracy in the context of a high-stakes test used for accountability purposes. We reasoned that if students are asked to predict their scores on high-stakes tests such as the Virginia Standards of Learning (SOL) and then reflect on their performance afterwards by postdicting their scores, they may consider their future needs with respect to effort and preparation for the exam and take responsibility for their own performance. Using a high-stakes test may especially encourage this kind of metacognition, as students' perceptions of the assessment task, their ability to accomplish it, and the reasons why they want to accomplish it, are especially potent (Brookhart, Walsh, & Zientarski, 2006). Asking students to calibrate their performance on these tests also may yield some diagnostic information for educators in terms of insight as to whether students feel they are prepared, and to what they attribute their calibration accuracy. This may lead to better future performance on these benchmark tests.

The research questions for this study were:

1. How accurately will middle school students predict and postdict their scores on the high-stakes, state-mandated SOL tests in sixth grade math?
2. What is the relation between middle school student achievement and calibration accuracy?
3. How do students explain their prediction and postdiction accuracy or inaccuracy on the SOL tests?

Method

Design

This was a non-experimental, descriptive study of middle school students enrolled in two regular and two honors math classes. The study employed both quantitative and qualitative data collection strategies. Calibration accuracy was determined by comparing predicted and postdicted scores to actual scores. We also examined if there was a difference between high and low performers in terms of calibration accuracy. Beyond asking students to predict raw scores, we also asked them to predict what category or range of scores (i.e., fail, pass, or pass advanced) they would achieve. Student explanations for their accuracy on their predictions and postdictions provided more in-depth qualitative data.

Participants

Participants included 6th grade students enrolled in math classes at a middle school in an urban middle school located in Virginia. A total of 968 students were enrolled at the school with demographics similar to those of the city demographics, with 67% African American, 21% White, and the remainder divided between Indian, Hispanic, and unspecified. The sixth grade students at this school were split nearly evenly between males and females (51% and 49%, respectively). Students in four classes were asked to predict and postdict their test scores on State

Standards of Learning Tests for Mathematics, 6th Grade. Classes 1 and 2 were regular math classes, and Classes 3 and 4 were honors level classes. Seventy-seven students participated; however, not every student made both a prediction and postdiction. This was most likely due to class absence on the day the predictions or postdictions were collected. Two teachers participated in the research.

Calibration Measures

The SOL test contained 50 multiple-choice items that were graded and 10 field test items that were not graded. Predictions of performance were collected on the day prior to taking the test. Using the Student Prediction Forms, students were asked to predict the number of items they expected to answer correctly out of the 50 test items. Item Response Theory (IRT), more specifically Partial Credit modeling (PCM) was used to convert raw scores to scale score and develop cut-off scores (Virginia Department of Education, 2008-2009). However, for our purposes, students were asked to predict/ postdict scores and ranges based on raw scores (the number correctly answered) which were easy for them to comprehend. Depending on the number of correct answers, students were categorized into one of three ranges: Fail (0 to 33 items correct converted to scale scores ranging from 0-399), Pass/Proficient (34 to 43 items correct with corresponding scale scores ranging from 400-4999), or Pass/Advanced (44 to 50 items correct with scale scores ranging from 500-600). Again, students also were asked to identify the category they thought they would achieve based on ranges for the number correct (raw scores) and not scaled scores, even though the state reports contain scaled scores derived from Partial Credit modeling (PCM). The form also contained an open-ended item asking students to explain why they predicted this score. Postdictions of performance were made as soon as practicable once the students finished taking the SOL in an examination room and were back in their classrooms. The same close-ended questions were posed. Students were then asked to reflect on the reasons they believed they were accurate or inaccurate in their predictions and postdictions.

Procedure

Teachers were given procedural instruction, and all forms were distributed and explained to the teachers prior to beginning data collection. The teachers explained the calibration procedure to the students in accordance with the instructions to help ensure standardization.

Students were instructed to write their first and last names, their teacher's name, and the date on the prediction and postdiction forms. This identifying information was removed as soon as the test results were reported. The forms were immediately collected and were not returned to the students. The teachers then gave them to the researchers who entered all data into a spreadsheet. When the results from the SOL Test were made available approximately 6 weeks later, the school district's research liaison entered the students' test scores on the spreadsheet, deleted identifying information, and returned the spreadsheet to the researchers.

Results

Test Scores

A total of 77 students participated in making predictions and postdictions, although not all students made both predictions and postdictions as they may have been absent on either day, and one class did not provide predictions. A one-way analysis of variance (ANOVA) was conducted to determine if significant achievement differences existed among the four classes. Student scale scores served as the dependent variable, and class number (1-4) served as the independent variable. The results indicated a significant difference among the classes, $F(3, 73) = 12.4, p < .01$, with class membership accounting for 34% of the variance of the scores. Post hoc tests using Tukey's HSD indicated a significant difference between the two regular classes and two honors classes. There were no significant differences between either the two regular classes or two honors classes. In standardized scores, a passing score (Pass Proficient) on the SOL Test ranged from 400-499; an Advanced Proficient score ranged from 500 – 600. As reflected below in Table 1, the students in the regular classes had a mean test score of 381.6, while students in honors classes had a mean score of 484.4. Because of the significant difference in scores between regular and honors classes, the descriptive results for prediction and postdiction accuracy are reported separately.

Table 1.

Mean Standardized Scores and Standard Deviations of Regular Classes and Honors Classes

Class	<i>N</i>	<i>M</i>	<i>SD</i>
Regular Math Classes	36	381.6	63.1
Honors Math Classes	41	484.4	80.7

Prediction and Postdiction Accuracy by Achievement Group

Descriptive statistics were used to evaluate student accuracy. Student accuracy was determined by the number of points student predictions and postdictions deviated from their actual score. For example, if a student guessed they would obtain a score of 35, and they actually received a score of 40, the difference is 5 points (absolute difference). Therefore, smaller numbers reflect greater accuracy. The first row in Table 2 shows the mean for all students, regardless of class membership. On average, the mean for all students was 6.8 for prediction accuracy, and 7.1 for postdiction accuracy. However, because there was a significant difference between achievement groups, descriptive statistics also are reported by type of class. Regular classes were less accurate with an average of about 9 points difference between their pre- and postdiction scores from their actual scores, while honors' classes were slightly more accurate with an average difference of about 5 points from both their pre- and postdiction and actual scores.

Table 2.

Descriptive Data for all Students

Group	Absolute Predictions			Absolute Postdictions		
	<i>N</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>
All	54	6.8	5.4	64	7.1	5.7
Regular Classes	16	9.5	6.4	30	9.2	6.7
Honors' Classes	38	5.6	4.6	34	5.3	4.6

To examine further the relationship between achievement and accuracy, we categorized all students across classes into two groups using a median split. The median score was 424 . There were 39 high achievers and 38 low achievers. The means and standard deviations of the absolute prediction and postdiction values are shown in Table 3.

Table 3.

Means and Standard Deviations for High and Low Achievers on each Calibration Strategy

Calibration Judgment	High Achievement Group > 424			Low Achievement Group < 424		
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>
Absolute Prediction	30	4.1	2.90	24	10.13	6.00
Absolute Postdiction	35	4.5	4.61	29	10.28	5.26

Both prediction and postdiction values show that higher achieving students were more accurate. The absolute values indicate that high achievers were generally within 4 points of their actual score, while the low achievers were within 10 points. Independent samples t-tests were conducted to compare the groups on prediction and postdiction accuracy. The results of the t-tests confirmed that these differences were statistically significant. The findings indicated that the difference in the means between high and low achievers on absolute prediction accuracy was significant (unequal variances assumed), $t(31.5) = -4.56$, $p < .01$. The difference in means between high and low achievers on postdiction accuracy was also significant (equal variances assumed), $t(62) = -4.68$, $p < .01$.

Signed Differences

Absolute scores consider only the number of points from the mean, regardless of negative or positive differences. Signed scores use both negative and positive numbers in the calculation, giving a better picture of over- or underconfidence. Negative scores represent underconfidence, while positive scores represent overconfidence.

On average, both regular and honors classes were overconfident in their predictions and postdictions (see Table 4), but the honors classes were much less overconfident with mean signed pre- and postdiction scores of 1.3 and .3, while regular classes had signed pre- and postdiction averages of 7.3 and 6.5, respectively. The regular classes were 6 points on average more overconfident than the honors' classes.

Table 4.

Signed Differences in Regular and Honors Classes

Predication and Postdiction Accuracy	<i>n</i>	<i>M</i>	<i>SD</i>
<u>Regular</u>			
Prediction Accuracy	16	7.3	9
Postdiction Accuracy	30	6.5	9.4
<u>Honors</u>			
Prediction Accuracy	38	1.3	7.1
Postdiction Accuracy	34	0.3	6.6

Calibration Accuracy and Overconfidence by Scoring Category

As described earlier, student scores were classified into one of three ranges determined by the Virginia Department of Education: Fail (0-33, scaled to range from 0-399), Pass/ Proficient (33-43, scaled to range from 400-499), and Pass/Advanced (44-50, scaled to range from 500-600). Students were asked to predict their scoring category or range based on the number they thought they would answer correctly. Table 5 shows the number and percentage of students that predicted and postdicted their scores would be in that range, and the number of students who actually had scores in that range.

Table 5.

Student Pre- and Postdictions of Score Ranges

Range	Prediction	%	Actual	%	Postdiction	%	Actual	%
Failure	4	6%	27	40%	2	3%	23	36%
Pass	28	42%	24	36%	31	49%	25	40%
Pass Adv.	35	52%	16	24%	30	48%	15	24%

Student range predictions and postdictions were inaccurate and reflect overconfidence. Students who received a failing score were especially overconfident in the predicting and postdicting these ranges. While four students predicted they would fail, 27 actually did. This same overconfidence was repeated with the postdictions, While two students postdicted they would fail, 23 actually did. Predictions and postdictions for students who believed they would attain scores in the pass advanced range indicated overconfidence as well: 35 students predicted advanced scores, but only 16 attained them; 30 students postdicted advanced scores, but only half that number actually scored in pass advanced range. The number of students who predicted and postdicted pass proficient scores was much closer to the actual number that was in that range, although overconfidence was again a factor. Twenty-eight students predicted pass proficient scores and 24 attained those scores; another 31 students postdicted pass proficient scores but only 25 obtained them.

Student Explanations for Calibration Accuracy

Open-ended questions on both the predictions and postdictions included student explanations of factors that contribute to their accuracy/inaccuracy, as well as explanations for any differences between predictions and postdictions. A coding scheme was generated based on the most common responses, and an “Other” category to include responses that did not fit into any of the other classifications.

Students answered the first question, “Why do you predict that you will get this score?” immediately following their predictions. These answers were coded into six final categories, as shown in Table 6.

Table 6.

Student Responses Regarding Basis for Predictions

Prediction Basis	<i>n</i>	Percent
Effort/Study	23	34%
Self-Evaluation	17	25%
Prior Test/Class Grades	14	21%
Easy/Hard Subject	9	13%
Other	5	7%
Total	68	100%

Most student responses were coded in the category of Effort/Study (38%), which reflected student beliefs that time they spent preparing for the test was related to how much effort they had put in to learning the material through the year in class or studying. A representative response for effort was: “Because I’m going to try,” or “Because I put a lot of effort,” indicating that students equate effort with achievement. Students also specifically said that their predictions were based on the premise that they studied, as evidenced by responses such as: “Because I been [sic] studying hard,” and “Because I studied for the test,”

The second category in which 25% of the responses were coded was termed Self-Evaluation. Students who responded with answers in this category seemed to believe that they knew enough about themselves and their abilities that they could accurately predict how well they would do on the test. A typical response for this category was “Because I know most of the stuff we covered this year,” reflecting metacognitive perceptions of knowledge, or “Because I’m a capable and confident learner,” reflecting metacognitive perceptions of self-efficacy. Interestingly, most students responded in a manner that suggested they believed they would pass the test, again showing overconfidence because 40% of students making these predictions failed. The few who indicated it was likely they would fail still attributed it to self-evaluation, “I don’t think I will do well but if I study then I could get 30-something right. Quite frankly I don’t know if I will.”

The third ranking category in which responses were classified was Prior Test/Class Grades, and it contained 20.6% of the responses. This category reflected the notion that future scores were based on past test or class grades. They seemed to believe that their future performance was related to their past performance. If they did well on previous tests they felt they would continue do well. “Because I usually pass with an advanced score.”

A total of 13% of the responses were coded into the fourth category, Easy/Hard Subject. Student responses in this category reflected student beliefs that they were good or bad in math, which indicates an external locus of control. Their explanations suggested that their scores on the test were outside of their control because they were either inherently good or bad in the subject. This

was differentiated from Prior Test/Class Grades because these students have developed an attitude about the subject that did not reference past grades or performance, although it may have at some point originated as a result of feedback such as grades. A frequent answer in this category was: “Because I’m good at most math,” or “Because I’m really not good in this subject.”

The fifth and last category was Other, with 7% of the responses. These answers were difficult to place in any of the other categories, and had such varied responses as: “Because I believe!” and “I take my time.”

After completing the SOL test, the next open-ended question asked students to explain why they thought their prediction was accurate or inaccurate. They were then asked to explain why their postdictions were accurate or inaccurate. Because the resulting responses and categories that emerged were so similar, the description of findings from these two questions were merged. The categories and results are summarized in Table 7.

Table 7.

Student Explanations for Accuracy at Postdiction

Explanation	<i>n</i>	Percent
Knew Number Right/ Wrong	19	20%
Expected Test Easier/ Harder	18	19%
Study/ Effort	18	19%
Confidence	15	16%
Past Grades/ Experience	10	11%
Other	10	11%
Don’t Know (about accuracy)	5	5%
Total	95	100%

The category receiving the most combined answers (20%) was “Know How Many Answers Wrong/Right,” and this was a common response from students who believed they were accurate or inaccurate in their pre- and postdictions because they felt they knew about how many questions they got right or wrong. A typical response in this category was: “Accurate, because I do know what questions I had problems with and the ones that was [*sic*] easy for me.” Many more students claimed that their predictions were still accurate; only two students claimed their predictions were inaccurate.

The next category was that the “Test was Easier or Harder than Expected” (19%). Many students were apparently surprised by their perspective of the test’s difficulty or simplicity. A

representative answer was: “Accurate because it was easy,” or “We guessed the test would be easier.” Many more students reported that the test was easier rather than harder than they expected, again reflecting overconfidence.

The category of “Study/Effort” also contained 19% of the responses. Students attributed their prediction and postdiction accuracy to being prepared because of the amount of effort they expended during the school year or the time they spent studying for it. This category reflects an internal locus of control. A typical student answer was: “Accurate, because I studied hard for the test and I know that I did well,” or “Because I learned a lot and did a lot of practice work.”

The next category was “Confidence” (16%). This category was reserved for responses in which students expressed confidence in their own abilities and a belief that they did well on the test. One answer that typifies this response was “I have a feeling in my guts and I am smart.” Another student expressed belief in his knowledge, “Because I know the stuff.”

Ten percent of responses were coded into the “Past Grades/Experiences” category. Students cited past scores on the SOL tests or class grades as proof they would perform similarly for the current SOL test. A typical response was: “Because I thought about my SOL grades in elementary school & they were close to the score I predicted.” Another wrote: “It was accurate because from all me [*sic*] grades.”

The category of “Other,” also contained 10% of the responses. There were several hard to code answers, such as “Because I took the test,” and “Cause [*sic*] I had my mind set on that” that really did not fit into any of the other categories.

The final category was “Don’t Know.” Five responses (5%) were coded into this group from students who were unwilling or unable to guess. Two answers that typified this were: “I don’t know really,” and “Inaccurate cause I don’t no [*sic*] if I did good or not by guess.”

Discussion

The research questions focused on how accurate middle school students were in their calibration attempts, what was the relation between accuracy and achievement, and how students would explain their calibration accuracy. The quantitative and qualitative responses shared a common theme of overconfidence. Student predictions and postdictions of their test scores, their score ranges, and their qualitative responses indicated that many more students thought they would do better or pass the test than actually did. There was clear relation between achievement group and calibration accuracy. Higher-achieving students were more accurate in their calibrations than lower-achieving students.

An interesting finding with respect to calibration accuracy was how similar the results from the present study were to studies of college-age students (e.g., Bol et al., 2001, 2005; Hacker et al., 2000, 2008). In these studies, researchers also found that higher-achieving students were more accurate in their predictions than lower achieving students. Koku and Qureshi’s findings (2004) also support the present results. High performing students are more likely to metacognitively realize the capacity of their knowledge, while lower achieving students have limited insight.

However, the present results differed from some previous studies (Bol et al. 2001, 2005; Hacker et al. 2000, 2008) in that all students were overconfident. Typically, overconfidence had been shown only by lower-achieving students, but in the present study, higher-achieving students also were overconfident.

One implication of the present findings is that students' ideas of their own self-efficacy and learning ability likely form prior to 6th grade, and if calibration interventions to increase student self-regulation are done earlier, student beliefs about their own self-efficacy could be improved. Brookhart et al. (2004) demonstrated that this was possible with third grade students, who did show an increase in calibration accuracy after weeks of practicing and graphing their results (2004). If third graders can learn to be better self-regulators, this may also be true for middle school students.

Another implication is related to overconfidence, which was especially pronounced among lower achieving students. Koku and Quereshi (2004) reasoned that a student who is overconfident may just pick an answer they believe is correct without sufficiently examining all of the answers. If this is true, then early intervention strategies involving calibration may also reduce student tendencies towards overconfidence through practice.

Unlike some findings reported elsewhere (e.g., Bol et al., 2005), postdiction accuracy for middle school students was not much different from prediction accuracy. As Hacker et al. suggested (2000), students under "complex memory demands" may use their predictions as the basis for their postdictions. Considering that these students were required to take, in most instances, more than one high-stakes test over a period of weeks, or in some cases days, this hypothesis may be supported by the current findings. Another explanation may be that the Standards of Learning test is only taken once a year and students do not have as much experience calibrating their judgments for it. Inaccuracy in calibration was particularly evident when predicting score categories or ranges.

In addition, student qualitative answers were illuminating. Many students attributed grades and achievements to internal factors as seen in responses that attributed scores to study, effort and self-evaluation, and external factors as seen in responses that attributed scores as a result of the test itself being too hard or harder than they expected. These findings are similar to Hacker et al.'s (2008) results obtained from college student responses to their Attributional Styles Questionnaire. Attributional styles were dependent on performance level. For higher-achieving students, attributional style did not explain a significant portion of the variance beyond exam scores. In contrast, attributional style did explain a significant portion of the variance for lower-achieving students. The authors suggested that although the findings were correlational, low performers' judgments of performance may be more susceptible to their beliefs about their own performance than high performers.

Limitations and Directions

There were limitations associated with the present study. As previously mentioned, students may have been unduly stressed because of the end-of-year testing cycle in which they took more than one test in most cases. This may have caused them to rely on predictions as the basis for

postdictions. There were also many cases where students did either predictions or postdictions, rather than both, as they may have been absent on the day that this data was collected, or they may have chosen not to participate. The teacher of one class did not collect the student predictions as instructed. Finally, the sample size was low, limiting external validity.

As indicated in earlier studies (Bol et al., 2005; Hacker et al., 2008), lower performing college students may have persistent beliefs about their own performance that contribute to their calibration accuracy and performance. It would be fruitful to conduct follow-up research with the middle school students to determine whether calibration accuracy is resistant to change at this age or whether interventions might improve their accuracy, and therefore metacognitive skills, before their beliefs become persistent or stable. Rather than focus on end-of-year tests, intervention studies might better focus on practice strategies and calibration across repeated trials.

References

- Bandura, A. (1989). Human agency in social cognitive theory. *American Psychologist*, *44*, 1175-1184.
- Barkley, J. M. (2006). Reading education: Is self-efficacy important? *Reading Improvement*, *43*, 194-210.
- Barnett, J. E. & Hixon, J. E. (1997). Effects of grade level and subject on student test score predictions. *The Journal of Educational Research*, *90*, 170-174.
- Bol, L. & Hacker, D. J. (2001). A comparison of the effects of practice tests and traditional review on performance and calibration. *The Journal of Experimental Education*, *69*, 133-151.
- Bol, L., Hacker, D. J., O'Shea, P., & Allen, D. (2005). The influence of overt practice, achievement level, and explanatory style on calibration accuracy and performance. *The Journal of Experimental Education*, *73*, 269-290.
- Brookhart, S. M., Andolina, M., Zuza, M., & Furman, R. (2004). Minute math: An action research study of student self-assessment. *Educational Studies in Mathematics*, *57*, 213-227.
- Brookhart, S. M., Walsh, J. M., & Zientarski, W. A. (2006). The dynamics of motivation and effort for classroom assessments in middle school science and social studies. *Applied Measurement in Education*, *19*, 151-184.
- Butler, D. L. & Winne, P. H. (1995). Feedback and self-regulated learning: A theoretical synthesis. *Review of Educational Research*, *3*, 245-281.
- Chen, P. & Zimmerman, B. (2007). A Cross-National Comparison Study on the Accuracy of Self-Efficacy Beliefs of Middle-School Mathematics Students. *The Journal of Experimental Education*, *175*, 221-244.

- De Carvalho-Filho, M. K. & Masamichi, Y. (2001). The effects of social cues on confidence judgments mediated by knowledge and regulation of cognition. *The Journal of Experimental Education*, 69, 325-343.
- Dembo, M. H. & Eaton, M. J. (2000). Self-regulation of academic learning in middle-level schools. *The Elementary School Journal*, 5, 473-490.
- Hacker, D.J., & Bol, L. (2004). Metacognitive theory: Considering the social influences (pp. 275-297). In S. Van Etten & D. McInerney (Eds.), *Research on sociocultural influences on motivation and learning*. Volume 4, Big Theories Revisited. Greenwich, CT: Information Age Press.
- Hacker, D. J., Bol, L., & Bahbahani, K. (2008). Explaining calibration accuracy in classroom contexts: The effects of incentives, reflection and explanatory style. *Metacognition and Learning*, 3, 101-121.
- Hacker, D. J., Bol, L., Horgan, D. D., & Rakow, E. A. (2000). Test prediction and performance in a classroom context. *Journal of Educational Psychology*, 92, 160-170.
- Koku, P. S., & Qureshi, A. A. (2004). Overconfidence and the performance of business students on examinations. *Journal of Education for Business*, 79, 217-224.
- Lin, L. L., & Zabrocky, K. M. (1998). Calibration of comprehension: Research and implications for education and instruction. *Contemporary Educational Psychology*, 23, 345-391.
- Maki, R. H., Shields, M., Wheeler, A. E., & Zacchilli, T. L. (2005). Individual differences in absolute and relative metacomprehension accuracy. *Journal of Educational Psychology*, 97, 723-731.
- McMillan, J. H., & Hearn, J. (2009). Student self-assessment: The key to stronger student motivation and higher achievement. *The Education Digest*, 74, 39-44.
- Mok, Y. F., Fan, R. & Pang. (2007). Developmental patterns of school students, motivational and cognitive. *Educational Studies*, 33, 81-98.
- Pintrich, P. R. & Schunk, D. K. (2002). *Motivation in education: Theory, research, and applications* (2nd ed.). Upper Saddle River, NJ: Merrill/Prentice Hall.
- Virginia Department of Education (2008). *Virginia Standards of Learning technical report: 2008-2009 administration cycle*. Richmond, VA: Author.

**“You really did some thinking about your real life, didn’t you?”
Talking With Students About Books and Race**

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Abstract

This article reports on the discussions of race by third-grade students after reading a work of fiction. The study took place in two third-grade classrooms in the context of the read aloud, a popular instructional format in elementary classrooms. The aim of the study was to describe the nature of discussions regarding race and to examine teacher-student perceptions of these discussions. Results showed that children were much more comfortable talking about race than were their teachers. Along with teacher and student perceptions of discussions, our work underscores the value of content-oriented book discussions, oral and written activities, and follow up assignments as essential elements to the read aloud.

In an increasingly global and diverse society, teachers can serve as key change agents in promoting meaningful dialogues with students about sensitive issues such as race. Teacher-led book discussions offer opportunities for students to exchange ideas through the comprehension and interpretation of issues related to the topic of race in the curriculum (Cole, 2003; Eeds & Wells, 1989; Wolk, 2004). Teachers must be willing to venture beyond personal fears and neutral boundaries (Dresang, 1999; Rudman, 1995; Tomlinson, 1995) to discuss, explore, and learn about race-related matters in an age of political correctness and shifting community norms. On the subject of sensitive issues, McBee (1996) found that:

Lower grade teachers [2-5] often do not feel properly trained or prepared to address such issues, and they are reluctant to engage in teaching subjects that, they feel, will take up valuable instructional time and lead to a loss of control over classroom behavior. Some are afraid of repercussions from parents or their administrators while others question their ability to present controversial material from a neutral perspective. (p. 1)

Discussions on race seldom happen in elementary schools and are frequently censored at the secondary level (Fine & Weis, 2003), an unfortunate circumstance given that the curriculum offers many venues for the exploration of the topic. For instance, contemporary children’s literature can be an ideal catalyst for candid text discussions about race and other sensitive topics. Several quality children’s books on race (Appendix 1) provide an ethical and moral framework in which to bridge cultural divides and correct misconceptions students may have regarding racial issues.

The aim of the present study was two-fold: (1) to examine and compare the nature and types of interaction between and among teachers and students during a book discussion on race and (2) to investigate students’ social cognition regarding race as expressed orally and in writing immediately following daily and end-of- book readings. This study was part of a larger one that

investigated book discussions on sensitive issues in the context of the organized event known as read aloud (Renwick, 2008). According to Fisher, Flood, Lapp, & Frey, the interactive read aloud is a literacy event in its own right and includes considerations of 1) text selection, 2) class organization, 3) reader preview and practice, 4) introduction of the book and explanation of its purpose, 5) discussion of content, and 6) independent reading or writing follow-up (Fisher, et. al, 2004).

A read-aloud experience involves a knowledgeable adult reading a book and discussing it with the students during and/or after the reading. Most scholars view read aloud as having multiple purposes: a way of reading for enjoyment and fostering a love of literature/reading; a way of promoting a variety of literacy skills such as vocabulary, content and comprehension and the sounds of print; and as a way of transforming student experiences particularly when students question assumptions and emotional and social expectations in the text (Duke & Kays, 1998; Fisher, Flood, Lapp, & Frey, 2004; Goldenberg, 1992/1993; Lickteig & Russell, 1993; Smolkin & Donovan, 2001; Stahl, 2003).

We took stock of these considerations in our observations, but focused primarily on how teachers and students in two different classrooms negotiated and critically reflected on the topic of race during discussions within the read-aloud event. It was hoped that if teachers scaffolded and facilitated a thoughtful and productive discussion of race, students might be challenged to embrace new perspectives, consider broader views of the subject, and communicate with others by lending voice to social issues.

A Conceptual Framework for the Study

For young children, read aloud invites them to explore alternative views by externalizing beliefs and attitudes in an interactive and dialogic context of rich literary experiences, in this case, those related to race and ethnicity. During interactions with the teacher and peers, they can challenge previous assumptions, acknowledge other's views, and become more aware of social justice and cultural issues (Banks, 2002).

Rosenblatt's transactional theory (1995), which accounts for reader's stances toward a text, offers the elementary teacher a way to encourage learners to go beyond carrying away only information from the text (efferent) or reacting only to personal, lived-through experience evoked by text (esthetic) but also to apply, extend, and illuminate text from a critical perspective and, in so doing, transform knowledge (Cai, 2008; McLaughlin and DeVogd, 2004; Yenika-Agbaw, 1997).

Teacher scaffolding provides the academic support to enable students to learn new material and negotiate text (Wood, Bruner, & Ross, 1976). What teachers select to discuss about race and how they frame their questions about it is integrally related to the way the text's theme is developed and how it highlights certain content and features. Texts, in particular, can be used to integrate content learning and advance knowledge building with reading instruction to promote thinking (Palincsar & Duke, 2004). To this end, educators attend to the integral role that text plays in determining the type and nature of interactions (Armbruster, 1996; Barr, 1987; Bradley & Johnson, 2007; Wenger, 1998). Wenger (1998) underscores this point by stating, "Having a

tool [book] to perform an activity changes the nature of that activity” (p. 59). Sipe’s research (2000) shows that during read aloud children demonstrate ability to interpret and process text on several levels including dealing with the text as an object for analysis and interpretation, relating texts to other texts, and connecting texts to personal life. Any explanation of book discussions, therefore, must include an examination of self and experiences through the interaction of reader, teacher, text, and students.

The lessons found within books can create far-reaching lifestyle changes that go beyond mere comprehension. Change has been a continual theme in literacy research. Vygotsky (1999) long believed that change occurred first on the social level and then on the personal level. As he stated “Each function in the child’s development appears twice on two levels: First, on the social, and later on the psychological level; first, between people as an interpsychological category, and then inside the child as an intrapsychological” (Vygotsky, 1999, p. 128). Moreover, Vygotsky showed that higher levels of learning took place when students collaborated verbally and exchanged ideas.

Piaget (1936; 1963) explained the role of change in terms of a disorienting situation or conflict that created dissonance or disequilibrium and this, in turn, sets in motion a need to balance knowledge through accommodation and assimilation. Transformative or conceptual change is about making sense of experiences and grappling with them through perspective sharing and becoming critically aware of one’s existing assumptions, biases, and taken-for-granted beliefs (Freire, 1970; Mezirow, 1991). If experience shapes beliefs and values, then applying knowledge to one’s life while learning from and with others can be a transformative experience (Mezirow, 1991).

Cognitive and Social Development of Racial Attitudes

“Race is a socially constructed term that presupposes psychological, social, cognitive, and affective differences across racial groups which are attributed to genetically or biologically based racial differences, even though the scientific basis for these differences have been criticized” (Quintana, 1998; p. 28). Racial scholars argue that racial differences “do not develop even when there are visible, physical differences between people unless there is a context that interprets those differences as meaningful” (Eberhardt & Goff, 1996; p. 228). Aboud & Doyle (1996) consider racial discrimination as “a predisposition to respond in an unfavorable manner to members of a racial group” (p. 161). Children learn prejudice from parents and other socialization agents such as media, friends, and siblings (Allport, 1954).

If race is a social, historical, and political phenomena, it is also true that it has a cognitive component as well. A cognitive Piagetian framework considers how children must come to recognize diversity before attaching values to it. “Research suggests that knowledge of the breadth and implications of gender and racial stereotypes emerges around age six and increases with age” (p. 540), and . . . by age ten, children can recognize discriminatory actions that are both overt (e.g., name calling) and covert (e.g., being suspected of wrongdoing), understand that these actions may be caused by others’ social stereotypes, and use contextual information to make decisions about whether discrimination is likely to have occurred” (Brown and Bigler, 2005, p. 535).

According to Hirschfield (1995), three, four, and seven year olds already understand cognitive aspects of race and know, for instance, that concepts of differentiation means that a person's skin color does not change with growth. Hirschfield (1995) also questions children's abilities for understanding immutability – racial identity constancy. This is a cognitive understanding in which being black doesn't mean resembling a parent but is inherited and doesn't change. At particular stages, children can sort and categorize according to biologically controlled properties, specifically physical features (Aboud, 1988; Clark & Clark, 1940; Katz, 1982; Vaughan, 1987; Ramsey, 1987). Preschoolers, in fact, may see color as a result of tanning or change of dress as a change of identity (Ramsey, 1987; 1991).

Current thinking on the topic of race presumes both a social and cognitive perspective. One social cognition model integrates the social variables with cognitive development of children's understanding of ethnicity and race (Quintana, 1998). Quintana outlines the progression of racial understandings from physical to literal to social descriptions and identifies social and cognitive features (social cognition) in four levels broken down into age ranges: Level 0, (early childhood), Level 1 (childhood), Level 2 (youth), Level 3 (adolescence) and Level 4 (adulthood). Within this scheme, the responses of the third-grade students in our study would fall developmentally within the approximate age ranges of late Level 0 [6 yrs.], Level 1 [6-10 yrs.] and Level 2 [10-14 yrs.].

Level 0 is a time when young children form attitudes about race, before they are even aware of social evaluations and judgments. Rather they base these attitudes on observations and perceptions. Because of their dichotomous thinking and limited socialization into society they may show a color preference (e.g., a human tendency to be diurnal rather than nocturnal) or a propensity toward cultural messages (e.g., folklore that is pro-White; anti-Black). Children at this age are more apt to make stereotyped over-generalizations of their preferences but seem to be more inclined to make meaning and sense of race (permanence) without attributing racial differences to ethnic prejudice.

In Level 1, racial bias declines as children hold more complex and integrated views of racial groups, become aware of individual differences and recognize similarities. Children's definitions of race correspond much more closely to definitions commonly used by adults. They are more mature in key cognitive skills. In making the Piagetian transition from preoperational to concrete operation, they are able, with increasing ability, to consider dual perspectives or understand the permanence of racial status despite superficial external appearances. With more sophisticated conceptions of social groups, they may refer to ancestral origin as determining racial status (if you are Black your parents are Black) or mention non-observable biological characteristics of race (e.g., ethnic food, activities, and language). Children attend to literal features and shift focus from group differences to focusing on individual differences that occur in ethnic groups. At this level, children believe external appearance may not be good indicators of internal psychological characteristics (e.g., rich earn money and poor are lazy) yet they still have difficulty understanding prejudice and may be troubled by experiencing or witnessing it. They may also have misconceptions about racial permanence and social implications believing that ethnic status may change if adopted by parents of different races.

Level 2 is a less well-studied stage with emphasis on social features including emotions, cognitions and role-taking ability. Nevertheless, it reflects the social perspective of ethnicity not just objective knowledge as in Levels 0 and 1. While still aware of social realities associated with ethnicity (social class, formation of friendships), children recognize it has consequences for forming friendships and group relations and they begin to understand nonphysical cues of race such as socioeconomic status. These new understandings have significant social implications for comprehending that prejudice does exist.

Methodology

We selected a qualitative design to study book discussions about race since the emphasis was on exploring relations and interactions among teachers, students, and books. Given that the focus of observation was group interaction rather than individuals, the conversation of students and their teachers in two intact third –grade classrooms served as a case (Stake, 2008). Our study used multiple forms of data, with an emphasis on oral and written data to provide insights into two questions:

1. What is the nature of interactive text-based discussions about race based on two third-grade classes serving as cases?
2. How can oral and written responses, as reflected in the discussions, written reflection forms, focus groups, interviews, and writing samples, provide a window into children’s socio-cognitive development of race?
- 3.

The linguistic data analyzed were: (1) types of teacher-student and student-student interactions before, during, and after book discussions, (2) student and teacher written reflections immediately after critical chapters, (3) student focus groups and teacher interviews following completion of the entire book, and (4) pre-and post-essays.

Site and Participants

The school chosen for this study was a Title 1 K-5 racially and culturally diverse public school in the Florida Panhandle. The school was one not randomly chosen but available to the researchers. The school had a demographic population of 57% African-American students, 31% Caucasian students, and 12% other minority students with a combined total of 625 students. 70% of its students qualified for free or reduced lunch.

The overall design of the school site included a variety of learning environments. Our study took place in one self-contained classroom and one semi-open classroom that shared planning and storage areas. Two third-grade teachers, Ms. McCaffey (Ms. M.) and Ms. Bellamy (Ms. B.) (pseudonyms) and their classes of 12 students each participated in the project. Each study classroom reflected the school’s population and was equally balanced for gender and free-lunch count; both, however, had a higher percentage of African Americans as shown in Table 1.

Table 1.

Demographic Information

Classrooms	Gender			Ethnicity			
	Female	Male	Total	White	Black	Other	Total
Ms. M's Students	6	6	12	2 (16.7%)	9 (75%)	1 (8.3%)	12
Ms. B's Students	6	6	12	2 (16.7%)	8 (66.6%)	2 (16.7%)	12
Total	12	12	24	4	17	3	24

Selecting Books

We next went through a process of selecting the book for the classroom teachers to use as the read aloud text with the students. The professional literature guided our search for developmentally appropriate books for children ages 8-12 on the topic of race. We gave primary consideration to award-winning books (American Library Association's Best Books for Young Adults; ALA, 2005; Jane Addams Children's Book Awards, 2006; and the Chapman Awards for Best Classroom Read-Alouds, 2004) and recommended titles that followed Tu's criteria (1999) of quality literature. Books considered also had to be considered high interest for children, be of suitable length for the study, and connect to district and school standards. Given these guidelines, our choice of *Crossing Jordan* by a local author, Adrian Fogelin (2002).

Each of two classes of third-grade students listened to their teachers read aloud the twenty chapters of *Crossing Jordan* over the course of fifteen weeks; fourteen sessions in Ms. M's class and sixteen sessions in Ms. B's. Teachers allocated twenty to thirty minutes for each session with a range time engaged to twenty-thirty minutes. A book discussion followed each read-aloud session and centered on the day's reading. Audiotapes captured interactions before, during, and after book discussions for a total of 540 minutes

Data Collection

The following data were collected in this research study: a specifically designed instrument created to capture interactions during the observations of book discussions, written reflective forms for the study participants, interviews and focus groups, and pre-post-essay prompts. We summarize each and discuss our analysis.

Observations Using the Initial Coding Elements (ICE) Form

We developed an Initial Coding Elements (ICE) form to code general patterns of interaction. We identified three interrelated coding areas, based on the work of Cochran-Smith (1984) and Sipe (2000):

- *Text-Based Interactions*: literal, inferential, and evaluative statements along with text comparisons.
- *Personal Interactions with the Text*: statements regarding life experiences, personal opinions, and value judgments.
- *Societal Interactions with the Text*: statements including moral interpretations and cultural sensitivity as it related to race and social justice.

Members of the research team tallied (on ICE) the number, types, and percentages of text-based, personal, and social interactions during book discussions of all chapters. We used ICE solely to determine the form and function of questions and statements or the “how” of constructing race among participants.

To describe the content of the discussion, we examined thematic patterns across the ICE forms using a critical chapter in the book. A critical chapter was one that included the topic of race as part of the theme and was crucial to the climax (conflict) or unfolding resolution of the novel. The critical chapter selected for *Crossing Jordan* was Chapter 15: Missy Bodine [the baby sister] comes down with heat prostration. Cass Bodine, realizing that something is terribly wrong with her sister Missy, runs next door to get Mrs. Lewis, an African-American nurse, to save Missy’s life. Now Missy’s dad [Mr. Bodine] has to reconcile his feelings about African-Americans, given that Mrs. Lewis has just saved his baby’s life. In this chapter one feels the emotions of anxiety, relief, and racial apprehension as the adults in the two families begin to relate to each other for the first time. As such, we predicted that this chapter would have the most communicative interactions in the social interactions column on ICE. To that end, we prepared a transcript of the talk that took place during Chapter 15 and did a content analysis using the constant comparative approach (Glaser and Strauss, 1967) to identify emerging patterns of racial content. Preliminary findings showed that seven content themes (including an “other” category) surfaced in the initial analysis of teacher talk including statements about narrative elements (e.g., characters, setting, plot), reading skills, discipline, friendship, and explicit and implicit reference to race. Student topics overlapped those of the teacher with the addition of making connections to life experiences.

Written Reflective Forms

Following the reading of select chapters, students completed written reflective forms to shed light on the discussion. The written reflection forms contained the following prompts for each chapter: (1) What do you remember about today’s book discussion? (2) Now, look at your answer for question number one. Underline the part of your answer that you feel is the most important, and (3) Did you say anything in today’s discussion? If the answer is yes, tell me what you said. If the answer is no, tell why you did not say anything. Teachers answered similar reflection prompts to triangulate student data and offer a member check.

Student Focus Groups and Teacher Interviews

At the completion of the entire book, researchers organized student focus groups to gather additional information about race discussions. Some of the questions included: What did you think about the book your teacher read? What did you feel was the most important part of the book? Is there anything you didn't like about the book? Tell me about the book discussions that you had. Did you enjoy them? Why or why not? Did they add to the meaning of the story? Were you an active participant in the discussions? Were you able to make personal connections to the book? In what ways? Do you think this book should be read to future classes? Why? Why not? If your teacher were to read this book to another class, what suggestions do you have to improve the read aloud and book discussion?

At the end of the study, the researchers interviewed teachers about the book selection, whether they would read the book again to future classes, if they'd do anything differently, what parts of the book students liked best, what they believed were critical chapters, what they thought of book discussions and if they felt all the students had a chance to make personal connections to the book and do independent reading and writing.

Pre-Post Essays

To get a broad measure of children's background views on race before and after reading the book, the research team administered and scored identical pre-and post-discussion essays. The pre-and post- essay prompt was: "What would happen if you were told that you couldn't play with someone just because s/he was a different color than you are?" The prompt was asked as a pointed question to target students' knowledge about the specific issues rather than open-ended statements that might measure quality writing skills (Brossell & Ash, 1984; White, 1994).

To triangulate content data, we also examined students' explicit and implicit views of race using a primary trait rubric, a form of holistic scoring that "... determine[s] whether a piece of writing has certain characteristics or primary traits that are crucial to success with a given rhetorical task" (Lloyd-Jones, 1977, p. 32). In this case it was the explicit and implicit references to race found in the book. Each essay had the possibility of a score from 0-4 with 0 being the lowest score and 4 being the highest. Two independent raters scored all essays at the end of the study against a rubric and anchor papers and we established interrater agreement. We removed names of students and neither the researcher nor the reader knew whether the writing was a pre-or-post sample.

Results

Interactions and ICE

We taped, transcribed, and coded (using ICE) each of the teacher's book discussions across all chapters. Interrater agreement for Ms. M's interactions was 94% and for Ms. B's, 90%. We present number of responses and percentages for the critical chapter in Table 2 for Ms. M. and

Table 3 for Ms. B. These results of the critical chapter of *Crossing Jordan* represent similar findings across all the other chapters.

Table 2.

Number and Percentage of Responses from ICE form for Chapter 15 in Ms. M's Class

Code Sidebars	Ms. M		Students	
	n	%	n	%
Text-based	42	(62.7)	24	(66.7)
Personal interactions	4	(6.0)	6	(16.7)
Societal interactions	-	-	2	(5.5)
Off-topic interactions	21	(31.3)	4	(11.1)

Note: The dashes indicate a lack of response in that area.

As we show in Table 2, the majority of Ms. M's questions fell into the ICE category text-based with 20 of the 42 statements, literal rather than inferential or evaluative. For example, she asked, "Ok, thus far in the chapter, what happened to Missy?" Student participants responded 67% of the time with literal, text-based statements in answer to these types of direct questions.

Table 3.

Number and Percentage of Responses from ICE form for Chapter 15 in Ms. B's Class

Code Sidebars	Ms. B		Students	
	n	%	n	%
Text-based	49	(61.2)	23	(54.8)
Personal interactions	6	(7.5)	16	(38.1)
Societal interactions	2	(2.5)	3	(7.1)
Off-topic interactions	23	(28.8)	-	-

Note. The dashes indicate a lack of response in that area.

Table 3 shows that Ms. B. also asks a majority of text-based questions and students answer accordingly, with 16 of the 20 statements, literal. For example, the teacher asks: "Who remembers how she [Missy] got heat prostration?" And a typical student answer might be "The baby was overheated."

In the personal category, far fewer in number, most of Ms. M's questions call for inferential responses that implicitly require a personal reaction or opinion: "Boys and girls, what do you

think is going to happen with the daddy right now? He's coming home and he sees Jemmie's mom holding Missy." Accordingly the students' statements are personal feelings or opinions: "She [Lou Anne] feels so bad that she was worrying about her boyfriend instead of caring about her sister [Missy]." Ms. B's personal statements focused less on opinions and more on life experience questions pertaining to the students: "So you really did some thinking about your real life, didn't you?" Student replies included: He's gonna think that there's something wrong with his family and he's going to be scared to death; He's gonna think that Jemmie's mom did something to her. Such questions seemed to free students to say more since they could draw on personal experiences.

Finally in Ms. M's class, we observed only two responses in the societal category. One was a moral interpretation, "He's going to apologize for all the mean things that he said;" the other dealt with cultural sensitivity, "He [Mr. Bodine] might see that the black person is nice." Ms. B's societal interactions were also low in number but underscored moral values about race ("Yes, because he [Mr. Bodine] doesn't like black people. But boy was he happy that she [Mrs. Lewis] was a nurse and that she saved their baby's life"). Student responses again reflected the teacher's comments.

Racial Content of Book Discussions

If ICE revealed few comments in the societal category in both classrooms, a different picture emerged when we further analyzed explicit and implicit content about race. Table 4 (Ms. M's class) and Table 5 (Ms. B's class) shows the number of explicit and implicit responses and their corresponding percentages. The interrater agreement for these coding was 90.6% for Ms. M. and 92% for Ms. B.

Table 4.

Number and Percentage of Explicit and Implicit Statements for Ms. M. and Students for the Book Discussion Chapter 15

Teachers & Students	Explicit statements		Implicit statements	
	n	%	n	%
Ms. M	-	-	13	(19.4%)
Students	2	(5.6%)	10	(27.8%)

Note: The dash indicates a lack of response in this area.

Table 5.

Number and Percentage of Explicit and Implicit Statements for Ms. B. and Students for the Book Discussion Chapter 15

Teachers & Students	Explicit statements		Implicit statements	
	n	%	n	%
Ms. B	3	(3.8%)	14	(17.5%)
Students	3	(7.1%)	5	(11.9%)

Note: The dash indicates a lack of response in this area.

Table 4 shows that when we combine the percentages of explicit and implicit statements for Ms. M. and her students, we see that race statements comprise more than 50% of the total. Thus, much of what was interpreted as literal, text-based interactions during the initial observations, upon further analysis appeared to be implicit questions about race. Furthermore, the number was much higher than the other chapters because of the nature of the critical chapter and its direct emphasis on race.

Table 5 shows that, just like in Ms. M's class, Ms. B. and her students discussed the issue of race far more than indicated on ICE (40% of the total statements). Whereas Ms. M. used comparable amounts of explicit and implicit statements (40.3% and 52.8% respectively), Ms. B. and the students made slightly more explicit statements. It is interesting to note that neither the veteran teacher Ms. M. nor the novice teacher Ms. B. showed any significant differences in either the amount of explicit and implicit talk about race nor the forms of questions asked on ICE.

Written Reflections

In Ms. M's class, three students participated in the discussion of the critical chapter but most did not. Two said they just didn't want to; four didn't have anything to say, one didn't think she had the right answer, and one student said, "I did not because it [the discussion] was interesting." One student just wasn't sure if he had participated.

Eight students reported participating in the discussion in Ms. B's class. Four students said they didn't because they could not think of anything to say or because their comment was "stolen by someone else."

When asked what they remembered about the discussions, the students in both classes answered similarly. In Ms. M's class none wrote about race directly. When asked to underline one of the statements they thought was the most important, only one student implicitly referred to race: "The mom [Mrs. Lewis] and dad [Mr. Bodine] are sitting in the truck by each other." Four students thought that Missy's illness was a key point: "I remember that the baby almost died and I felt like I would cry." The remaining students were off-topic and wrote comments such as "I remember Jemmie." In Ms. B's class, students reflected on friendship or on the running competition but seldom talked about race. Nine of the students wrote about Missy's heat

prostration, one commented on Andy getting his face scratched, one wrote about a friend's family member that had heat prostration and another wrote that he was in time-out. In fact, Ms. B. commented, "I was very disappointed in our discussion. It was a very long chapter and critical to the characters' change of heart. The students were hot and tired, so they zeroed in on the funny parts."

Not surprisingly, when asked what students remembered about the discussion, the choices mirrored what the teacher stressed and believed significant, thus, conflating the data about what students knew and how they felt about race. For instance, if the teacher spent time focusing on Missy's heat prostration, the student might answer a question about Missy's heat attack. If the teacher mentioned Mr. Bodine thanking Mrs. Lewis for helping to save his child, the students might say, "Mr. Bodine, the man said, "thank you." Thus, while the teachers made implicit comments about race to literarily map the text, these comments seemed to greatly influence student response.

Pre-Post Essays

The pre-post-essays provided data for understanding students' views of race before and after the read aloud. On the pre-discussion essays four students in Ms. M's class scored a 3 or 4 (seven students had a "2" and one student a score of "1"). On the post-discussion essays, six students had a score of "3 or 4"; four students had a "2"; and two students had a "1". Eight of the students' scores did not change from the pre-to post-test; three showed a gain of one point, and one had a loss.

There were 12 students that completed the pre-post essays in Ms. B's class. On the pre-test, ten students scored a three or four, two students received a score of two. On the post-discussion essays nine students had the same score, one showed a gain, and two showed a loss.

We coded the essays for explicit and implicit patterns and, on the pre-discussion essay, students in Ms. M's class addressed race directly or indirectly in at least 22 of 28 sentences. Eleven wrote *either* an explicit statement or an implicit statement while one student wrote *both* types of statements. On the post-discussion essay, the total number of sentences 33, thirty-two sentences contained the issue of race with either an explicit or an implicit statement. Twelve students wrote *either* an explicit or an implicit statement, with four students' essays containing *both* types of statements. Examples of typical race statements included: "I would be very disappointed because I have three black friends and they are very nice to me and if I could not play with them my life would be different. If I could not play with them I would be sad" or "I would be so mad that I can not play with a white person. But Martin Luther King Jr. said that you have to treat others the way you get treated. I would get so mad at my mother. I would say why couldn't I play with white people. It will be so sad to not let a white person play with me. And I would tell here that she is so mean to all whites. But it should be a right that you play with a white."

Similar findings occurred in Ms. B's class. On the pre-discussion essay, the students in Ms. B's class wrote a total of 56 sentences, 91% of which contained an explicit or an implicit reference to race. Every student wrote *either* an explicit or an implicit statement in his or her essay. Nine students wrote *both* types of statements. On the post-discussion essay, Ms. B's students wrote a

total of 51 sentences with 91% of those sentences containing either an explicit or an implicit statement on race. Although not explicitly discussing race in discussions, students had lots of opinions about race as exhibited in their essays: “My parent said I can’t go with a white boy to be my friend. I will sneak out to go see my friend;” or “If I could not play with them I would be sad. Glad I wasn’t there back when whites were separated from blacks. If I was alive back then my life would be more sad and there would be a difference in my life. I would want equal rights if I were alive back then, I would be like Martin Luther King Junior.”

In a nutshell, while students in both classes did not necessarily offer deeper insights into race from pre-to post, their essays did make visible opinions and experiential information about race that was not expressed in book discussions.

Student Focus Group

Another space for students to voice opinions and understandings of race was in focus groups. For instance, when the researcher asked the students of Ms. M’s class what they felt was the most important part of the book, they overwhelmingly made explicit references to race such as: “I think that the most important part of the book is that they [Jemmie and Cass] got to be friends because their two parents actually got along at the end of the story and they actually made a good like club cuz of their colors—black and white,” or “I think the most important part of the story is that at the end of the story the dad said, he said black people aren’t that bad to white people and he said I shouldn’t be a racist because I didn’t even know them. And I was talking stuff about them and he finally met them and said dang they’re nice people.”

What was most telling about the framing of responses in focus groups was the candid and straightforward way students voiced opinions, using vocabulary strikingly unlike what was displayed in the book discussions.

Like in Ms. M’s focus groups, Ms. B’s students discussed their views of race frankly and honestly with the researcher. An interchange among five students in Ms. B’s class show this:

Student 1: He sorta didn’t like them because they were black.

Student 2: He’s jealous-because he was taught not to like black people and to treat black people bad.

Student 3: He was kinda like that cuz when he was a teenager going in high school a whole bunch of blacks gathered around him and fought him and beat him up.

Student 4: He was racist, his dad was probably the person that didn’t like them, his dad umm was probably part of the kkk what’s it called...

Student 5: ku-klux-klan.

In an open forum such as the focus groups, children were not bound by question and correct answer formats, they were able to build on each others’ discourses and construct a deeper understanding of race.

Teacher Interviews

During interviews, the teachers projected caution about expressions of race. Ms. M. admitted leaving out certain words in the story like *bigot*. “I just do not want to say the word *bigot*. It wasn’t something I really needed to discuss.” While we did not understand the teacher’s hesitation about the word *bigot*, we did understand her reluctance regarding the explicit use of the “N” word.

In thinking about her class’s book discussions on *Crossing Jordan*, Ms. B. confirmed that students could recognize and question sensitive issues: “They [students] didn’t understand the segregation concept because they’re not living in that as much. However, they got righteous indignation. They could not understand this man [Mr. Bodine], you know. They [students] couldn’t understand why they [Jemmie and Cass] couldn’t be friends.”

But while students may have felt comfortable about their own stance on race, the teacher admitted not always feeling this way. In one incident in the book in which the friends Cass and Jemmie are running a race to raise money for sickle-cell anemia, Ms. B. states her reaction to a question about sickle cell. “I just remember feeling uncomfortable because they [students] got off on something that I didn’t want to talk about and I tried to steer the conversation back. I thought a teacher should not get into this and I ended up saying talk to your parents about that.”

Both teachers spent the greater part of the interview explaining the instructional aspects of reading rather than race and saw read aloud as taking away crucial time that was needed for state testing preparation of reading skills. Neither saw any reason for follow-up assignments (e.g. journal entry, writing assignments, dramatic enactments) related to the reading.

Discussion and Implications

Based on the data and our review of the literature, we reported how two teachers discussed race within the context of read aloud. Initially, both Ms. M. and Ms. B. were apprehensive about the book’s topic, stating they were not sure if their students were “ready” to be exposed to sensitive reading material. They preferred “happy” books that were for listening and entertaining. Their views reflected others’ beliefs that teachers frequently found the introduction and discussion of sensitive social issues too controversial for children (Lehr, 1995; McBee, 1996; Wollman-Bonilla, 1998). As Wollman-Bonilla (1998) stated, “As teachers carry out the work of selecting texts for classroom use, many seem to lack the courage to present non-mainstream perspectives and experiences, and they lack faith in children’s ability to recognize and handle difficult issues” (p. 287).

The scheduled time for read aloud was telling. Ms. B. held her read aloud in early afternoon while Ms. M. chose to hold her read-aloud at the end of the day before dismissal. Ms. M. seemed to be aware that this was not the ideal time. “I wish that I had more time to hear what they said, because a lot of the times, the bell was going to ring or something like that. There wasn’t really enough time to get what they wanted.” Although this scheduled time did not seem to affect the types of teacher-student interactions, it did reflect the relative importance each teacher gave to the read aloud. In talking with both teachers about the place of read aloud in the curriculum, we

learned that due to time constraints and the pressures for state test preparations, the first activity to go in the curriculum was read aloud. To justify its worth during the study, teachers did what they could to make a reading lesson of the read aloud. Because read aloud was primarily a speech event, teachers saw little purpose in having students write about what they had already heard and discussed. Ms. M. stated she believed students “processed it [the discussion] so well verbally,” they didn’t need any writing extension activities. Given the forthright comments students made in written work, we believe the exclusion of follow-up writing was a missed opportunity for learning about what students knew and experienced.

What is the nature of interactive text-based discussions about race based on two third-grade classes serving as cases?

The nature of interactions during book discussion could best be described as following Cazden’s (1988) initiation, response, evaluation (IRE) structure of talk. Throughout the book discussions, the teachers spoke more than the students. For example, in the critical chapter Ms. M. spoke 65% of the time and the students spoke 35% of the time while Ms. B. spoke 66% of the time and the students 34%.

The teachers’ choices about what to underscore in a lesson was critical to what students reiterated or took away from the discussion. Both teachers discussed race, but it was implicitly delivered and framed as text-based, literal questions. The emphasis on literal comprehension mediated the sensitive topic of race such that the function and intent of the questions seemed to be that of comprehension assessment (Durkin, 1978/1979) rather than explicit invitations to explore and understand race relations. How teachers scaffolded text seemed to account, in large part, for the students’ selective perceptions. Given the emphasis on comprehension assessment, teachers’ implicit, literal questions never problematized the racial tensions in the book but rather covered over them (Fine, 1987). Personal and social interactions, on the other hand, encouraged higher-level inferences and evaluations for processing story content. Notwithstanding the form of response, the fact remained that teachers made more implicit rather than explicit statements. One could argue that this was an attempt at political correctness or the teacher’s tactful style, but it may have validated Fine’s (2002) observation that *failure to name* the issue of race can result in “benign neglect” (p. 197). According to Fine (1987), failure to correct misconceptions or to move away from dichotomous thinking can deny social inequalities and mute student voice.

Students’ responses to the teacher and the text during book discussions indicated they understood how to answer an implicit question or comment that mapped the text but seldom were they able to show the depth of their knowledge about race. Students tended to adopt a deferential stance rather than a critical one (Palinscar & Duke, 2004). The few times in which a student broached a topic related to race (sickle cell), the teacher side-stepped the question or redirected it. Literal discussions were more like a game of 20 questions than they were inquiry or acts of in depth curiosity about the substantive issues (Lindfors, 1999; Martinez & Roser, 2003). The paradox of teaching comprehension while at the same time avoiding understanding of race was puzzling.

Can oral and written responses as reflected in discussions, written reflection forms, focus groups, interviews, and writing samples provide a window into children’s socio-cognitive of development of race?

During book discussions, it was difficult to map student responses onto Quintiana's levels given that the majority of student replies mimicked the teacher's questions, which deemphasized race. Written reflection forms that emphasized student perceptions of the quality of discussions also evaded the topic of race and highlighted the "answers" to the teacher questions posed during read aloud. Our work underscored what Eeds and Wells (1989) suspected all along: that "almost all of [the] children's experiences with literature in elementary schools today are in an inquisition mode" (p. 4), whereby direct questions having the "right" answers are posed to the students and "their comprehension of the story is judged by how closely their answers match those in the textbook" (p. 4).

In the pre-and post-essays, however, the situation was different. Students felt free to voice responses about race in sincere and thoughtful ways. For example, in the pre-essays, the majority of written responses contained unreserved explicit and implicit statements of a very personal and social nature. In response to: "What would you do if your parents said that you couldn't be friends or play with someone just because she or he was a different color than you were?" the students' responses were candid and clear: "If my parents said that I will still play with them because Martin Luther King said that everyone should play with everyone. That could hurt other people's feelings; You could get shot by doing that in my neighborhood; You should play with all kinds. You should not hurt people's feelings; You would not want to feel bad because your friend's mom said that you can't play with black or white. My friend is white."

The post-essays also showed students uninhibited views toward race: "If my parents said I can't play with my friends because they are a different color than I will convince them that I can play with my friends even if my friends are different color than me.; I would do that because they are my best friend and I can't just let my parents tell me not to play with my friends if they are just different color than me; I would tell my parents that is not right to be racist." Thus, when given an opportunity to air their views openly through a written essay, students had much to say about race. Student responses to essay prompts for *Crossing Jordan* showed much higher levels of development, reflecting the upper limits of Level 2 ("reflects children's understanding of social perspective of ethnicity" (Quintiana, 1998; p.37) and Level 3: ("children to consider multiple dimensions associated with their understanding of their personal and social world" (Quintiana, 1998; p. 35).

Another place where students demonstrated higher levels of social-cognitive development of race was in focus groups. In the presence of an adult, other than their teachers, the students had no qualms about bringing up race or voicing their own apprehensions about race relations in the book when they existed: "I really liked the whole story except when it got to racist I didn't like it. And I didn't like when they was talking about racist and stuff and I got really uncomfortable and I didn't know that because it was way back then."

While it was beyond the scope of this study to consider student responses based on their own personal race and ethnic heritage, our data seemed to indicate that, for the most part, both black and white children avoided statements of prejudice. A few outlier responses, however, existed. One or two black children indicated discrimination against white peers. For example, "I don't care because I don't play with white people so I don't care;" "I wouldn't be mad or sad or

anything. I don't play with white people. I'll do what parents said. If there black I'll play with them. I will never play with a white kid."

Like other researchers who have investigated race in the context of book discussions, we did not expect a single book to make a significant difference in children's racial views, but we were disappointed that the potential to discuss an important societal issue in the context of good literature eluded the class members (Copenhaver-Johnson, Bowman, & Johnson, 2007). The lost opportunity to discuss race directly, rather than veiling it in literal comprehension questions, could have cleared up misconceptions and given children a chance to reflect on their own experiences with race relations. A forum such as read aloud, in which teachers can entertain the multiple perspective feedback of peers, can go a long way in teaching children about one another. Clearly, "there are many courageous teachers who use social issues' books regularly . . . but there are also many who are concerned about using books that realistically depict racism, class conflict, and violence—afraid these books may be too disturbing for children" (Lewison, et al., 2002, p. 215). It would seem, however, that students are indeed capable and willing to delve deeply into these matters. The read-aloud book discussion, however, may need to be redefined as more than comprehension assessment or mere reading "without interruptions for purpose of enjoying and listening to a story" (Santoro, Chard, Howard, Baker, 2008) if it is to provide a useful instructional space for holding discussions and teaching critical thinking and interpretations that shed light on pressing social issues.

Teachers will need to set purposes for the read aloud. Book discussions and other forms of response to books (spoken or written) are activities that can help teachers reach objectives such as problem solving, social justice, idea clarification, and tolerance (Aboud & Fenwick, 1999). Thus, it would seem prudent to pay attention to not only the form of questions being asked (Dillon, 1984), but also the sense of meaning regarding content, intent, and function. In short, teachers might widen the curriculum to delve into content for its own sake rather than viewing each book as only an occasion to teach reading. Focusing on the ideas and content of a book as a way of understanding social issues can lead to comprehension by channeling students more directly on the *what* of reading rather than the *how* (Neuman, 2001).

Finally, it seems appropriate to offer teachers ways to discuss sensitive issues in an explicit and direct way rather than embedding it in literal comprehension (Delpit, 1997). Given that teachers in this study did not have a place for using writing with book discussions, they were unable to build on students' previous knowledge or help them use other channels of communication to share ideas. It was the free expression situations such as the essays and focus groups that encouraged students to move beyond a safe and sterile voice (Christensen, 1994). Thus, if teachers are to shape positive attitudes and nurture social justice during book discussions, they may have to open discussions and address more directly what is uppermost in students' minds. In our study, writing was an integral means for studying children's views, more so than the controlled discussions of the book readings. Focus groups also attest to the fact that when limits are not placed on discussions, much can be learned about what children know and believe. Unless student-centered discussions are allowed to flourish, it will be unlikely that students will voice views and perspectives on sensitive issues. Although it remains to be seen whether teachers can approach such topics as comfortably as their students, the significance of talking about matters relevant to student lives remains indisputable.

References

- About, F.E. (1988). *Children and prejudice*. Oxford, England: Blackwell.
- About, F.E., & Doyle, A.B. (1996). Does talk of race foster prejudice or tolerance in children? *Canadian Journal of Behaviour Science* 28, 3 , 161-170.
American Library Association.
- About, F.E., & Fenwick, V. (1999). Exploring and evaluating school-based interventions to reduce prejudice. *The Journal of Social Issues*, 55, 4, 767-785.
- Allport, G. N. (1954). *The nature of prejudice*. Cambridge, MA: Addison Wesley.
- American Library Association. Best books for young adults and the Coretta Scott-King Award. Retrieved July 15, 2009 , from <http://www.ala.org/ala/awardsgrants/seals/index.cfm>
- Armbruster, B. (1996). Considerate texts . In D. Lapp, J. Flood, and N. Farnan (Eds.), *Content area reading and learning: Instructional strategies* (2nd ed.). Boston: Allyn & Bacon.
- Banks, J. A. (2002). *An introduction to multicultural education* (3rd ed.). Boston: Allyn and Bacon.
- Barr, R. (1987). Classroom interaction and curricular content. In D. Bloome (Ed.), *Literacy and Schooling* (pp.150-168). Norwood, NJ: Ablex.
- Bradley, B., & Johnson, J. (2007). Alphabet books in early childhood classrooms. *The Reading Teacher*, 60 (5), 452-463.
- Brown, C.S., & Bigler, R.S. (2005). Children's perceptions of discrimination: A developmental model. *Child Development*, 76 (3), 533-553.
- Cai, M. (2008). Transactional theory and the study of multicultural literature. *Language Arts*, 85 (3), 212-220.
- Cazden, C. B. (1988). *Classroom discourse: The language of teaching and learning*. Portsmouth, NH: Heinemann.
- Chapman Awards for Best Classroom Read-Alouds. Retrieved July 15, 2009 from <http://www.planetesme.com/chapman.html>
- Clark, K.. & Clark, M. (1940). Skin color as a factor in racial identification of Negro pre-school children: a preliminary report. *Journal of Experimental Education*, 8, 161-163.
- Cochran-Smith, M. (1984). *The making of a reader*. NJ: Ablex Publishing

Corporation.

- Cole, A.D. (2003). *Knee to knee, eye to eye*. Portsmouth, NH: Heinemann.
- Copenhaver-Johnson, J. F. Bowman, J.T., Johnson, A.C. (2007). Santa stories: Children's inquiry about race during picture book read-alouds. *Language Arts*, 84 (3), 234-244.
- Delpit, L. (1997). What should teachers do? *Rethinking Schools*, 12 (1) 6-7.
- Dillon, J. (1984). The classification of research questions. *Review of Educational Research*, 54, 327-361.
- Dresang, E. (1999). *Radical change: Books for youth in a digital age*. NY: H.H. Wilson.
- Duke, N., & Kays, J. (1998). "Can I say 'Once upon a time'?" : Kindergarten children developing knowledge of information book language. *Early Childhood Research Quarterly*, 13, 295-318.
- Durkin, D. (1978/1979). What classroom observations reveal about reading comprehension instruction. *Reading Research Quarterly*, 14 (4) 48-533.
- Eberhardt, J. L., & Goff, P.A. (1996). Seeing race. In C. C. Crandall & M. Schaller (Eds.), *Social psychology of prejudice: Historical and contemporary issues*, (pp. 219-236) Lawrence, Kansas: Lewinian Press.
- Eeds, M., & Wells, D. (1989). Grand conversations: An exploration of meaning construction in literature study groups. *Research in the Teaching of English*, 23(1), 4-29.
- Fine, M. (1987). Silencing in public schools. *Language Arts*, 64 (2), 157-174.
- Fine, M., & Weis, L. (2003). *Silenced voices and extraordinary conversations: Re-Imagining schools*. New York: Teachers College Press.
- Fisher, D., Flood, J., Lapp, D., & Frey, N. (2004). Interactive read-alouds: Is there a common set of implementation practices? *The Reading Teacher*, 58, 8-17.
- Freire, P. (1970). *Pedagogy of the oppressed*. New York: Seabury Press.
- Glaser, B.G., & Strauss, A.L. (1967). *The discovery of grounded theory: Strategies for qualitative research*. Chicago: Aldine.
- Goldenberg, C. (1992/1993). Instructional conversations: Promoting comprehension through discussion. *The Reading Teacher* 46, 316-326.

- Hirschfield, L. A. (1995). Do children have a theory of race? *Cognition*, 54, 209-252.
- Katz, P.A. (1982). Development of children's racial awareness and intergroup attitudes. In L.G. Katz (Ed.), *Current topics in early childhood education* (pp. 16-54). New York: Ablex.
- Lehr, S. (1995). (Ed.). *Battling dragons: Issues and controversy in children's literature*. Portsmouth, NH: Heinemann.
- Lewison, M., Leland, C., Flint, A. S., & Moller, K. J. (2002). Dangerous discourses: using controversial books to support engagement, diversity, and democracy. *The New Advocate*, 15 (3), 215-225.
- Lickteig, M. J., & Russell, J. F. (1993). Elementary teachers' read-aloud practices. *Reading Improvement*, 30(4), 202-208.
- Lindfors, J.W. (1999). *Children's inquiry: Using language to make sense of the world*. NY: Teachers College Press.
- Lloyd-Jones, R. (1977). Primary Trait Scoring. In C. R. Cooper & L. Odell (Eds.), *Evaluating writing: Describing, measuring, judging* (pp. 33-66). Urbana, IL: National Council of Teachers of English.
- Martinez, M., & Roser, N. L. (2003). Children's responses to literature. In J. Flood, D. Lapp, J. R. Squire, & J. M. Jensen (Eds.), *Handbook of research on teaching the English language arts (2nd ed)*, (pp. 799-813). Mahwah, NJ: Erlbaum.
- Mezirow, J. (1991). *Transformative dimensions of adult learning*. San Francisco: Jossey-Bass.
- McBee, R. H. (1996). Can controversial topics be taught in the early grades? The answer is yes! *Social Education*, 60 (1), 38-41.
- McLaughlin, M., & DeVoogd, G. L. (2004). *Critical literacy: Enhancing students' comprehension of text*. New York: Scholastic.
- Neuman, S. (2001). The role of knowledge in early literacy: A review of selected technical reports from the Center for the Improvement of Reading Achievement. *Reading Research Quarterly*, 36 (4), 468-475.
- Palincsar, A.S. & Duke, N.K. (2004). The role of text and text-reader interactions in young children's reading development and achievement. *The Elementary School Journal*, 105, (2), 183-197.
- Piaget, J. (1936, 1963) *The origins of intelligence in children*. New York: W.W. Norton & Company.

- Quintana, S. M. (1998). Children's developmental understanding of ethnicity and race. *Applied & Preventive Psychology*, 7, 27-45.
- Ramsey, P.G. (1991). The salience of race in young children growing up in an all-white community. *Journal of Educational Psychology*, 83, 23-34.
- Ramsey, P. G. (1987). Young children's thinking about ethnic differences. In J. Phinney & M.Rotheram (Eds.), *Children's ethnic socialization: pluralism and development* (56-72). Beverly Hills, CA: Sage Publication.
- Renwick, J.M. (2008). Exploring third-grade students' ability to express their views on Contemporary social issues following read-aloud book discussions. Unpublished doctoral dissertation. Florida State University.
- Rosenblatt, L. M. (1995). *Literature as exploration* (5th ed.). New York: The Modern Language Association of America.
- Rudman, M.K. (1995). *Children's literature: An issues approach* (3rd ed.). New York: Longman Publishers.
- Santoro, L.E., Chard, D.J., Howard, L., Baker , S.K. (2008). Making the very most of classroom read-alouds to promote comprehension and vocabulary. *The Reading Teacher*, 61 (5), 396-408.
- Sipe, L. R. (2000). The construction of literacy understanding by first and second graders in oral response to picture storybook read-alouds. *Reading Research Quarterly*, 35, 252-275.
- Smolkin, L.B., & Donovan, C.A. (2001). The contexts of comprehension: The information book read aloud, comprehension acquisition, and comprehension instruction in a first-grade classroom. *The Elementary School Journal*, 102 (2) 97-122.
- Stahl, S.A. (2003). What do we expect storybook reading to do? How storybook reading impacts word recognition. In A. van Kleeck, S.A. Stahl, & E.B. Bauer (Eds.), *On reading books to children: Parents and teachers* (pp. 363-383). Mahwah: Erlbaum.
- Stake, R. (2008). Qualitative case studies. In N.K. Denzin & Y.S. Lincoln (Eds.), *Strategies of Qualitative Inquiry* (3rd ed.) (pp. 119-149). Thousand Oaks, California: Sage Publications.
- Tomlinson, C. (1995). Justifying violence in children's literature. In S. Lehr (Ed.), *Battling dragons: Issues and controversy in children's literature* (pp.39-50). Portsmouth, NH: Heinemann.

- Tu, W. (Ed.). (1999). *Using literature to help children cope with problems* (Report No. ED436008). Bloomington, IN: (ERIC Clearinghouse on Reading, English, and Communication Digest # 148).
- Vaughan, G. (1987). A social psychological model of ethnic identity. In J. Phinney & M. Rotheram (Eds.), *Children's ethnic socialization: pluralism and development* (73-91). Beverly Hills, CA: Sage Publication.
- Vygotsky, L. (1999). *Thought and language* (A. Kozulin, Trans.). Cambridge, MA: The MIT Press. (Original work published 1986)
- Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge University Press.
- White, E. (1994). *Teaching and assessing writing. Recent advances in understanding, evaluating, and improving student performance* (2nd ed.). Portland, ME: Calendar Islands.
- Wolk, S. (2004). Using picture books to teach for democracy. *Language Arts*, 82, (1), 26-35.
- Wollman-Bonilla, J. E. (1998). Outrageous viewpoints: Teachers' criteria for rejecting works of children's literature. *Language Arts*, 75(4), 287-295.
- Wood, D.J., Bruner, J.S., & Ross, G. (1976). The role of tutoring in problem-solving. *Journal of child psychology and psychiatry*, 17 (2) 89-100.
- Yenika-Agbaw, V. (1997). Taking children's literature seriously: Reading for pleasure and social change. *Language Arts* 74, 446-453.

Appendix

Select Children's Books Dealing With Race

- Armstrong, W.H. (1976). *Sour land*. Harpercollins.
- Blume, J. (1986) *Iggie's house*. Yearling.
- Curtis, C. P. (2004). *Bud, not Buddy*. Random House.
- Curtis, C.P. (2007). *Elijah of Buxton*. Scholastic.
- Elkins, S.(2004). *Ebony and Ivory: Discovering the 10 keys to racial harmony*. Broadman and Holman Publishing.
- English, K. (1999). *Francie*. Holtzbrinck Publishing.
- Fogelin, A. (2002). *Crossing Jordan*. Peachtree.
- Frazier, S.T. (2007). *Brendon Buckley's universe and everything in it*. Delacorte Books for Young Readers.
- McKissack, P. C.(2001). *Run away home*. Scholastic.
- Spinell, J. (1999) *Maniac McGee*. Little Brown Young Readers.
- Taylor, M. D. (1997). *Roll of thunder, hear my cry*. Penguin.
- Woodson, J. (1994). *I hadn't meant to tell you this*. Bantam Doubleday Dell.