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Avoiding Ignorance and Mindlessness in Educational Research: Moving from “Good Enough” Studies to More Mindful Approaches

Hersh C. Waxman

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Guest Column

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Stuart Firestein’s (2012) recent book, *Ignorance: How it Drives Science*, highlights the need for scientists and researchers to teach what we don’t know about the unknown part of research. He advocates that what we don’t know about a phenomena or “knowledgeable ignorance” guides us to develop better questions and ultimately make real advances in science. This perspective allows researchers to continually focus on what they don’t know and frame new questions that will deepen our understanding of phenomena. While Ellen Langer’s (1989) insightful book, *Mindfulness*, doesn’t specifically focus on ignorance, it does describe the dangers of individuals becoming too rigid with their routines and mindless in their thinking and behaviors. This concept of mindlessness often applies to educational researchers and it is a serious concern because researchers typically follow a research paradigm which guides their “thinking about researchable problems, theory, methods, and interpretation of data” (Padilla, 1990, p. 18). In other words, a paradigm is an accepted and shared model of research where the same rules and standards are applied (Kuhn, 1970). Our paradigms can often lead to mindlessness because they represent a uniform perspective of the researcher toward the problems being studied. The present article focuses on the concepts of ignorance and mindlessness and applies them to the current context of educational research. I maintain that addressing these concepts can improve the quality of educational research as well as improve educational practices.

Educational researchers seldom focus on the ignorance in their field and they often conduct mindless studies that do not advance the profession. Consequently, they often conduct research that has been criticized by many politicians, leaders, professional organizations, and educators. These criticisms have argued that education research: (a) has

been "inadequate," (b) has had little impact on educational practice, and (c) needs to be changed (National Research Council, 1999, 2002). Furthermore, these attacks on education research have specifically pointed out that: (a) the field is too diffuse and lacking in focus, (b) many studies are flawed methodologically, and (c) most of the questions posed are insignificant (Lagemann, 2000). Scott (2000), for example, claims that most education research is irrelevant to the real concerns of practitioners and that much of the research in the field makes claims that it cannot substantiate. Hargreaves (1996) similarly adds that there is a large amount of frankly second rate educational research which does not make a serious contribution to fundamental theory or knowledge; which is irrelevant to practice; which is uncoordinated with any preceding or follow-up research; and which clutters up academic journal that virtually nobody reads. More recently, Henig (2008), Goldhaber and Brewer (2008), and others have criticized educational research because it has been too politicized and misused for policy making.

These concerns of educational research have stimulated the federal government, nonprofit agencies, school districts, and others to try to reform educational research and move it to a more scientific, evidence-based approach. Unfortunately, this scientific-based research emphasis that focuses on randomized designs and value-added statistical models has not been able to address the complexity of conducting educational research in classrooms and other educational settings (Berliner, 2002).

Most educational researchers try to conduct "good" research studies. Unfortunately, these studies become "good enough" studies that often are published, but do not enhance the knowledge base or improve educational practice. The purpose of this commentary is to explain why the field should change from these adequate or "good

enough" types of research and adopt a more "mindful" research approach that adds knowledge to the field and seeks to improve education. The following sections describe the concerns with this "good enough" approach and then describe the more "mindful" approach to educational research.

Good-Enough Research

"Good-enough" research is very prevalent in our field. Many of us have been involved in "good-enough" research studies. These may be either qualitative or quantitative small-scale studies, secondary analyses of existing data sets, or studies that focus on issues that are frequently addressed by other researchers (Goldhaber & Brewer, 2008). These studies may have adequate technical aspects (e.g., adequate design, reliability, and validity) and sometimes yield interesting findings, but the defining characteristic of these types of studies is that they are only minimally acceptable and they don't have an impact on the knowledge base or educational practice. These studies may be good enough to satisfy requirements for doctoral dissertations and they often are good enough to be published in reputable professional journals, but these studies typically fall short in several different areas. One of the first serious concerns is that these studies often do not address a critical problem or area. The study may replicate other studies in the field, but it still may not be addressing the real critical issue in the area. Research is often driven by the enthusiasm of researchers rather than practitioners and policy makers who are interested in having the research help them address pressing educational issues.

A second limiting concern of "good-enough" research is that we often accept faulty research designs and inadequate samples because we perceive it to be too difficult to extend the research and obtain representative or large enough samples. Educators are often so fearful of working in schools, that we have been criticized for being "data dogs," moving

in and out of schools so quickly that we collect a minimal level of data and nothing too "rich" because it will be too time consuming. We are also guilty of using convenience samples that don't allow us to generalize from our research.

A third area we don't often adequately address is the study's context. Context is a critical variable to consider when applying educational research findings and researchers often don't describe the specific setting where their study was conducted in sufficient detail. For transparency and replication purposes, samples of participants should be described as specifically as possible in terms of demographic factors and other relevant characteristics. The failure to address contextual differences is one of the primary explanations why states, school districts, and individual schools often see the implementation of new programs and school reform fail (Payne, 2008).

A fourth area where we accept mediocrity is in our choice of analytic procedures. In some quantitative studies, for example, we may report descriptive and inferential results, but we avoid advanced analytic models (e.g., structural equation modeling or hierarchical linear modeling) because we are unfamiliar with the technique or it is too time consuming to complete. In qualitative studies, this may consist of a failure to do member checks because it is perceived too difficult to get feedback from our participants or, again, too time consuming.

A final area where we often accept "good enough" research is in the interpretation area. We generally include brief explanations or summaries of our findings, but we fail to thoroughly interpret the results or critically examine our work. Instead of examining plausible rival hypotheses that may suggest some alternative explanations for the results of our study, we merely state that future studies

need to have larger sample sizes in more diverse settings using randomized selection.

Mindful Research

Technical or methodological proficiency is an important research skill, but it is not sufficient to carry out high-quality research. If researchers can improve their skills in detecting plausible rival hypotheses or alternative interpretations that are different from the interpretation made by the researcher, then the quality of their own research will improve (Huck & Sandler, 1979). Furthermore, researchers also need to develop "thoughtfulness" or "reflectiveness" about research (Seltzer & Rose, 2006) and describe the ignorance of their work so that others can develop better questions and gain more understanding of phenomena.

There are several areas or components of research studies where researchers could be more mindful of their work. While introductions and reviews of research in typical research articles are often merely written to provide a context for the study (i.e., show where the study fits into the current body of research in the area), sometimes the introduction/review section can provide some unique value and be especially thoughtful or mindful. Occasionally, novel theoretical/conceptual models are presented and described that make sense for practitioners, researchers, and policy makers. Other more traditional reviews of research may similarly provide value if they relate two or more distinct educational concepts. Research or reviews that link apparently disparate areas can again provide value to educators and researchers who often see things only in the traditional way they've been doing things.

A final example where the introduction or review of research can provide value is in the actual description of studies reviewed. None of us are familiar with all of

the studies conducted in a particular field. A mindful review can (a) include new studies that we are not familiar with, (b) summarize them in a succinct way or method (e.g., table) that clarifies the research for us, or (c) explicitly address the gaps in the knowledge base.

Mindful research can also be included in methods sections. I am always interested, for example, in the instruments that researchers use. A mindful study to me would highlight why a particular instrument was chosen and what the instrument measured well. Similarly, I would be interested in having researchers describe what their particular instruments didn't measure well. Describing the "ignorance" of the methods section is clearly illuminative and would be of great value to most researchers.

It's easier to understand how the results and discussion sections could be more mindful. In addition to reporting the findings accurately, it would be especially mindful if the researcher highlighted unanticipated outcomes or presented the findings in a new or novel way of reporting. For a discussion section to be mindful, it is important that there is a critical discussion of (a) important policy and practical implications, (b) new research studies that should be conducted, and (c) how the findings relate to the current theory and research in the field. In addition, it would be extremely valuable if the researchers highlighted what they didn't learn from the study and the ways that "ignorance" could be developed in new studies that may help us gain understanding of the phenomena.

I am not suggesting that all research articles need to incorporate all of these thoughtful or mindful components, but researchers should attempt to advance the field by providing some value in at least some of these areas. These suggested changes are important to develop more mindful approaches to research, but in order for

educational research to make a difference in improving education we still need to address the issue of focusing on critical research issues. As John Easton, the current director for the Institute of Education Sciences, has recently argued "our greatest challenge is in working better with practitioners and policy makers to use the research to make schools better places where students learn more" (Easton, 2010, p. 1). Others have similarly advocated for "use-inspired basic research" (National Research Council, 2002; Stokes, 1997) or engineering approaches to educational research that focus on how to make things actually work in the settings we want to improve. As the eminent researcher, David Berliner (2009) succinctly describes it, "it is the tinkering by teachers and researchers and the study of their craft by the teachers themselves, that seems to me the most likely to pay off in improved education" (p. 311). The Carnegie Foundation for the Advancement of Teaching, for example, describes this collaborative process as building networked improvement communities in education (Bryk, Gomez, & Grunow, 2011). Penuel, Fishman, Cheng, and Sabelli. (2011) similarly describe the emerging model of design-based implementation research that focuses on the persistent problems of practice from multiple stakeholders' perspectives and calls for reconfiguring the roles of researchers and practitioners.

In their recent book on improving teaching, *Professional Capital: Transforming Teaching in Every School*, Andy Hargreaves and Michael Fullan (2012) argue that the "professional expertise is not just having and being aware of evidence, it's also about knowing how to judge the evidence and knowing what to do with it" (p. 54). I strongly agree with their perspective and I also maintain that educational researchers similarly need to be able to (a) be more mindful and reflective of the quality of their own work, (b) focus on the "ignorance" in their research, and

(c) try to work collaboratively with researchers from other disciplines, practitioners, and policy makers to address important research questions. When these three activities are done on a more consistent basis, it will promote more mindful research that will make a difference in education.

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Abstract

The present study uses systematic observations to investigate the availability and use of instructional technology in 64 middle school classrooms serving predominantly minority students from economically disadvantaged families. The *T3 Overall Classroom Observation Measure*, a high-inference walk-through instrument, was developed to examine: (a) types and use of technology present in the classroom, (b) teachers' technology usage, (c) students' technology usage, (d) teachers' general instructional behaviors, and (e) students' general behaviors. The results revealed that instructional technology was widely available in the classrooms, but most teachers and students were only using it to "some extent."

Technology in Urban Middle School Classrooms

National reports and current research have found that students in middle level schools are often at greatest risk of academic failure. Characterizing middle schools as "problematic," "mayhem in the middle," and "the forgotten middle," several recent reports have blamed middle schools for the increase of student behavior problems, disengagement from school, and low academic achievement (ACT, 2008; Wilcox & Angells, 2007; Yecke, 2006). One of the critical issues facing middle schools is inequitable access to important educational resources such as instructional technology (Good & McCaslin, 2008). In other words, disadvantaged populations of middle school students have been found to have the least access to instructional technology, which can aid in learning.

There have been a large number of studies that have examined the use of technology in schools (Beers, Paquette, & Warren, 2000; Gray, Thomas, & Lewis, 2010; O'Dwyer,

Russell, Bebell, & Seeley, 2008). Most of these studies, however, have been generic in nature and have reported broad findings that are generalized either across the country, a region of the country, or a given state. There have been a few studies that have assessed technology use in particular districts or individual schools, but these studies generally have not examined the extent to which computer technology is integrated into the curriculum and used in middle school classrooms in urban settings (Padrón, Waxman, Lee, Lin, & Michko, 2012)

Another concern regarding research on technology use in schools is related to the measurement of "technology use". Most studies assessing technology use have relied on self-report data from administrators or teachers (e.g., McKinney, Chappell, Berry, & Hickman, 2009; Pagni, 1991-92; Vannatta & Fordham, 2004). These types of data are often unreliable and tend to be upwardly biased in the direction of over reporting the actual amount of technology use (Cuban, 2001). Few researchers have actually gone into classrooms to see how teachers and students use technology daily (Cuban, 2001).

There have only been a few studies that have used systematic classroom observations to investigate technology use in schools (Huang & Waxman, 1996; Waxman & Huang, 1995, 1996), but most of these studies have been generic (e.g., generalizing across different content areas and grade levels), rather than focusing on instruction in urban middle school classrooms.

In one of the few studies that have focused on classroom observations of technology use, Waxman and Huang (1995) examined the extent to which computer technology was integrated into the curriculum of 200 elementary and middle school classrooms from a large, urban school district. They found that there was no integration of computer technology in the elementary school classrooms,; while middle school students were observed working with computers in the content areas only 2% of the time. In another observational study, focusing on 1,315 students from 220 middle school mathematics classrooms, Huang and Waxman (1996) found that calculators were the most frequent type of technology used, but they were used only about 25% of the time. During the observations, computers were used less than 1% of the time in mathematics classrooms.

In a more recent study, Padrón, Waxman, Lee, Lin, & Michko (2012) observed technology use in 27 fourth- and fifth-grade classrooms serving Hispanic English Language Learners (ELLs) who came from socially- and economically-disadvantaged circumstances. They found that the use of technology in these classrooms was very limited and that the only instructional practice that was used extensively was direct instruction.

Purpose of the Study

This study focuses on the critical issue of using technology as a tool to enrich classroom practices for urban middle school students. Research has indicated that the use of educational technology as a learning tool can increase student learning (Hattie, 2009; Lei & Zhao, 2007; Lee, Waxman, Wu, Michko, &

Linn, 2013; Walberg, 2011). There have been very few observational studies, however, that have examined the use of technology in urban middle school classrooms which serve predominantly minority students from economically-disadvantaged families. The purpose of the present study is to systematically observe the extent to which instructional technology is available and used in middle school classrooms in an urban school district. Although there is substantial evidence that indicates that technology-enhanced instruction is an effective teaching practice for students in urban schools, especially for ELLs and students from high-poverty urban schools (Padrón & Waxman, 1996; Park, 2008; Waxman & Padrón, 2002; Waxman, Padrón, & Arnold, 2001; Waxman, Padrón, & García, 2007), it is not an instructional strategy that has been found to be widely used in urban middle schools.

Methods

Participants

The participants in this study were 64 classrooms from all nine middle schools located in a large urban school district in the south central region of the United States. The school district served predominantly minority students (> 70%) from economically-disadvantaged families (>50%). The classrooms and schools were selected to be included in the study because they had been awarded a Target Technology in Texas (T3) Collaborative grant as part of the American Recovery and Reinvestment Act (ARRA) of 2009. The purpose of the T3 grant was to stimulate the use of educational technology by providing funding so that schools could purchase additional hardware and software, and provide professional development for teachers (Texas Education Agency [TEA], 2011). . The teachers in this study were provided with face-to-face and online professional development throughout the school year as well as individualized coaching sessions from the project director. The professional development emphasized integrating technology into the classroom and improving pedagogy and students' critical

thinking skills. The content area distribution among the 64 observed classrooms was nearly equal for mathematics, science, language arts, and social studies.

Instrument

The T3 Overall Classroom Observation Measure is a high-inference instrument used to examine: (a) types and use of technology present in the classroom, (b) teachers' technology usage, (c) students' technology usage, (d) teachers' general instructional behaviors, and (e) students' general classroom behaviors. The T3 Overall Classroom Observation Measure is considered a walkthrough or walkabout instrument that is designed to obtain multiple snapshots of classroom practices in order to provide a rich data picture (Downey, Steffy, English, Frase, & Poston, 2004; Kachur, Stout, & Edwards, 2010; Smith, Cude, Braziel, Waxman, & Smith, 2008). The purpose of this data was not to evaluate individual teachers, but to record the teacher and student behaviors that occurred during the 20-minute data collection period.

The T3 Overall Classroom Observation Measure was adapted from the Classroom Observation Measure (COM) (Ross & Smith, 1996), which measures the extent to which certain effective instructional strategies are demonstrated during a class period. The COM has been used in a number of studies, has been found to be reliable and valid (Ross, Smith, Lohr, & McNelis, 1994; Ross, Troutman, Horgan, Maxwell, Laitinen, & Lowther, 1997), and has been adapted and used recently (Waxman, Padrón, Franco-Fuenmayor, & Huang; 2009). The T3 Overall Classroom Observation Measure was used at the end of the classroom walk-through to rate, on a 3-point scale (1=not at all; 2=some; 3=great), the extent to which technology use and general instructional strategies were demonstrated during the observation period. The amount of technology available in the classroom was also recorded. Finally, subsequent to each walk-through, researchers rated the classroom on its overall implementation of technology, using a 5-point scale (0= no use of technology; 1=low-level use of technology; 2=somewhat

meaningful use of technology; 3=meaningful use of technology; 4=very meaningful use of technology).

Procedures

Near the end of the school year, trained observers observed the 64 classrooms for approximately 20 minutes each. The teachers were aware of the week that the observations were scheduled, but they were not aware of the specific day or time that their class would be observed. Classrooms that were involved in nontraditional instructional contexts (e.g., testing) were avoided and attempts were made to revisit them at other days or times. The inter-rater reliability in the present study was .84, which indicates a high degree of consistency among observers. Means and standard deviations were calculated for all variables and multivariate analysis of variance were conducted to examine if there were differences among science, social studies, mathematics, and language arts teachers on (a) the extent to which technology was available, (b) the extent that technology was observed being used, and (c) their instructional behaviors.

Results

Table 1 (below) displays the means and standard deviations for the availability of technology in the 64 classrooms, and teachers' and students' use of technology. The three types of technology that were most frequently observed were laptop computers ($M=6.91$, $SD=7.29$), DVDs/CDs and headphones ($M=2.55$, $SD=7.43$), and desktop computers ($M=1.63$, $SD=3.34$). It should be noted that the standard deviations for these three items were large which indicates that there was a large variation in the number of these items that were observed in the classrooms. Despite the technology being present in the classroom the observations revealed that laptops were being used only to some extent ($M=1.67$, $SD=0.90$), while desktop computers and DVDs/CDs and headphones were not being used at all ($MDesktop=1.19$, $SDDesktop=0.57$; $MDVDs=1.08$, $SDDVDs=0.37$). These results indicate that the technology being present does

not guarantee that it will be used in the classroom. Another interesting finding was that almost every classroom that was observed had an interactive whiteboard (M=0.98, SD=0.33) that was being used to some extent (M=2.11, SD=0.97). It appears that teachers were comfortable integrating this technology into the classroom. One possible reason for this is that teachers might have received training on the integration of interactive whiteboards during their professional development, while training for other forms of technology might not have taken place.

Table 1

Summary of Classroom Observations of Technology Availability and Use

Type of Technology	Tech Availability		Tech Use	
	M	SD	M	SD
MP3 player/iPod	0.30	1.41	1.00	0.00
Interactive whiteboard/ SMART Board	0.98	0.33	2.11	0.97
Flip camera/ video camera	0.80	1.71	1.03	0.18
Digital camera	0.47	1.36	1.08	0.37
DVDs/CDs & headphones	2.55	7.43	1.08	0.37
Skype/ video communication	0.44	2.29	1.02	0.29
Laptop computer	6.91	7.29	1.67	0.90
Desktop computer	1.63	3.34	1.19	0.57
Television	0.42	0.53	1.03	0.25

Notes. The technology availability item is the actual number of specific types of technology observed in the classroom. The technology use item used the following key: 1=not observed at all; 2=some extent (once or twice); 3=great extent (3 or more times).

Table 2 (below) displays the means and standard deviations for the use of technology by teachers and students. Teachers were integrating technology into the lesson and using technology to display materials or assignments to some extent (M_{Lesson}=2.27, SD_{Lesson}=0.86; M_{Display}=1.97, SD_{Display}=0.94). Teachers

were not using technology for non-instructional purposes (M=1.11, SD=0.45). The other items for teachers' use of technology had means between one and two, which indicates that teachers were not observed using the technology or were using it only to some extent. Standard deviation between 0.8 and 0.9 for these items suggest that there was some variation in teachers' use of technology. Students were observed using technology to some extent for (a) enhancing problem solving and creativity (M=1.98, SD=0.92), (b) independent inquiry/research (M=1.94, SD=0.91), and (c) producing new knowledge (M=1.97, SD=0.91). The means for the rest of the students' use of technology items were between one and two with standard deviations around 0.8, which implies that students were either not using technology or were using it only to some extent but there was some variation in student technology use.

Table 2.

Summary of Classroom Observations of Teacher and Student Technology Use

Teacher Use of Technology	M	SD
Teacher integrated technology into lesson	2.27	0.86
Teacher assisted students with technology	1.79	0.88
Teacher used technology as a communication tool (e.g., Skype, email/chat)	1.64	0.88
Teacher used technology to create lessons	1.63	0.88
Teacher used technology to access the Internet	1.45	0.80
Teacher used technology to display material/assignment	1.97	0.94
Teacher used technology to assess/correct assignment	1.56	0.79
Teacher used technology for a non-instructional purpose (e.g., checking email)	1.11	0.45
Student Use of Technology	M	SD
Students used technology to enhance problem solving/creativity	1.98	0.92
Students used technology to learn basic skills (e.g., tutorials, drill & practice)	1.73	0.84
Students used technology to access the Internet	1.70	0.85
Students used technology as a communication tool	1.41	0.75

(e.g., Skype, email/chat)			Teacher let students develop concepts or procedures	2.10	1.44
Students used technology for word processing	1.52	0.76			
Students used technology for assessment purposes (e.g., individualized tracking)	1.58	0.81	Teacher related concepts to students' actual lives	1.37	0.68
Students used technology for independent inquiry/research	1.94	0.91	Teacher provided opportunities for students to assume responsibility and initiate classroom activities	1.95	0.92
Students used technology to produce new knowledge	1.97	0.91	Teacher used a variety of modalities including auditory, visual, and movement	1.74	0.81

Table 2 continued

Teacher Instructional Behavior	<i>M</i>	<i>SD</i>
Teacher actively facilitated students' engagement in activities and lessons to encourage participation	2.09	0.87
Teacher linked concepts and activities to one another and to previous learning	2.08	0.84
Teacher applied new concepts to similar situations (elaborated)	1.81	0.87
Teacher connected ideas and concepts	1.89	0.79
Teacher initiated experiences, discussions and activities	1.91	0.90
Teacher acted as coach/facilitator	2.15	0.90
Teacher allowed students to develop concepts or procedures	2.03	0.88
Teacher provided students opportunities for problem solving	1.92	0.88
Teacher asked many open-ended questions	1.55	0.78
Teacher provided adequate feedback to students (answers, information, etc.)	2.02	0.90
Teacher provided direct instruction for the entire class	1.75	0.91
Teacher assisted students to organize thinking (identify and describe patterns)	1.76	0.87
Teacher integrated feedback and assessment into instructional cycle	2.21	4.03
Teacher initiated project-based learning activities	1.78	0.92

Table 2 continued

Teacher Instructional Behavior	<i>M</i>	<i>SD</i>
Teacher provided opportunities for students to be creative and/or generate their own ideas and/or products	1.81	0.91
Teacher offered encouragement of students' efforts that increased students' involvement and persistence	1.98	0.83
Teacher appeared to have warm, supportive relationships with students	2.27	0.78
Teacher displayed negative affect toward students	1.17	0.42
Teacher monitored/checked student work	2.13	0.85
Students' Instructional Behaviors	<i>M</i>	<i>SD</i>
Students initiated and assumed responsibility for learning activities	2.28	0.88
Students connected ideas and concepts	1.94	0.85
Students utilized different ways to answer (alternative solutions)	1.65	0.81
Students were engaged in classroom activities	2.34	0.78
Students' activities were learner-centered	2.10	0.91
Students solved problems using real objects (e.g., manipulatives) in the classroom environment	1.48	0.67

Students displayed positive affect toward teacher	2.23	0.83
Students displayed negative affect toward teacher	1.22	0.55
Students displayed positive engagement with peers	2.16	0.86
Students worked with other students in small groups	1.89	0.92
Students displayed disruptive behavior	1.27	0.57
Students did independent seatwork	2.11	0.90

Table 2 continued

Overall Classroom Technology Rating	<i>M</i>	<i>SD</i>
Overall technology rating	1.92	1.46

Notes. All technology use items used the following key: 1=not observed at all; 2=some extent (once or twice); 3=great extent (3 or more times). The overall classroom technology rating used the following key: 0=No use; 1=Low-level use of computers; 2= somewhat meaningful use; 3=meaningful use; 4=very meaningful use of computers.

The means for teacher and student instructional behaviors are also shown in Table 2. Overall, most teachers’ instructional behaviors were observed to some extent. One item (the teacher asked many open-ended questions) was observed either not at all or to some extent ($M=1.55$, $SD=0.78$). Two items, on average, were not observed at all. These two items were the teacher related concepts to students’ actual lives ($M=1.37$, $SD=0.68$) and the teacher displayed a negative affect toward students ($M=1.17$, $SD=0.42$). Fairly high standard deviations for all items indicate that there was variation in the teachers’ instructional behaviors that were observed. Most student instructional behaviors were also observed to some extent. One item (students solved problems using real objects) had a mean

between one and two ($M=1.48$, $SD=0.67$) again indicating that this item was either not observed or observed to some extent. There were also two items (students displayed negative affect toward teacher and students displayed disruptive behavior) that were not observed ($M_{\text{Negative Affect}}=1.22$, $SD_{\text{Negative Affect}}=0.55$; $M_{\text{Behavior}}=1.27$, $SD_{\text{Behavior}}=0.57$). The standard deviations for all items were again high, suggesting variance in the observed student instructional behaviors.

The overall classroom technology rating for the 64 classrooms was 1.92, which indicated that the technology observed in these classrooms was “somewhat meaningful.” The standard deviation for this item was quite high ($SD = 1.46$), indicating that some classrooms were not using technology while other classrooms were using technology in very meaningful ways.

A MANOVA was used to determine if there were any significant differences between content areas for teacher and student technology use and instructional behaviors. The MANOVA results indicated that there were no statistically significant differences by content area for technology use or instructional behaviors. In other words, there were no differences among science, social studies, mathematics, and language arts teachers on (a) the extent to which technology was available, (b) the extent that technology was observed being used, and (c) their instructional behaviors.

Discussion

Developing students who can participate in a global economy that is increasingly more focused on technology is one of the greatest challenges facing educators today. The findings of the present study indicate that computers are not fully integrated into the delivery of instruction in the nine middle schools in this urban school district. In fact, the acquisition of technology in the school district examined in this study has clearly exceeded the amount of technology infusion. These findings are similar to other studies that have also found that the quantity of computers in the classroom does not appear to be a key factor that affects teaching

and learning, but rather the way computers are used in instruction that appears to make a difference (Lei & Zhao, 2007; Lowther & Ross, 2003).

The findings from the present study indicate that technology availability in this urban school district is higher than previous studies (probably due to the T3 grant), but technology use in the present study is lower than the findings reported in other studies. This may be due to the fact that the present study observed regular classroom instruction rather than relying on administrator, teacher, or student self-reports of technology use. In addition, the present study did not observe students attending computer laboratory settings, where students often learn about computers in general. Consequently, the results from this study may provide a much more realistic assessment of instructional technology use in urban middle school classrooms. Informal conversations with teachers revealed that they felt so pressured to have their students do well on state-mandated tests that it hindered their technology use in the classroom. These perceptions, however, need to be systematically examined in future studies with more in-depth surveys or interviews.

The results of the present study suggest that the technology has not been thoroughly implemented in these urban middle school classrooms that serve a large number of minority students. Although the teachers who participated in the present study were volunteers and were provided with several professional development opportunities on how to integrate technology in their content areas, this training did not appear to be sufficient for them to fully implement technology in their classrooms.

For the most part, instruction in these urban middle school classrooms was predominantly student-centered with teachers actively engaging students in classroom activities by acting as a coach/facilitator. Although technology has been found to be a better fit with more constructivist approaches to teaching rather than the traditional lecture, recitation, drill and practice approaches that are most common in schools today (Collins &

Halverson, 2009; Wenglinsky, 2005), this was not the case for the present study.

This study is limited in the fact that it only observed middle school classroom in one urban school district. Additionally, observations only occurred once for a 20-minute period. Future studies should examine classrooms in other urban districts and should include several observations for longer time periods. Teacher and student interviews would also provide further insight into the factors that play a role in the successful integration of technology in the classroom.

The findings from this study also raise several other important questions that need to be addressed in future studies. Most of these questions center on determining: (a) the skills and abilities that teachers need to effectively implement technology, (b) the factors that constrain teachers from using technology, and (c) the types of support teachers need to implement the use of technology throughout their instruction. Future research may also want to examine the use of walkthrough or walkabout data for providing feedback to teachers or administrators about the quality of technology use and classroom instruction. By finding the answers to these questions future research may show how technology can help urban middle school students achieve academic success both in the present and in the future.

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Abstract

This aim of this paper is to explore the concept of intellectual and moral virtue across cultural, religious, and philosophical points of view—with special attention to the role of education in the formation of virtue. The central ambition of this paper is to determine if virtue is a concept that transcends cultural contexts and, should it do so, to what extent? It is shown that certain ubiquitous virtuous character traits are valued across cultural lines, and that similar understandings of virtue emerge in almost all cultural and religious contexts. Despite this, it also clear that virtue functions differently across cultural and religious contexts, and that the expression of virtue may itself look very different. This is demonstrated through various religious texts, works of philosophy, and traditional proverbs from several important traditions: Chinese, South Asian, Greek philosophy, and African moral theory. I conclude with a discussion of challenges facing virtue-based theories.

Introduction

The virtues are by no means a new topic in moral and character education—an understatement to be sure. Indeed the topic moral virtue and more recently, intellectual virtue, continues to interest scholars in many disciplines. Much of this renewed interest can be traced back to Elizabeth Anscombe's (1957) seminal article, "Modern Moral Philosophy," wherein she urges a break from Kantian and Utilitarian ethics, and a return to classical Greek moral theory rooted in virtue. Shortly thereafter the philosophical field of *virtue ethics* was born. A few decades later, responding to an intractable epistemological conundrum put forth by Edmond Gettier (1963), Ernest Sosa (1980) published a now classic article entitled, "The Raft and Pyramid: Coherence versus Foundationalism." Therein he levied his considerable philosophical prowess to put forth a new approach to epistemology—one employing virtue as a powerful epistemological concept. Others found his approach appealing, and soon scholars like Loraine Code (1987), James Montmarquet (1993), and Linda Zagzebski (1996) were discovering novel ways to understand the relationship between belief formation and intellectual virtue. This movement, now called *virtue epistemology*,

occupies a central place in the canon of contemporary work in the theory of knowledge.

What is striking in both cases—virtue ethics and virtue epistemology—is how versatile and powerful the concepts of moral and intellectual virtue are. This prompted three questions: (1) how do other cultures understand virtue; (2) to what extent do these conceptions converge and diverge; and (3) to what extent will multiple conceptions of virtue result in *incommensurability*? Christopher Peterson and Martin E. P. Seligman (2004) faced similar worries during the early stages of their large-scale empirical and philosophically grounded study of virtue in multiple cultural contexts. They too confronted the possibility that virtues are incommensurate across cultural lines:

When we undertook our project, we started by creating our own list. With little modesty, we asserted that our list included strengths and virtues valued in all contemporary cultures around the world. But when we showed our list to colleagues, we encountered the frequent objection that there are no strengths and virtues valued across all cultures. Indeed, we were told that the subcultural variations along regional, socioeconomic, religious, and ethnic

lines in just the contemporary United States precluded a universal list even for the here and now. We took these criticisms seriously and worried about reifying characteristics valued only at the turn of the new century by upper-middle-class European American academics (p. 33).

It is fair to assume, I believe, that many scholars of comparative education will express similar uncertainties about this project. After all, we live in the age of postmodernity—an age that casts doubt on the project of categorization. As such, I have undertaken this project with great caution and intellectual humility.

This aim of this paper is to explore the concept of intellectual and moral virtue across cultural, religious, and philosophical points of view—with special attention to the role of education in the formation of virtue. The central ambition of this paper is to determine if virtue is a concept that transcends cultural contexts and, should it do so, to what extent? Notably, the perspectives I cover are deeply complex, and only cursory coverage can be given of each. For the sake of clarity, then, when speaking of the Yoruba and Akan peoples, I am largely concerned with role of virtue in their cultural practices; my discussion of Confucianism and Buddhism draws mainly from religious texts and practices, and Greek notions of virtue (unsurprisingly) are drawn largely from philosophical sources. It is shown that certain ubiquitous virtuous character traits are valued across cultural lines, and that similar understandings of virtue emerge in almost all cultural and religious contexts. Despite this, it also clear that virtue functions differently across cultural and religious contexts, and that the *expression* of virtue may itself look very different. This is demonstrated through various religious texts, works of philosophy, and traditional proverbs from several very important traditions: Chinese, South Asian, Greek philosophy, and African moral theory. I conclude with a discussion of challenges facing virtue-based theories.

Virtue in Cultural Context

According to Ninian Smart (1999), three world regions have been particularly influential in the history of religion and ideas—China (Taoism and Confucianism), South Asia (Buddhism and Hinduism), and the West (Greek philosophy, Judaism, Christianity, and Islam) (p. 2). I follow Smart's lead, but add African culture because of its historical and cultural richness. I survey how virtues are understood and function within several of these philosophical and religious traditions. This discussion, while regrettably brief, provides sufficient ground for making some general observations.

Chinese Virtue – Confucianism

Confucianism was conceived against a backdrop of political turmoil. The Zhou Dynasty (1040? – 256 B. C. E.) had recently disintegrated and the king's authority was severely diminished. What power remained was concentrated in the hands of a number of dukedoms that imposed their own taxes, raised their own armies, and often waged war on each other—and people suffered. Bryan W. Van Norden (2007) offers the following intriguing quote from a leading minister of Jin:

Our ruler has here 4,000 chariots of war. Even if he acts contrary to the Way, it is still necessary to fear him; if he, beyond that, is acting in accordance with the Way, who can prove his opponent? An ox may be meager; but if it fall upon a pig, would you not fear the pig would die? ... If we lead on the multitudes of Jin, using also the forces of the other states? ... if we come thus to punish Lu for its offenses ... what can we seek that we shall not get (p. 33)?

Although the minister was cognizant of the Way (*Dao*)—the principles that govern the meditative life—other concerns clearly trumped it. In fact, brute reality showed that leaders depended more upon force and cunning strategy for prosperity than adherence to the Way. This sort of thinking was out of tune with the general regard ordinary people had for the Way. These person looked to a distant past when “Heaven” granted Kings

power and success based on their possession of *dé* (virtue) and their respect of the Way. This bifurcation generated deep social tension.

It was this chaos into which Confucius was born. The son of a once prosperous family, he made the study and teaching of the old traditions his life's work. Needless to say, his teaching took root. Confucianism is undoubtedly the most instrumental system of thought to emerge from China. According to Norden (2007), Confucius "provided the intellectual background against which all later thinkers react, and he started a movement that continues to be socially and philosophically influential more than two thousand years later" (p. 65). Confucianism's influence soon spread out across East Asian and eventually spanned continents. However, Confucianism is a misleading term. Confucius did not "invent" a brand new religion or system of thought. Rather he expanded on a centuries-old Chinese tradition. Xinzhong Yao (2000) explains:

It is true that as a distinctive 'school' Confucianism began with Confucius. It was Confucius who explored deeply and elaborated extensively on the basic principles of what was to become Confucianism, and it was Confucius and his disciples who succeeded in transmitting and transforming their ancient culture. But it would go too far to suggest that Confucianism was 'created' solely by Confucius and Confucianism was sustained exclusively by the faith in Confucius. In this sense, the word 'Confucianism' is a misnomer for the tradition that is normally referred to as *ru jia*, *ru jiao*, *ru xue* or simply as *ru* in China and other East Asian countries (p. 17).

Nevertheless, Confucius' role was crucial. In virtue of clearly articulating the central tenets of *ru*, and doing so in a compelling and clear way, Confucius revitalized the tradition. What, then, did he have to say?

Confucius was primarily concerned with humans and the principles that shaped humanity.

In particular, he believed that healthy social relationships were essential for a prosperous society. To this end, he advanced two especially important theses: Persons can teach and learn goodness, and a peaceful society is only possible when it is ruled by wisdom (Yao, 2000, p. 26). From these theses, Confucius eventually developed his four key ideas—those that would eventually become the foundation for the Confucian tradition. First, Confucius continued to promote *dao*, which literally translates as "path," "road," or "way." Following *dao* was the basis for moral and peaceful social conditions. Second, Confucius promoted rituals (*li*), which were thought to be instrumental for the cultivation of virtue, and a means of educating persons in the ways of *ru*. Third, he stressed the importance of humaneness (*ren*). Those who practiced *ren* would demonstrate a concern for the wellbeing of others and an avoidance of self-aggrandizement. And, fourth, Confucius promoted general virtue (*dé*). Confucian virtue was understood as a deeply held moral authority that granted persons power to act righteously. Confucius was especially concerned with the cultivation of *dé* among the aristocracy who were ultimately responsible for the prosperity of society (Yao, p. 26). Taken together these four components roughly describe the tenets of Confucianism. Of course, generations of scholars and religious leaders have expanded and transformed classical Confucianism. In the following section, I focus largely on primary sources—the works of Confucius themselves and the five virtues they advance.

The central virtue and one of the guiding principles for Confucius is *ren*. *Ren* functions as a kind of moral attitude and is comprised of various "building block" virtues. When these blocks are fitted together a person will display what Confucius calls "humanity." This is *compassionate* humanity (a concerned regard for the dignity of humans) and is central to the Confucius' social philosophy. The person who possesses *ren* is "a man [sic] who is strong, resolute, simple, and slow to speak is near to humanity" (Confucius, 2010, bk. 1 chap. 14). He seems to suggest that rashness and loquaciousness impede one's ability to understand the human condition. As noted,

however, *ren* is made up of several other virtues (*dé*). These are described in the analects:

Zizhang asked about *ren*. The Master said, “He who can enact five things in the world is *ren*.” When asked for details, he went on, “Reverence, tolerance, trustworthiness, quickness, and generosity. He is reverent, hence he receives no insults; he is tolerant, hence he gains the multitudes; he is trustworthy, hence others entrust him with responsibilities; he is quick, hence he has accomplishments; he is generous, hence he is capable of being placed in charge of others (Confucius, 2010, bk. 17 chap. 6).

These virtues work together and are dependent on each other. One’s generosity should be characterized by earnestness; one’s truthfulness prompts diligence, and so forth. Confucius never talks about the virtues in isolation. Virtue epistemologists have noted this interrelationship between virtues although the issue is a “thorny” one (Zagzebski, 1996, p. 156). Finally, according to Lee Rainey (2010), the moral virtues (*dé*) culminating in (*ren*) are expressed via ritual (*li*) (pp. 34-35). In fact, the cultivation of virtue is directly tied to ritual and education.

Education: The Cultivation of Virtue through Ritual and Self-Reflection

Confucians believe that virtues are acquired through cultivation and education, and/or some mixture of both. “Its chief aim is to educate the learner to be fully human and to become a qualified member of the community of trust, and its primary approach is to enhance self-cultivation and develop students’ capabilities of fulfilling their responsibilities for themselves, for their families and for society at large” (Yao, 2000, p. 283). The goal of Confucian education (which is true of many cultures) is ultimately tied to the social prosperity of the community. Confucius (2010) writes, “Cultivate yourself to bring comfort to the people” (bk. 14, chap. 42). Learning begins with oneself but extends to others. He takes this

one step forward, arguing that a love of learning is requisite for many of the virtues.

If, you love *ren*, but you do not love learning, the flaw is ignorance. If you love knowledge but you do not love learning, the flaw is unruliness. If you love faithfulness but do not love learning, the flaw is harming others. If you love straightforwardness but you do not love learning, the flaw is offensiveness. If you love valor but you do not love learning, the flaw is causing chaos. If you love incorruptibility but you do not love learning, the flaw is recklessness (Confucius, 2010, bk. 17, chap. 8).

The desire to learn—that is, to take an active hand in acquiring new understanding—plays an important role for Confucius. Students who train their minds have the tools available to achieve positive ethical outcomes; they have the necessary know-how and know-that to exercise virtue. Moreover, learning itself refines and strengthens these virtues. Without learning, however, the impulse to behave virtuously may never obtain or (worse still) may result in vicious behavior. There is another important point to be made: “love of knowledge” is also an *intellectual virtue*—one that plays a very important role in the acquisition of knowledge and understanding. Robert C. Roberts and W. Jay Wood (2007), for example, argue that the love of knowledge is a central epistemic virtue. Those who love knowledge are prone toward fact checking, persistence, and open-mindedness. In short, those who love learning also love knowledge (pp. 153-182).

Finally, I wish to note a few important features of traditional Confucian education—features that putatively nurture the aforementioned virtues. Educators in the Confucian tradition stress deep reflection, which involves intense study and careful analysis of the subject matter. The ultimate goal of this educational activity—at least on the traditional account—is the perfection of the person. Quite contrary to the Christian view of “original sin” and essential wickedness of human nature,

Confucius held that persons were fundamentally good. Education, then, provided a way to move toward this perfection. Chinese students have amassed a well-deserved (almost stereo typical) reputation for being extremely diligent and hardworking. This might be attributable to the philosophical (and educational) foundation laid by Confucius and his followers. The very first lines of the *Analects* illustrate how important study was to Confucius: “The Master said: To study and at due times practice what one has studied, is this not a pleasure?” For Confucians, education is a lifelong process of self-cultivation that emphasizes strength of will and determination. Timothy Bergen (1995) explains that Chinese emphases on “perfectibility, learning, rationality, effort, and will-power” are closely related to one another in Confucian literature, and that “this fact sheds light upon how Eastern learners view education and explains why effort is seen as important in the process of human perfectibility” (p. 45). In the language of virtue: Chinese educational culture values diligence and steadfastness with respect to learning.

South Asian Virtue – Buddhism

Buddhism is among the largest and most influential religions in the world. Its primary concentration is in the region of South Asia, which includes India, Pakistan, Sri Lanka, Nepal, Bhutan, Bangladesh, and Burma. Leslie Alldritt (2005) estimates that there are approximately 360 million Buddhists in the world, making it the third largest religion in the world after Christianity and Islam (p. 4). It has been estimated that over half of the world’s population lives in areas significantly influenced by Buddhism (Harvey, 1990, p. 1). Numerous varieties of Buddhism exist, although three broad schools are dominant: the Southern variety where Theravada Buddhism is prevalent, the Eastern version which mixes Chinese religious tradition with Buddhism, and the Northern variety found in Tibetan culture—the modern inheritors of ancient Indian Buddhism (Harvey, 1990, p. 4). The following analysis draws from the sacred canons of each of these schools with the intention of providing a general account of Buddhist understandings of virtue.

The founder of Buddhism, Siddhārtha Gautama (500? – 350? B.C.E.) was born and taught near the Ganges River in Northeastern India. However, the historical facts about his life remain contested. Most accounts, though, assert that he was born into a wealthy family and with the prospect of hold power. Michael Carrithers (1983) offers the following sketch:

The Buddha was born the son of a king, and so grew up with wealth, pleasure and the prospect of power, all goods commonly desired by human beings. As he reached manhood, however, he was confronted with a sick man, an old man and a corpse. He had lived a sheltered life, and these affected him profoundly, for he realized that no wealth or power could prevent him too from experiencing illness, old age and death. He also saw a wandering ascetic, bent on escaping these sufferings. Reflecting on what he had seen, he reached the first great turning-point of his life: against the wishes of his family he renounced home, wife, child and position to become a homeless wanderer, seeking release from this apparently inevitable pain (p. 2).

Despite Carrithers own admission that his account is only roughly true, it nevertheless explains an important feature of the Buddhist religion. The Buddha’s path to enlightenment originated in his confrontation with the existence of pain and suffering. Carrithers goes on to describe how the Buddha began his spiritual journey by practicing meditation and self-mortification. These proved ineffective until one day he determined to quietly reflect upon the human plight. From this tranquil contemplation he achieved an awakening—solving the “enigma” of suffering. For the next forty-five years he spread his message of enlightenment, and a world religion was born (p. 3).

To grasp how Buddhists understand the concept virtue, it is necessary to cover the basic teaching of Buddhism. According to Stephen Laumakis (2008), the most important concept in all Buddhist thought is the notion that who we

are is product of our thinking. Just as the body is shaped by food and exercise (or lack thereof), so too can we “maintain, shape, transform, and indeed, strengthen” our minds’ “powers by meditative practices and exercises” (p. 40). To control the mind and thus perception is the goal of Buddhist religious experience. Bearing this insight in mind, let us briefly consider the tenets and practices of Buddhism as manifest in the Middle Way, Four Noble Truths, and Eightfold Path.

The Three Teachings

The Buddha taught that a way between extreme asceticism and hedonism existed—what came to be known as the Middle Way. The Buddha discovered that self-denial and mortification produced debilitating emotional and physical suffering, and failed to live up to its promises. While, on the other hand, hedonistic enjoyment of life’s pleasures failed to fulfill his desire for peace, worldly pleasure was too fleeting to bring lasting joy. The Middle Way, however, “gives rise to vision, which gives rise to knowledge, which leads to peace, to direct knowledge, to enlightenment...” (Laumakis, 2008, p. 47). Metaphysically, the implications of the Middle Way are that human souls are not fixed and eternal, nor are they destined for ultimate annihilation. Instead, they are *annatta*—lacking a fixed self (Laumakis, p. 270). Epistemologically, the Middle Way suggests cautious path between naïve certainty and total skepticism about our beliefs.

The Four Noble Truths capture the basic teachings of the Buddha and are modeled on Indian medical science: confirming that patient is sick, diagnosing the sickness, prescribing treatment, and implementing the cure. The Truths follow this pattern. The first noble truth simply states that *dukkha* (suffering and pain) exists—both existential and physical *dukkha*. This is the starting point of the Buddha’s thought. The second Noble Truth is more complex. It states that the causes of *dukkha* are linked in a causal chain that begins with “contact” with the world, others, and ourselves. This contact produces sensation, which in turn producing craving, and craving produces

suffering when it is unrequited. The third Noble truth states that the cessation of these causes of *dukkha* is possible. Finally, the fourth Noble Truth prescribes the *Way* to overcome *dukkha*—the Eightfold Path (Laumakis, 2008, pp. 52-60).

The specifics of the Buddha’s Middle Way are laid out in the Eightfold path. These steps are (Olson, 2005, p. 54):

Right View or Understanding

Right Thought or Purpose

Right Speech

Right Behavior

Right Livelihood

Right Effort

Right Mindfulness

Right Concentration

The term “path” suggests that one takes consecutive and linear steps toward enlightenment. This is a misunderstanding as these steps occur simultaneously. Moreover, the word “right” indicates that one correctly perceives the true state of affairs or reality. These steps are also divisible into three main categories: Wisdom, Meditation, and Moral Action. The first category—Wisdom—indicates that one grasps the Four Noble Truths and their implications for life. “This is the greatest wisdom that one can achieve in this life. These are skillful, useful, and beneficial views. If you attain this wisdom, you are liberated from the cycle of pain and sorrow” (Olson, p. 55). Grasping this Wisdom recommends taking steps toward addressing the existence of *dukkha*. Meditation, the second category, explicates this massive mental struggle to free the mind of evil states. Controlling the mind and cultivating strength of will are essential because the mind defaults to craving and grasping for things that lead to suffering. The final category—Moral Action—involves our conduct in speech, behavior, and livelihood. Here Buddhists believe that the reduction of *dukkha* depends upon our willingness resist participating in the causal

chain of suffering. Put differently, when we resist repaying an evil with another evil we stop the chain reaction that promulgates further suffering. This final category gets us closer to a Buddhist theory of virtue.

Buddhism and Virtue

Three steps on the Eightfold Path deal explicitly with moral action. It is not surprising that Buddhists have written extensively on moral character. According to Damien Keown (2005), “There is more to the Buddhist moral life than following rules. Rules must not only be followed, but followed for the right reasons and with the correct motivation. It is here that the role of the virtues becomes important.” He goes on to claim that the precepts (rules) and virtues are two sides of the same coin. Precepts are essentially “a list of things a virtuous person would never do” (p. 12). Like many other religious traditions, Buddhist virtues are supposed to be habituated so that they come forth naturally from a person’s character. This corresponds with Zagzebski’s (1996) observations about the motivational component of intellectual and moral virtues—the view that they impel us to act and think in particular ways (p. 167). Likewise, the virtues counteract their *dukkha* producing opposites—*klesas* (what we call vices in the West). In other words, those who are virtuous are less prone toward generating more suffering in the world.

Perhaps the most influential list of virtues was composed in the Mahayana tradition. In this tradition, the bodhisattva (an enlightened person or being) practices six core virtues—referred to as the *paramita* or Six Perfections. These include generosity, morality, patience, perseverance, meditation, and insight (Keown, 2005, p. 17). However, earlier it was noted that followers of the Buddha must struggle to avoid negative thinking. This fact directly affects the way that such virtues are practiced. Suppose an enlightened Buddhist monk decides to minister to the needs of homeless people. He discovers an alley where the homeless are living in cardboard boxes. They are dirty, underfed, and sickly. A natural human response would be to place

oneself in these persons shoes, and to be filled with despair.

To become emotionally identified with her would be like a person without any ability to swim jumping into a lake to save a drowning child, which would result in a double drowning. It is necessary for a compassionate person to be cool-headed and emotionally self-controlled, a posture similar to that of a medical doctor analyzing a patient and prescribing a remedy in a detached manner—which does not mean a cold-hearted, uncaring way. The Buddhist goal is to strive for the spontaneous exercise of compassion (Olson, 2005, p. 69).

Thus the monk has learned to control his mind. He understands (insight) the situation and feels appropriate amounts of compassion and generosity. He also understands that his ministrations—while good and noble—will make only a small difference. And he perseveres; he returns to that ally each day, all the while refusing to succumb to *dukkha*.

Education: Obtaining Virtue through the Five Precepts

Virtue is taught via the Five Precepts that *lay* Buddhists are encouraged to follow in both the Mahayana and Theravada traditions. These include a respect for life, avoidance of theft, abstinence from sexual misconduct, avoidance of untruthfulness, and avoidance of drunkenness. The precepts “are meant to be followed by Buddhists at all times, the object being to establish a habit-formation of virtuous and restrained conduct, in opposition to the unwholesome tendencies of greed, hatred, and delusion...” (Story, 2009, para. 7). Living by these principles not only encourages self-control and moral behavior, but also places a person in a positive—habit forming—state of mind that affects deep change. Helmut Klar (2011) offers several methods for inculcating the Five Precepts into a child’s education. First, he notes that imitation (of parents and teachers) is of central importance. When parents take their

dharmic responsibilities seriously, and live those convictions out, children will imitate them. Klar also encourages parents to celebrate Buddhism with their children. This can be done by keeping images of the Buddha in the home, and celebrating festival days. Finally, he notes the importance of reading and discussing Buddhist texts with children, especially the Five Precepts (pp. 2-6). Taken together, such activities are foundations for “learning by heart”—that is, fostering a deep regard and love of Buddhism from a very early age.

Cultivation of virtue is integral to following the Middle Way of the Buddha, and thus assumes privileged place in Buddhist monastic education. Future monks are taught the necessity of cultivating inward virtues in both ritual-based education and their philosophical training. George B. J. Dryfuss (2003), a Westerner who studied in the Dalai Lama’s temple for 15 years, describes several ways this is done. First, he points out that newly arrived monks are immersed in rigorous ritual life. New monks, for example, are encouraged to recite texts with specific and highly precise inflection. This is thought to preserve textual meaning, but it is also thought to cultivate the virtues of conscientiousness and carefulness (pp. 86-87). If monks decide to pursue scholarship in the monastery, their training regimen intensifies significantly. They continue to memorize large portions of text (largely philosophical texts) but add to this education training in debate—the primary method of teaching for many monastic teachers. The central goal of which is to produce perspicuity of thought and critical reasoning skills. As noted earlier, however, the skills (or virtues) do not operate in isolation from other virtues. The monk, whose thoughts penetrate truth, is one whose character is deeply virtuous (Dryfuss, p. 170).

Greek Philosophy

Virtue has a long history in Western (European) thought—particularly through the influence of Greek philosophy and Christianity—and one could fill several volumes tracing its extensive influence. Instead, I provide a very rough sketch of virtue by highlighting

some key concepts that emerge from Greek philosophy and contemporary virtue ethics.

The two key concepts that preoccupied ancient Greek moral theory were virtue (*arête*) and happiness (*eudaimonia*). Prior to Plato and Aristotle, however, the two concepts were nearly synonymous. “[Virtue] amounts, roughly, to success in life, where such success is measured largely if not entirely in external terms—in the extent to which one has acquired the typically recognized good things in life: wealth, power, friends, and the like” (Meyer, 2008, pp. 3-4). The distinction between virtue and happiness on this account is blurry. Virtue is understood almost exclusively by its external manifestation, e.g., one is virtuous when one is obviously successful. In Plato and Aristotle, however, virtue is redefined as an internal characteristic or trait (Meyer, p. 4). One might act courageously, for example, but one is courageous only insofar as courage is a deeply engrained character trait.

Aristotle is probably the most influential Greek philosopher to articulate a concept of virtue. He begins by noting that our actions generally have a goal (*telos*)—a reason for having done them. “Every skill and every inquiry, and similarly every action and rational choice, is thought to aim at some good” (Aristotle, 2004, p. 3). Indeed, if our actions lacked some sort of goal they would be essentially meaningless. Aristotle also distinguishes between two forms of *tele*: there are goals that facilitate achieving other goals, and there are goals that we pursue *for their own sake*. Consider the act of making cookies. There are a whole series of steps I must take in order to make (and eat) a batch of cookies. I have to run to the market and purchase the ingredients, prepare the batter, knead the dough, pre-heat the oven, and so forth. Each of these steps is a *telos*—but each points toward a greater *telos*: to enjoy a batch of fresh cookies. This greater *telos*—enjoying cookies—explains the steps I took along the way. “The ubiquitous human phenomenon of doing things for reasons, therefore, depends on there being at least one thing we pursue for its own sake” (Meyer, 2008, p. 52). Of course, there are many things we pursue for their own sake—friends, lovers,

children, prosperity, pleasure, and so on. But, as Aristotle notes, “we choose them also for the sake of happiness, on the assumption that through them we shall live a life of happiness; whereas happiness no one chooses for the sake of any of these nor indeed for the sake of anything else” (p. 3). In short, for Aristotle happiness is the ultimate good and the *telos* for which we should all strive.

What role do virtues like courage, honesty, and practical wisdom play in the acquisition of happiness? To address this question, two points need to be clarified. First, Aristotle tells us that our basic function—that which makes us distinctly human—is our capacity to reason. Roger Crisp (2004) offers an interesting and helpful analogy. “It is worth remembering that in Greek a horse that ran fast could be said to have a ‘virtue’ or excellence, in so far as it performed well its characteristic activity” (p. xiv). A horse has a virtue when it performs well in one of its basic functions. Many take Aristotle to be endorsing what has come to be known as the “function argument, which takes the following form (Meyer, 2008, p. 63):

1. Happiness is “doing well.”
2. Doing well means performing our human function well.
3. Our human function is reasoning.
4. Therefore, happiness consists in using our reason well.
5. Therefore, happiness is activity of excellence of reason.

When persons reason well—the basic function—they do so because they exercise virtue. Nafsika Athanassoulis (2011) elaborates: “If the function of man [sic] is reason, then the good man is the man who reasons well. This is the life of excellence or of eudaimonia. Eudaimonia is the life of virtue—activity in accordance with reason, man’s highest function” (para. 32). Thus happiness is the byproduct of reasoning well—of virtuous reasoning. This leads to a second consideration.

Second, the *nature* of reason is tied to Aristotle’s understanding of the bipartite soul. Briefly, the soul is divisible into rational and non-rational parts (Aristotle, 2004, pp. 103-104). The rational segment is the source of the *intellectual virtues*—the chief of which is practical wisdom. It is less obvious how the non-rational part of the soul relates to reason. Once more a division is created—this time into a part concerned with things like nutrition, but also a part that has “more in common with reason, and is capable both of opposing it (in the case of a weak-willed person, for instance) and of obeying it. The virtues of this second sub-part are the virtues of character: courage, generosity, and so on” (Crisp, 2004, p. xiv). Thus, excellent (virtuous) reasoning is tied to both virtues of character and intellectual virtues. As a consequence, those who are morally and intellectually virtuous experience *eudaimonia*.

Education: Cultivating Virtue through Education and Habituation

How, then, are the (moral and intellectual) virtues acquired? In the first place, Aristotle (2004) thinks they are acquired through different and separate means: “intellectual virtue owes its origin and development mainly to teaching, for which reason its attainment requires experience and time; virtue of character (*ēthos*) is a result of habituation (*ethos*), for which reason it has acquired its name through a small variation on ‘*ethos*’” (p. 23). Thus Aristotle’s virtues are acquired in two ways—through teaching (intellectual virtues) and habituation (moral virtues). Let us consider intellectual virtues first.

Aristotle distinguishes between two kinds of intellectual virtue: the contemplative and the calculative. According to Dunne (1999), contemplative virtues are learned deductively—that is, one starts with the general and moves toward the specific (pp. 49-63). These virtues include *episteme* (scientific knowledge), *nous* (intuitive reason), and *Sophia* (philosophical wisdom). *Episteme* or “scientific knowledge” provides a good example. One can (putatively) only acquire this virtue deductively—that is, by listening to descriptions, considering

explanations, and studying the arguments of one's instructors. The upshot is that it is acquired through teaching, *not habituation*. The calculative virtues, on the other hand, are more difficult to restrict to the result of teaching alone. In brief, the calculative virtues include *phronesis* (practical wisdom) and *techne* (skill). These virtues "enable one to attain 'variable' (contingent) truths that are 'in agreement with right desire'" (Battaly, 2006, p. 202). Moreover, each is acquired via inductive and deductive teaching. Practical wisdom, for example, is obtained through listening and considering lectures about "what is noble and just" (Aristotle, 2004, p. 6). Thus one learns practical wisdom via deduction. But induction is also important. This entails learning through practice—e.g., practice adjudicating and considering particulars—which begins to look very similar to *habituation*. I consider this point in more depth in the following chapter.

The moral virtues, as noted above, are acquired through habituation. "We become builders by building, and lyre-players by playing the lyre. So too we become just by doing just actions, temperate by temperate actions, and courageous by courageous actions" (Aristotle, 2004, p. 23). In short, we become virtuous by *practicing* virtue, which has the clear implication that the moral upbringing of students cannot be taught by instruction alone. It requires that children consistently practice virtuous acts thereby acquiring truly virtuous character traits. The matter is complicated, however, by Aristotle's claim that one cannot become truly morally virtuous without the presence of the intellectual virtue of practical wisdom.

It is clear from what we have said, then, that we cannot be really good without practical wisdom, or practically wise without virtue of character. Moreover, on these lines one might also meet the dialectical argument that could be used to suggest that the virtues exist in isolation from one another. The same person, it might be argued, is not best suited by nature for all the virtues, so that he will already have acquired one before he has acquired another. This is

possible in respect of the natural virtues, but not in respect of those on the basis of which a person is said to be really good; for he will possess all of them as soon as he acquires the one, practical wisdom (p. 118).

This is because the complexities of life often demand we discern a how to act properly. This interdependence of intellectual and moral virtues is at the heart of Aristotle's argument for the unity of the virtues.

African Concepts of Virtue

There is a vibrant philosophical community on the African continent. For example, in *A Companion to African Philosophy*, Kwasi Wiredu (2004) assembles an impressively diverse collection of essays addressing topics like the philosophy of mind, history of African philosophy, logic, and moral philosophy—all from a distinctly African perspective. But what is African philosophy? Somewhat simplified, there are presently two general perspectives on African philosophy—the traditional and the anti-ethnophilosophical. According to Wiredu, "Traditionalists have tended...to restrict the concerns of modern African philosophy to issues having some connection with traditional African thought and culture." On the other hand, the anti-ethnophilosophers argue that "the modern world presents intellectual challenges which may not all admit of such a derivation, and to abstain from involvement with them on the grounds of a non-African origination is unlikely to prove a blessing to Africa in the modern world" (p. 4). The division, then, centers on the role of Western thought. This issue extends beyond the concerns of this chapter. I would note, however, that the notion of virtue advanced here draws from traditional African philosophy.

It is also worth noting that the term *African Philosophy* is equivalent to using the term *Western philosophy*; each encompasses innumerable philosophical perspectives shaded by a larger cultural milieu. Sensitive to this, I have tried to restrict my generalizations to those made by Africans doing philosophy. There is

good reason for this. Africa is in the midst of crisis of self-determination—the consequence of having been aggressively colonized for centuries. It is for those whose lives are tied to the African continent, whose futures are (literally) at stake, to generalize about the nature of that future and self-identity.

Foundations for Moral Thought in Africa

In most African cultures, the foundation of ethics is twofold: a respect for the individual appropriately balanced with the needs of the community. But this is a tenuous balance as Segun Gbadegesin (1991) notes:

From this it follows that there need not be any tension between individuality and community since it is possible for an individual to freely give up his/her own perceived interest for the survival of the community. But in giving up one's interests thus, one is also sure that the community will not disown one and that one's well being will be its concern.... The idea of individual rights, based on a conception of individuals as atoms, is therefore bound to be foreign to this system. For community is founded on notions of an intrinsic and enduring relationship among its members (pp. 66-67).

To understand the virtues, one first needs to grasp the interdependent relationship between the individual and the community, and the mutual demands engendered by this relationship. Gbadegesin uses the term *survival* quite deliberately; many African communities have extremely limited access to natural resources. The individual that fails to grasp her obligations to community risk expulsion. What, then, is the character of this bond between the person and her community? Traditionally, this connection has been understood as fundamentally rooted in religion—that is, that the basis for morality is inextricably tied to the deeply religious nature of African culture. Several notable African scholars have propagated this view, including Bolaji Idowu, John Mbiti, and J. O. Awolala. Unfortunately, this view also misses an

important point: “These authors fail to understand what makes religion important in African life, namely, the welfare of the individual and that of society” (Bewaji, 2004, p. 397). African people are not—in the pejorative sense—so deeply religious as to have no regard for human welfare outside of religious systems of thought. Indeed, religion serves as a means of discharging their responsibilities to maintain human welfare. Devotion and worship of deities is performed genuinely, but not for the sake of the deity. Rather religious worship is offered for the benefit of society. When a deity fails to serve (or bless) the interests of the society, people are free to sever that relationship (Bewaji, p. 399). In short, African people *value* human life for its own sake—not as the product of blind religiosity.

African Virtue

Bearing these contextualizing remarks in mind, we can now turn our attention to African notions of virtue. Kwame Gyekye (2011) notes, “Good character is the essence of the African moral system, the linchpin of the moral wheel” (section. 1). Indeed, he also claims that:

Many writers have made the observation that despite the indisputable cultural diversity that arises from Africa's ethnic pluralism, there are underlying affinities in many areas of the African life; this is surely true in the African religious and moral outlook. There are some features of the moral life and thought of various African societies that... are common or shared features (section. 2).

Following Gyekye's assertion that “good character” is the basis for moral reasoning in African society, I examine the two largest ethnic populations in Western Africa—the Yoruba and Akan people.

Bewaji notes that the Yoruba hold to a set of pervasive ethical norms that regulate the behavior of both persons and the gods. Those who live uprightly—whose character exhibit virtue with respect to themselves, tribal elders, and others in general are variously called *oniwa*

rere, oniwa tutu, and Omoluwabi (Bewaji, 2004, 399). These terms denote persons that are esteemed in their respective societies for their virtuous character. Bolatito Lanre-Abass (2008) highlights six core virtues in Yoruba society. These include integrity (*iwa*), justice (*iwa eto*), trust (*igbagbo*), accountability (*akoyawo*), sensitivity (*iyara ni imo*), and service (*ise iranse*) (p. 132). The importance of cultivating such virtues is caught up in the Yoruba proverb, “The adornment of a smile is white teeth; the adornment of a person is good character” (Owomoyela, 2005, p. 268). Such proverbs are illustrative: they succinctly encapsulate the rooted cultural wisdom about the importance of virtue. As noted above, Africa societies emphasize the individual’s responsibility to the community and vice versa; the Yoruba are no different. The good or virtuous community member values and speaks highly of her town. “Whoever says the town is not pleasant should pack his or her luggage and head for the bush” (Owomoyela, p. 314). Indeed, numerous proverbs recommend that loyal community members should be recognized and rewarded for their faithfulness to community.

The Akan people of Western Africa echo similar sentiments. “When virtue finds a town, the town thrives and abides.” The Akan link the success of a town to its character—or rather, the character of its people. This reiterates the social nature of African moral thought and central place of character. Indeed, individual happiness is only achieved when one is in right standing with his fellows: “The well-being of man depends on his fellow man” (Gyekye, 2011, section 8). Among the several virtues valued by the Akan are goodwill, sympathy, compassion, and altruism. But this raises another question: How are the virtues acquired or learned?

Education: Personhood and the Acquisition of Virtuous Character

Becoming virtuous is an ongoing process social education in which persons continually evolve. In fact, the relationship between character and education is the basis for understanding personhood in African thought. Ifeanyi Menkiti (1984) explains:

The various societies found in traditional Africa routinely accept this fact that personhood is the sort of thing which has to be attained, and is attained in direct proportion as one participates in communal life through the discharge of the various obligations defined by one's stations. It is the carrying out of these obligations that transforms one from the it-status of early child-hood, marked by an absence of moral function, into the person-status of later years, marked by a widened maturity of ethical sense—an ethical maturity without which personhood is conceived as eluding one (p. 176).

According to Menkiti we begin our life-journey with *it-status*—that is, without a secure identity. Over time, however, through responsible participation in the life of the community we obtain *person-status*. D. A. Masolo (2004) argues that personhood is actually “attained through an educational process that intensifies at every stage in one’s growth and development” (p. 491). He offers the example of message carrying. Children in many African communities are tasked with carrying message from one person to another. While seemingly innocuous, such task are designed to train children “in the virtue of obedience and serve to others while also bring them to the knowledge of close and distant relatives, an obvious attempt to fit children into the larger social system...” (Masolo, p. 492). As children mature into adolescence and then to adulthood, their social obligations increase (as does their status as persons). Ideally, their character develops in similar proportion. Of course, both good and bad character traits may emerge. One Akan proverb states that “one is not born with a bad head, but one takes it on from the earth” (Gyekye, 2011, section 3). In short, persons are not born with intrinsic character traits and habits, but obtain them through time, training, and experience.

Some Points of Contact and Divergence

It goes without saying that the intellectual traditions discussed are radically different in many ways: their religions, cultural customs and traditions, even their moral practices and laws. Certain Asian cultures, for example, believe it is perfectly ordinary and unproblematic to give monetary gifts to potential clients in order to gain their business. In the United States such practices are illegal. Likewise, the sacrifice of animals is an act of worship for many cultures, but a cause for horror in many European cultures. This highlights the fact that, although two cultures may value similar virtues, the manner in which these virtues shape customs and practices leaves a lot of room for difference. Let us consider some of these similarities and differences.

The Confucian notion of *Ren*—the sum total of virtues leading to compassion—is a crucial component of Confucian ethics. Both Buddhist and African traditions also have placed great emphasis on an empathetic stance toward others. Indeed, the stability of African communities hinges on a concern for the wellbeing of other members of the community. Although Aristotle was primarily concerned with individual happiness, he also believed that those who were virtuous would display attitudes of friendliness, generosity, and justice.

Buddhism's emphasis on enlightenment is founded on controlling and modifying one's cognitive life. A similar thrust is evident in Confucianism's emphasis on the importance of education. Recall that Confucius (2010) believed a love of knowledge central to the acquisition of virtue. In fact, he believed that one would become vicious without knowledge (bk 14, chap. 42). This partially explains why both traditions emphasize diligence and hard work with respect to learning. Aristotle also stressed the importance of the cognitive life, believing that our most basic function is reason. Those who reason well embody the virtues. They also experience happiness and Aristotle (2004) tells us "happiness, therefore, will be some form of contemplation" (p. 198).

With respect to the virtues of character, Aristotle argued that they are obtained through habituation and practice. This insight is echoed in African moral thought. Children are given multi-layered tasks that develop character, and initiate them into the larger community. The latter is intended to cultivate a concern for the wellbeing of the community at large. This is a form of habituation, or learning by practice and repetition, and a feature that African societies share with the other traditions discussed. The rigorous memory training undergone by Buddhist monks, for example, teaches diligence, conscientiousness and carefulness (recall, they must inflect perfectly). Furthermore, Confucians, Buddhists, and Aristotelians share a regard for rules and/or precepts. These do not replace the cultivation of virtue. Rather, they provide a framework that enables persons to mature into virtue.

A devotion to community is a central feature of many African societies. Indeed, one's personhood hinges on maturing into a responsible (virtuous) adult. For the Yoruba this involves cultivating integrity, justice, trustworthiness, accountability, sensitivity, and service. These community-directed virtues are echoed in each of the traditions considered. This is evident in Confucian idea of *ren*—of becoming "near to humanity" (Confucius, 2010, bk 1, chap. 14). The person who has *ren* has a deep concern for other members of the community. Buddhists also practice community-directed virtues. For example, the custom of giving is an ancient practice intended to bring the negative craving for personal possessions under control, but it is also practiced for the sake of the wellbeing and unity of the community (Olson, 2005, p. 104). Finally, in a passage on the virtue of friendship, Aristotle (2004) states clearly that a concern for community is tied to a person's honor: "The person who contributes nothing to the community is not honored, since what is common is given to the person who benefits the community, and honor is something common" (p. 163).

Clearly positive accounts of virtue are present in each of the traditions considered. In this respect, the concept of virtue putatively

transcends cultural “borders” and religious traditions. But this does not diminish the fact that cultures also differ in terms of the virtues. Martin and Seligman (2004) conducted a survey of 15,000 persons from numerous distinct cultural contexts, and undertook a large-scale historical survey of ancient traditions to determine how virtues function in multiple contexts. They found that, despite these variations, six core virtues were present in every cultural context:

When data collection was complete, analysis involved condensing each list by locating thematically similar virtues and classifying them under an obviously emerging core virtue. By that term, we mean an abstract ideal encompassing a number of other, more specific virtues that reliably converge to the recognizable higher-order category (p. 35).

These higher-order categories included: wisdom, courage, humanity, justice, temperance, and transcendence. Twenty-four additional and more specific virtues were then categorized under each of these headings. Here there was a greater degree of variety between cultures. It is also important to note that these higher-order virtues did not share a one-to-one relationship across cultures.

While much more research should be done on the topic discussed in this paper, I one particularly powerful observation should be made about cross-cultural communication. Virtue—or more precisely—virtuous communication might aid in ameliorating cultural misapprehensions, misunderstandings, and in extreme cases—xenophobia. David Carr (2003) has pointed out that the strength of virtue theories is that the language it employs cuts across cultural divides:

To be sure, we can see that people from different parts of the world have very different—even contradictorily opposed—moral beliefs, but we are nevertheless able to recognize certain cross-cultural criteria of moral attitude

and conduct. The Moslem [sic] shopkeeper down the road has different beliefs from me, but I am well able to appreciate his honesty, integrity, courage and industry; on the other hand, I may have no trouble recognizing the racist bigots who persecute him—albeit in the name of my own culture—for the liars and cowards that they are. It is also clearly important that some such cross-cultural criteria of moral value are recognizable if there is to be the possibility of holding some cultures to moral account precisely for their injustice, mendacity, intemperateness or cruelty. From this viewpoint, it seems a mistake to index virtues to rival moral traditions in the manner of some recent neo-idealist moral and social theories—for the language of virtue is arguably the cross-cultural ethical currency of humankind (p. 231).

The evidence presented thus far suggests that Carr is correct; talk of courage, honesty, and justice are not foreign concepts to those of diverse backgrounds. Carr does not mention, however, that the cross-cultural “language of virtue” is predicated on a *disposition* and *willingness* to communicate. I suggest, then, that certain character traits are crucial if cultural exchange and understanding is to be achieved. An individual and society should be open-minded and epistemically humble. An open-minded person or society is receptive to other ideas and customs; it values and thus strives to understand others. In short, such persons (and cultures) begin with the presupposition that what we *know* and *understand* about other people groups is potentially wrong-headed, limited, or misguided.

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Abstract

The purpose of this study was to explore the beliefs middle school mathematics teachers have about ELLs, to identify the strategies used to help ELLs, to explore the support teachers need to teach ELLs, and understand some of the experiences of ELLs in mainstream mathematics classrooms. In addition to student and teacher interviews, 106 middle school mathematics teachers from 11 school systems completed a questionnaire. The qualitative portion of the data is presented here.

“When I first came here, I feel nervous and scared because I didn’t understand any English.”

–Trong, 8th grader from Vietnam

By the year 2030, approximately 40% of the school population in the United States will speak English as a second language (U.S. Department of Education, 2003). In order for English Language Learners (ELLs) to become academically successful, teachers must hold positive beliefs and high expectations for them. The beliefs and attitudes of teachers, perhaps as much as qualifications, can affect what children learn in their classroom. Teacher beliefs and attitudes, which are formed by the values they hold, play an important role in student performance (Freeman & Freeman, 1994; Moore, 1999). Thompson (1992) emphasizes that “to understand teaching from teachers’ perspectives we have to understand the beliefs with which they define their work” (p. 129).

Not only do teachers’ beliefs affect the expectations they hold of students, but their actions in the classroom also reflect their beliefs. The study of beliefs is a crucial element in teacher education because beliefs “drive classroom actions and influence the teacher change process” (Richardson, 1996, p. 102). Therefore, it is necessary to learn about the beliefs of teachers before trying to change their practices. According to Peregoy and Boyle (1997), if teachers have unexamined negative

beliefs toward ELLs, even well meaning teachers might discriminate without realizing it.

Purpose

The purpose of this study was to explore the beliefs middle school mathematics teachers have about the ELLs in their classrooms, to identify the strategies these mathematics teachers use to help the ELLs in their classrooms, and to explore the support teachers need to teach the ELLs in their classrooms. Finally, I hoped to learn how ELLs feel in their mainstream mathematics classrooms.

Review of the Related Literature

“I like barely came to school. We went to school in the class and she told me to go to the board and when I still haven’t read the question, so I just had to guess.”

–Alicia, 6th grader from Mexico

Similar to Ladson Billings’s (2004) discussion of the problem of “the poverty of culture” in teacher education, Pettit (2011) believes there is a “poverty of language learning” in U. S. teacher education. She claims that many teachers who have completed their degrees have an overwhelming lack of knowledge of second language acquisition

(SLA), multicultural education, and English to Speakers of Other Languages (ESOL) pedagogy. Research has shown that teachers' beliefs influence their classroom behavior (Pajares, 1992; Rueda & Garcia, 1996). According to Harklau (2000), the actions of teachers of ELLs "not only serve to teach language but also serve to shape students' attitudes toward schooling and their very sense of self" (p. 64).

Research has shown that many mainstream teachers believe ESOL students are primarily the responsibility of the ESOL teacher (Harklau, 2000). This is both impractical and incorrect. As Yoon (2008) states, "Teaching ELLs is not a responsibility of only ESL teachers but also of classroom teachers" (p. 516). Pettit (2011) identified a set of beliefs for successful inclusion of ELLs that include (1) high expectations for ELLs, (2) accepting responsibility for ELLs, (3) encouraging native language use both at home and in the classroom, (4) an awareness of the time it takes ELLs to learn academic English, and (5) a desire for professional development in relation to ELLs when needed.

Method

"When I was new, I was, like, nervous, not talking to people because you don't know no one and sad because the teacher asks something and you don't know but some people tell you but you still don't know if they tell you exactly what she says."

--Alicia, 6th grader from Mexico

Both qualitative and quantitative data were gathered for the study. Specifically, data came from three sources: a web-based teacher questionnaire, student interviews, and teacher interviews. Middle school mathematics teachers of ELLs completed the "Mathematics Teachers' Beliefs about English Language Learners Questionnaire." The questionnaire was distributed to 439 teachers in 11 school systems. Due to space limitations, only the qualitative data is discussed here.

Mathematics Teachers' Beliefs about English Language Learners Questionnaire

The qualitative portion of the questionnaire includes five open-ended items to give respondents an opportunity to either add more detail or say something that was not brought up through the other types of items. The open-ended items are (1) What are some of the challenges you face with the ESOL students in your classes?, (2) What do you like about teaching ESOL students in your mathematics classes?, (3) Please describe any strategies you use to help ESOL students in your classes., (4) In what ways do you feel the ESOL students in your classroom do or do not have an equal opportunity to learn the material in your mathematics class?, and (5) Please write any additional comments you have about this questionnaire or about the inclusion of ESOL students in mainstream classrooms.

Student Interviews

I interviewed four ELLs to provide student perspectives on being in mainstream classrooms. The interviews lasted approximately one half to 1 hour each. The interviews were conducted in the schools of the students. I tape recorded and later transcribed the interviews.

Table 1

ELL Interviewee Demographics

Student	Language	Grade	Gender
Alicia	Spanish	6 th	Female
Carlos	Spanish	6 th	Male
Diego	Spanish	8 th	Male
Trong	Vietnamese	8 th	Male

Note. All names are pseudonyms.

Teacher Interviews

In order to provide a more in-depth description of the teachers’ beliefs than could be attained just through the questionnaire, I interviewed five teachers. Table 2 provides demographic information on the 5 teachers I interviewed. They were all female.

The interviews took place in the schools where the teachers worked and lasted approximately 1 to 2 hours each. A Teacher Interview Protocol served as a guide for the interviews; the guide was semi-structured and was driven by questions that emerged from the questionnaire data. I tape recorded and transcribed the interviews.

Table 2

Teacher Interviewee Demographics

Teacher	Grade Level	% ELL in County	ELL Program Type
Ana	6th	0.4%	Pull-out
Colleen	6 th	10.4%	Inclusion/co-taught with ESOL teacher
Diane	7th	3.8%	International Center for recent immigrants
Hannah	8th	10.4%	Inclusion/co-taught with ESOL teacher
Linda	8th	0.4%	Pull-out

Note. All names are pseudonyms.

Analyses

I used a mixed research design of survey research followed by qualitative interviews. Qualitative analysis of coding and categorization of interview data provided a deeper understanding of middle school mathematics teachers’ beliefs about ELLs as well as information about the experiences of ELLs in mathematics classrooms.

Results

“Math is hard because I don’t understand so much English, and that makes it hard.”

--Diego, 8th grader from Mexico

I analyzed the five open-ended questionnaire items and the interview data qualitatively. Initially, I used Strauss and Corbin’s (1990) open coding system to write down any of my thoughts as I read the interview transcripts and open-ended responses. From there, codes were applied that resulted in categories, then themes (see Table 3). I used a combination of content and thematic analysis (Ezzy, 2002) because at times the categories were predetermined, yet other categories emerged from the data. Results of the analyses for each research question follow.

Table 3

Examples of Categories and Themes in Qualitative Analyses

Category Examples	Predetermined?	Research Question
Advantages	Yes	1
Challenges	Yes	1
Placement in mainstream classroom	Yes	1
Native language	Yes	1
Teachers’ beliefs about assessment with ELLs	Yes	1
Teaching experience, lived in a non-English speaking country, training received, gender, languages spoken, travel experience, ELL percentages	Yes	2

Modifications: differentiation, collaborative learning	Yes	3
Strategies: ESOL teacher, games, bilingual resources	No	3
Professional development	Yes	4
ESOL teacher collaboration	Yes	4
Students' opinions about assessment in mathematics	No	5
Students' experiences with teacher strategies used	Yes	5
Students' opinions about materials in mathematics: tests, textbooks, worksheets	No	5

Theme Examples	Research Question
ELLs motivation to learn	1
Lack of time	1
Reading in math	1
Vocabulary in math	1
Language learning in math	1
Responsibility for ELLs	1
Parental and home support	1
Bilingual textbooks and resources	3
Lack of collaboration	3
Mathematics/ESOL teacher tension	4
Words in mathematics	5
Writing in mathematics	5
Inconsistency in assessment	5
Bilingual resources desired	5

Note. No themes were predetermined, but were created based on participant responses to open-ended items and comments during interviews.

Research Question 1

What are the beliefs of middle school mathematics teachers about ELLs in mainstream classrooms?

Teachers' beliefs about the advantages of teaching ELLs. On the open-ended questionnaire items, teachers made many positive comments about ELLs. For example, 8 teachers mentioned ELLs being hard working or trying very hard; 7 teachers felt that ELLs were eager to learn or had a desire to learn. The most frequent comment, made by 10 teachers, was that they liked the diversity ELLs bring. For example, some teachers said they enjoyed learning about different cultures, backgrounds, and viewpoints from the ELLs in their classes.

One teacher I interviewed said that it helps broaden the thinking of the native English speaking students to have ELLs in their classes. This teacher also said the having more ELLs in class will “make you become more patient.” Similarly, another teacher I interviewed said that the native English speakers benefited from seeing someone who did not speak English struggle through that process. When asked about the effects of ELLs on the other students in the class, another teacher I interviewed said, “I am a firm believer that difference helps everybody.”

Teachers' beliefs about the challenges of teaching ELLs. In one open-ended item, teachers reported the challenges they face; Table 4 summarizes the most frequent responses. In response to an open-ended item, one teacher said, “There just isn't adequate time to assess their needs in a classroom with other students who speak English.” Related comments included, “I often do not have the time to teach all of the skills needed for their grade level” and “There is not enough time to cater to all students.” A common concern seems to be meeting the needs of the English-speaking students in a class with ELLs. For example, an open-ended item response read, “I understand

what I am supposed to do for my students. But when I have an ESOL class, no ESOL co-teacher, and little training, I simply cannot sit down and modify 28 different lessons. It's not feasible." Similarly, a teacher reported during an interview, "When I didn't have an ESOL teacher in the classroom, I just struggled, and it was all by myself. The native speaking English students were put on hold." Additionally, two out of the five teachers I interviewed said that the native-English speakers suffered academically by having ELLs in their classrooms.

Table 4

Challenges Faced by Teachers of ELLs in Mainstream Mathematics Classes

Challenge	Frequency
Language Barrier	9
Time (for planning, in the classroom)	6
Communication with parents	4
Communication with students	3
Word problems/vocabulary	2
"Some students are making no effort to become proficient in English"	1
"Students can and do exhibit racism"	1
Kids speaking their native languages	1
Impossible to "catch them up" in a classroom of 28	1
Lack of parent involvement	1

Teachers' beliefs about placement of ELLs in mainstream classrooms. A teacher responded to an open-ended item, "Students need to have at least some English proficiency to be placed in a regular math class." Another open-ended response read, "I think ESOL kids need basic language skills prior to going into any mainstream classroom ... for their benefit and mine and the other kids."

Similarly, one teacher I interviewed said, "I think all students, especially if they

come to us non-English speaking, need a beginning class, or to go to a school that's just for first year, beginning students, so they can at least have some acclimation when I say put your name on your paper, you understand what to do." According to another teacher I interviewed, ELLs are not even able to learn mathematics when they first arrive: "Can they learn the content? Not when they're first here, I mean, they've got so many other things to learn, just the behavior, the standard procedures, this school may be very different from where they came from. They may not have went to school, formal school, and so there are so many factors."

On the other hand, two comments were made in the open-ended section of the questionnaire indicating teachers' support for inclusion of ELLs in mainstream classrooms. One comment read, "I think inclusion is the best way if the teacher is equipped with the tools that will help these students." Similarly, a questionnaire respondent stated, "The inclusion of ESOL allows students to experience a diverse atmosphere which is relative to the global society."

Teachers' beliefs about reading in mathematics. Reading skills are important for success in mathematics (Grimm, 2008). According to Muth (1993), reading, particularly in word problems, plays an important role in mathematics learning. Although not addressed through any of the quantitative data, the open-ended questionnaire data and interviews indicated that regarding the success of ELLs in their classrooms, word problems and the amount of reading in the mathematics curriculum concern teachers. On an open-ended response, one teacher wrote, "So much now is reliant on reading. It's not just numbers in mathematics, and with the new standards it's even more so. When they have to read, they can't solve the problem." Other open-ended responses were "verbal expressions and word problems are very hard for them" and "when problem-solving, they don't have an equal opportunity to master the content because of the reading that's required." During an interview, one teacher gave a specific example about a difficult word problem. She said, "From the CRCT Coach books, probability

problems, if they are sitting there trying to figure out about the marbles in the bag, and then you do this, and you put the marble back after a draw, that falls back to English.” Another teacher I interviewed commented, “Reading is an issue.”

Many participants on the open-ended items and during interviews reported specifically about the emphasis on word problems in the Georgia Performance Standards (GPS). For example, open-ended item responses read, “It has been more difficult since GPS” and “ESOL students often have difficulty with the heavily-worded mathematics problems of Georgia’s new curriculum.” Similarly, a teacher I interviewed said, “There’s an awful lot more vocab in mathematics than people realize, with GPS especially!”

Teachers’ beliefs about vocabulary in mathematics. The topic of vocabulary in mathematics was not explicitly addressed in the quantitative sections of the questionnaire. However, the open-ended items and interview data indicated that teachers believed that even if ELLs can read the word problems and directions, the vocabulary of mathematics can be difficult for them. For example, teachers wrote on open-ended item responses that “the vocab is hard to understand,” “language is an issue with terminology,” “vocabulary plays such a big part in math,” and “when teaching math, there is a lot of vocabulary.” During interviews, other teachers gave specific examples of terms that have proven to be difficult for ELLs. For example, one teacher commented that the term “reciprocal” was confusing until she told them to flip the fraction. Another teacher I interviewed said that when she was teaching probability, one direction read “draw a tile out of a bag.” This teacher pointed out that to an ELL, “draw” means to create a picture. Similarly, another teacher I interviewed gave the following example:

We had a cylinder of beans, and we’re talking about the volume, and if we scooped out a cup, how much was left, ESOL students don’t understand “scooped out.” Some of the phrases that

are being used in our assessment still need some work because our ESOL students don’t know what some of those little short phrases were.

Teachers’ beliefs about the language barrier in mathematics. Trying to communicate with ELLs is challenging for many teachers. According to one teacher’s response to an open-ended item, “Language learning gets in the way of math learning.” Another participant responded to an open-ended item by commenting, “While numbers are a universal language, mathematics is not. It requires a great deal of language if taught correctly.” Others voiced their frustrations on the questionnaire in the following ways:

- How can I possibly teach complicated concepts to someone who speaks no English?
- If you cannot speak or understand the language, then how can you understand the directions or examples?
- ESOL students will always miss out on the classroom discussions because they cannot access the language.

Similarly, during an interview, one teacher commented that language is an issue and then later stated, “Language is a barrier in the mathematics classroom, a huge barrier.” Additionally, another teacher I interviewed said, “I just get frustrated if I can’t hold a conversation with them. It’s just so frustrating, but I’m sure it’s frustrating for them.” Moreover, a teacher confessed during an interview, “If they don’t understand me, and I can’t understand them, I don’t know how to teach them.”

Teachers’ beliefs about students’ use of their native language. For example, during an interview, one teacher told me she thought it was good for the other students to hear different languages spoken. Other teachers interviewed mentioned that using a native language is appropriate sometimes, but they still had their reservations. For example, one teacher I interviewed made the following comment:

I don’t want them using it as a crutch, but if we can use it to do the English and

their native language and parallel and start drawing some similarities to help bridge the gap, I don't see a problem with it.

Similarly, a different teacher said during an interview:

I think that your culture should always stay with you, and you should not be deprived just because you are going in another setting. Now I'm not saying use it all the time. But your culture is your culture, and that's something that's God given, and therefore you should be proud of it. But as far as trying to communicate with people when they're NOT of that language, then no.

On the other hand, other teachers indicated opposition to students' use of their native language in the classroom. For example, a teacher responded to the open-ended item asking "What are some of the challenges you face with the ELLs in your classes?" with, "The kids speaking their native language when talking with other students." Additionally, another teacher responded to this open-ended item by stating, "The challenge comes in when they begin to speak in Spanish and you aren't sure if they are staying on task." Similarly, one teacher I interviewed expressed her disapproval in this way:

In every class they love to speak Spanish, and I'll say ENGLISH, ENGLISH, ENGLISH. If you've had three years of English, speak it! Speak the language of English, not Spanish! If I've been taught Spanish for two years, my third year, I would be expected to be able to speak Spanish. WE need to start expecting that of our Spanish students speaking English.

Nevertheless, one student interviewed said, "When I don't know something, I talk to my friends in Spanish and they explain."

Teachers' beliefs about their responsibility for ELLs. For example, one teacher I interviewed said, "If there is just no

attempt made, then it's not my responsibility. You just can't be all to everybody all the time." Moreover, two out of the five teachers interviewed made references to "our kids" when referring to native English speakers. The open-ended questionnaire data provided no additional information concerning this belief.

Teachers' beliefs about assessing ELLs. Respondents to the open-ended items and the teachers I interviewed reported strong feelings on the topic of assessing ELLs. For example, an open-ended comment read, "Our performance standards don't take ESOL students into consideration. Similarly, one participant indicated an administrator was not holding ELLs to a high standard. The open-ended response read, "Some of the ones I have know that they will pass and do nothing in my classes. We are told to just give them a 70. That is not fair."

One teacher I interviewed said, "Most of our assessments are performance based now, and it's the language that always bogs down the ESOL students. How can we use the EXACT same assessment and expect the SAME thing from our non-English speakers?" Another teacher I interviewed also felt ELLs should be assessed differently than other students:

If they can't do basic computation, then they should fail, but if you are struggling with the language, but you can just put the mathematics down, show me this, I don't see where failing a student would be a benefit.

Similarly, another teacher I interviewed said, "If it's a language barrier, I don't believe you should grade them, but if it's a skill barrier, you need to grade them."

The results of the five interviews suggest that teachers' concerns about assessing ELLs go beyond the classroom to include standardized tests as well. For example, one teacher I interviewed said, "If they don't give them the CRCT in Spanish, it's just totally unfair. They don't even stand a good chance." Another teacher described her opposition to giving a recent immigrant a test in English. She said during an interview, "He was exempt from

CRCT, but I'm pretty sure he took the mathematics, and I'm like I don't understand. I just don't think it's fair. You aren't really able to assess their abilities."

Teachers' beliefs about parents of ELLs. Although I did not ask specifically about parents speaking English, a few teachers commented that not speaking English at home was an indication of a lack of support for school. One teacher stated during an interview that "when the parents aren't trying to speak English, it's almost like the parents aren't supportive of what you are trying to do at school." Similarly, another teacher I interviewed said:

We're just really bending over backwards when this is the country they've decided to move to. What don't you speak more English? Why are you speaking Spanish all the time and teaching your children *only* [italics added] Spanish, it's not helping them, and it's not helping the parents either. We'd like to see parents care as much as the teachers do in every way.

Teachers' beliefs about ELLs' home support. The idea that ELLs do not have the support they need from home was frequently mentioned as a challenge to teachers. For example, an open-ended response read, "Going home and not having very much support is a huge issue! It's not so much parents don't care, rather they *cannot* [italics added] really help them with most assignments!" Similarly, a teacher reported in an interview that "the parent support is just not there, so unless they get it in the classroom, don't expect them to get it at home." And according to another teacher I interviewed, "The support at home makes all the difference in the success you see in the classroom." Another interview participant divulged, "I don't think they are real strict about making them go to school down there. You can quit school when you are like 9 or something."

One teacher placed the responsibility of success at school back on the ELL. For example, an open-ended item response read, "Some use the language barrier as an excuse not to do

anything! Some have already shut down or just don't care. They may not have the support at home, but are not trying to get out of the rut."

Having lived in a non-English speaking country. When analyzing the open-ended questionnaire items, I found that the teachers who had lived in another country included the use of a native language as a strategy to help meet the needs of ELLs far more often than those who had not lived in another country.

Travel experience. The qualitative analysis of the open-ended responses on the questionnaire indicated that 24% ($n = 4$) of the teachers who had traveled to a non-English speaking country listed use of a native language as a strategy, while only 19% ($n = 7$) of teachers who had not listed it as a strategy. For example, one teacher who had traveled to a non-English speaking country reported, "I do translate some of the math vocabulary into Spanish (or their native language)." On the other hand, one teacher who had never traveled to a non-English speaking country reported on an open-ended item that he or she makes ELLs say the mathematics rules in English to help them remember them.

The qualitative data indicated that some teachers believed having more ELLs together in a classroom would make meeting their needs more manageable. For example, one teacher I interviewed commented, "It would be incredibly difficult if we had like a handful of ESOL kids. How are you going to have a student interpret for you? I would prefer to have one class with a significant amount rather than having them spread out over four classes." Similarly, another teacher I interviewed mentioned that she thought it is easier to teach ELLs when there are more of them. In analyzing the open-ended responses from the questionnaire, I found that the teachers with more ELLs were more likely to list group work as a strategy to help the ELLs in their classes understand the mathematics material than teachers who had fewer ELLs in their classrooms. Many of the teachers who had over 30% ELLs in their classrooms reported in the open-ended items that they need more help to meet the needs of these students.

Research Question 3

What strategies, if any, do teachers use to help ELLs succeed?

The questionnaire and the teacher and student interviews provided data to answer this question. I looked at the open-ended item “Please describe any strategies you use to help ESOL students in your classes.” I also asked the students during their interviews what types of things teachers do to help them learn math better.

On the open-ended items and in the interviews, many teachers expressed the idea that modifications were not necessary. For example, one teacher admitted that he or she was not meeting the needs of ELLs. The open-ended comment read, “ESOL students do not have an equal opportunity to learn the material in my mathematics class because I normally teach as though they do not have an Individualized Education Plan.” Additionally, one teacher I interviewed said, “They’re no different from the other kids.” Similarly, during an interview, another teacher said, “Once I’m teaching the mathematics, I don’t see it [being an ELL] as a benefit or disadvantage. They are another student in the class.” Another teacher made the following comment during an interview, suggesting that she was against modifications in her mainstream classroom:

I don’t modify assignments. When we get them, they go first to the international center, and then they come here and there is an ESOL person that works with them, and they are taken out. That’s a class like any other class, so when they come into *my* [italics added] classroom, there’s nothing there for modification.

However, on the open-ended questionnaire items, teachers reported using a variety of strategies other than modification to meet the needs of the ELLs in their classrooms. The most frequently named strategy was to provide ELLs with a peer tutor or peer buddy. Table 5 shows the frequency with which the strategies were listed. In addition to the

strategies listed in the Table 5, the following strategies were listed once: multicultural activities, repeat instructions slowly, play games, have students play teacher and work at the board, and have students keep vocabulary dictionaries.

Table 5

Strategies Teachers Used to Help ELLs

Strategy	Frequency
Peer Buddy	25
Adjusted/modified assignments	14
Small group	13
Visual representations/pictures	10
Individualized Instruction	6
Hands-on activities/manipulatives	5
Assignments in Spanish	5
Collaboration with ESOL teacher	3
Technology	3
Pointing and gesturing	3
Use of their native language	3
Extended time	2
Differentiation	2
Read work for them	2
Spanish glossary	2
After school or morning tutoring	2

The student interviews also provided qualitative data about the strategies teachers use to help ELLs. When asked, “What would help you understand math better?,” students provided a variety of suggestions (see Table 6).

Even though students mentioned bilingual resources as an effective strategy to help them understand mathematics better (see Table 6), sometimes translating material

into students’ native language is not adequate. For example, I asked the Vietnamese student to tell me about a time he couldn’t understand something in math. He responded, “Last year we had to use all the words of geometry and present. I don’t even know it in

Table 6

Quotes From Students in Response to the Question “What Would Help You Understand Math Better?”

Strategies	Quotes	
Collaborative Learning	Working with partners. Helps more when American.	
	I think working with friends.	
	Group work.	
Providing Examples	Give more examples. I would like more examples. Could give more example.	
	Games	With games. It’s better playing games in math. I had fun when playing a game.
	Bilingual Resources	Spanish book and English book so you can see Spanish and English. More Spanish things.

Individual Help	Come and help me individual.
Ask ESOL Teacher	When I don’t know something, I ask my ESOL teacher, and she tells to me things.

Vietnamese because in sixth grades I don’t know those things, so if you translate, I still don’t know.”

In summary, teachers believed it is important to use different strategies and modifications to help the ELLs in their classrooms to be successful. However, teachers were divided on whether they actually put these beliefs into practice. Student interview participants provided additional suggestions for teachers to use.

Research Question 4

What types of support are teachers receiving, and what additional resources could they use to meet the needs of ELLs?

When asked on the open-ended item about the challenges they face with ELLs, several teachers mentioned not having the proper resources and needing translators. For example, one teacher wrote on an open-ended item, “I need a Para or a co-teacher to help with differentiation of instruction.” Similarly, a teacher I interviewed commented, “I don’t have resources. If they had translators ... something they could put the English word in like evaluate and it would mean this is their language and they can see the association and hear it.” During another interview, a teacher suggested a phone translation service she had used in a previous job at a hospital. Another teacher I interviewed said, “I wish I had more help. More than a few of my 28 ESOL kids have fallen through the cracks because of class size, lack of time, and lack of knowledge.”

A few teachers wrote specifically about textbooks. The following comments were made:

(1) “Textbooks are just not well adapted to ESOL students,” (2) “I do not have a text with Spanish support – this is to their disadvantage,” and (3) “ESOL students would benefit most from a parallel language textbook.” Similarly, many teachers reported that they would like more materials in the native language of their students, primarily Spanish. Challenges reported on the questionnaire included not having materials with

Spanish directions or a glossary in the students’ native languages. One teacher brought it closer to home—“you can find books that have things written in Spanish and English, but *our* [italics added] standards need to be in 2 languages.”

On the open-ended items and during the interviews, the teachers made a number of suggestions about how professional development would help them teach the ELLs in their classrooms. For example, five teachers on either the open-ended items or during an interview professed a desire to learn or become more proficient in Spanish. Table 7 lists the other comments the teachers made on open-ended items and during interviews about wanting professional development to help teach the ELLs in their classrooms.

Table 7

Comments Made by Teachers to the Open-ended Questions and During Interviews about Wanting Professional Development

Teachers need intensive training on how to teach ESOL students all throughout the year. A one hour inservice at the beginning of the year is not sufficient.	It’s the training, any types of methodology that would be useful. I absolutely want professional development.
I would like to have more professional development on teaching ESOL students.	I do not have the training or resources to do these students justice.
The ESOL students are missing out on a	I would say that after this many years, I still

lot, and I think we need proper training. don’t know how to modify.

And again maybe I can learn something different through some kind of training or something. I just don’t know how to break that barrier right now. It was useful when our ESOL teacher went to Mexico and saw the schools and brought that info back. It helps when I understand the culture, understand where they are coming from.

The interviews with the teachers indicated that more collaboration and communication is needed between mainstream mathematics teachers and ESOL teachers. For example, four of the teachers interviewed suggested they need more help from the ESOL teacher. Specifically, one teacher commented, “I would like help from the ESOL teacher with the terminology, test taking skills, instructions on tests. I don’t like that the international center does their job, the ESOL person does theirs, and we do ours. There is no collaboration there.” Similarly, when asked what more the ESOL teacher could do to help her, another teacher said, “What can I do? What can I expect? Help me personally, know what the bar is. Modify tests, what’s their culture, if I needed them to finish something, they could always do that with her.”

The teacher interviews also suggested that the relationships between the mathematics teachers and ESOL teachers appear strained. For example, during the interviews, teachers made the following comments:

- I would LOVE to have help with grading the assessments. I watch the ESOL teacher be able to shut her notebook and go, and say see you tomorrow!
- The situation is me chasing her down, and her not telling me. I do collaborative (with special ed) and I know how that relationship works, and that relationship should be the same with the ESOL teacher. I feel like tell me something. I

would like her to modify tests if she were able to. Let me know, this child has no chance of doing this right now, you know, this is what she can do, this is what she can't do. It's a guessing game.

- I think I have one (an ESOL student) in here now, see the thing of it is, when they come in, they don't let us know, we don't get anything on the kids once they come in, we have to as a teacher find out all that for ourselves. Our schedules are not the same. More communication would be helpful.

Two of the teachers I interviewed suggested that students need more ESOL instruction. For example, a teacher at a school who did not have a formal ESOL program commented, "I think each school should have at least one ESOL class." Another teacher I interviewed said, "I think some of them need more one-on-one structured instruction than one hour a day."

Research Question 5

What are the experiences of ELLs in middle school mathematics classrooms?

Despite the common assumption that mathematics is a relatively easy subject for ELLs, after talking with students, I found the opposite to be true. Two of the students even said mathematics was their hardest subject to understand. When asked about the difficulties the students face in math class, they all made some reference to "the words." When asked to recall a time when something was easy in math and why, Diego, an eighth grade native Spanish speaker, said, "Because I understand the words."

The four students I interviewed agreed with the teachers I interviewed that reading, and more particularly writing, make mathematics difficult for them. When asked what they do not like about mathematics or what was hard for them, two students answered, "the writing." For example, one student said, "We have to write letters, like words, like three thousand," and another student said, "They write the numbers in

words, and sometimes I cannot read the numbers." When I asked for some examples of how writing was difficult, one student said, "Find the volume, the area, the length, and y." Another student said "Mathematics with a lot of words" was hard, and another said, "word problems hard." These answers continue to point to language comprehension. When I asked one student to remember a time when he could not do something in math class and why, he said, "Because I didn't understand the words."

These students had different experiences with assessment in their mathematics classrooms. Trong, an eighth grader from Vietnam, recalled when he first came to the United States in sixth grade. He said he had a hard time understanding the teacher, so he did not really know what was going on. On the tests, the teacher gave him a "special test." He said, "If there were a lot of words, she just give me math problems." However, he told me he got A's because "if I make bad, she don't count it." Two other students reported going to their ESOL teacher for help with assessments. During the interviews, two out of the four students mentioned the standardized test given in the state being hard to understand and having a lot of word problems.

All of the students expressed a desire to have more materials in their native language. They also believed they learn best when working in groups or with a friend. The students also reported that it would be helpful to have extra time with assignments, but they usually did not get it. Two students talked about how they were sometimes confused because their teacher worked out the problems differently than how they had learned the process in Mexico. Three of the students said there was not anyone at home who could help them with their math.

"It's hard because math has a lot of words."

--Carlos, 6th grader from Mexico

Summary and Discussion

Through open-ended item responses on the questionnaire, the teachers reported that they believed ELLs have difficulties with the amount

of reading, word problems, and specialized vocabulary in mathematics classrooms. Teachers also reported a lack of time as being a challenge to meeting the needs of ELLs. Additionally, through interviews, the teachers reported that ELLs do not have support from home when it comes to school work.

The students interviewed reported having difficulties in mathematics class because of the number of word problems and words they could not understand. These students wished they had more materials in their native language and more time to complete assignments. In addition, they felt they learn best when working in a group.

In the words of one teacher I interviewed, “One thing I like about mathematics is that mathematics is a link. You need to know one thing before going to the other thing. I think education is the same way. And I think our education working with these kids the link should be even tighter there, and that’s *not* [italics added] happening.” I believe collaboration must be practiced and discussed for mainstream teachers to be aware of the ESOL teachers’ responsibilities versus their responsibilities in the classroom. Teachers also need to overcome the poverty of language learning through professional development. For example, despite many teachers’ beliefs, proficiency in a native language facilitates English acquisition and leads to higher academic achievement (Lee, 2002), so students should be encouraged to speak their native language at home.

Teachers in this study reported wanting more effective resources, particularly in students’ native languages and geared toward the state curriculum. The Principles and Standards for School Mathematics (National Council of Teachers of Mathematics [NCTM], 2000) included equity as the first principle for reform of mathematics education. According to NCTM, excellence in mathematics education requires “raising expectations for students’ learning, developing effective methods of supporting the learning of mathematics by all students, and providing students and teachers

with the resources they need” (p. 12). Mainstream mathematics teachers must to apply this principal on a daily basis to the ELLs they teach.

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Abstract

This article addresses the nature of educational organizations for an engineering perspective. Principles of structural engineering are employed as a means of examining and addressing problems within educational organizations. Both current and future issues are addressed in relation to the redesign of educational organizations in relation to function, flexibility, and efficacy. Suggestions and recommendations are provided.

In October of 1989 a severe earthquake struck the San Francisco Bay area. Over the next few hours and days millions of Americans, via television, viewed scenes of horror and heroism, tragedy and triumph. One of the most tragic sights was the remnants of what once had been the two-tiered Nimitz Freeway in Oakland. The support for the two tiers had collapsed leaving the formerly impressive structure in rubble on the ground, one freeway tier atop the other, with drivers, passengers, and their automobiles crushed in the debris.

The scene in the Bay Area once again brought the nation's attention to focus on the issue of *infrastructure*. During the 1980s and 1990s, collapsing freeway bridges, overused sanitation facilities, and depleting sources of clean drinking water caused experts to examine the "decaying of America." This decay was primarily evident in what was believed to an outmoded and insufficient infrastructure of our nation's cities and roadways.

Infrastructure is a term generally applied in an engineering sense to mean "the physical

systems that provide transportation, water, building, and other facilities that are needed to meet basic human, social, and economic needs" (Grigg, 1988) The concept of infrastructure dates back to Socrates. His theories included the notion that to function, a person needs the facilities and arrangements available from community, security, institutions, and economic goods, and that these can only be provided when persons support the concept of community and the responsibilities it entails (Kolenda, 1984). An integral part of such support involves the understanding that components of the infrastructure must be constantly monitored, refurbished, and re-designed to deal with the ongoing stress to which they are subjected. Hutchison and Karsnitz (1994) define stress as the interaction of forces from live loads (variable loads that can and do change). Both types of loads must be considered when designing or addressing organizational needs from a systemic perspective, in that both can define structures via strain or deflection due to stress.

These types of forces can cause organizations to "change their shape" under

stress as they attempt to manage the constant conflict between those forces trying to destroy the structure and those trying to hold the structure up. There are essentially five ways a structure can react to stress forces. These forces can effect a structure both in an individual or collective manner. They are:

- 1) Compression – The tendency for a material to be condensed or squashed.
- 2) Tension – The tendency for a material to be stretched or pulled apart.
- 3) Shear – The tendency for a material to be divided by two opposing forces.
- 4) Bending – The tendency for a material to bend under stress.
- 5) Torsion – The tendency for a material to twist under stress.

Such forces lead to “distortion” within structures, a phenomenon where major and minor modifications in the shape of the entire structure and/or various elements of the structure. The distortion caused by these forces contributes to overall weakness, and possibly structural failure.

All these forces exert stress along thrust lines, areas created by loads. While both dead and live loads exert force, live loads have the further ability to move the thrust line. The sole limiting factor in the size of any structure is the location of the thrust lines, not the strength of the components. When thrust lines are loaded beyond a certain point, a structure becomes unstable. As most structures primarily involve the use of compression to maintain integrity, there is a limit to their size. Therefore, most of the strength inherent in any structure is used to support its own weight.

While these concepts were originally developed in and apply to the field of engineering, they hold a great deal of applicability for the profession of education. School districts that have come under conservatorship, districts with inordinately high dropout rates, or highly bureaucratic state departments of education are all examples of organizations in which the stress forces are distorting the structure. These organizations could also benefit from systemic engineering to improve integrity.

While the concept of infrastructure has been included as a component of educational systems, within that context it has most often been applied in an engineering framework to describe the physical structure of an educational facility (Ornstein & Levine, 1989). By using an infrastructure model in a different sense, to analyze the educational system, this article identifies specific stress points that are causing the educational system in the United States to either collapse or be less than successful in dealing with the variety of problems children bring to the educational setting.

While in a pure sense, the concept of infrastructure is not intended to apply to an educational model, there are some important analogies which can be drawn. Analytically, examining education via an infrastructure framework can be interpreted as quasi-systems analysis. Using a systems theory approach (Senge, 1990) the educational system may be viewed either in terms of interacting persons or in terms of analytical abstractions (Betts, 1992; Newell, 1978; Sistrunk, 1974). In both instances, the school system is perceived as a social system in which persons act individually (Getzels & Guba, 1957; Getzels & Thelen, 1960) or as being composed of artificially defined subsystems of human interactions (Banathy, 1991; Parsons, 1968).

Systems Analysis

The systems approach to analyzing and solving problems is crucial to the effectiveness of any organization. Systems thinking allows individuals to understand that 1) structure influences behavior and 2) structure in human systems is subtle (Blackbourn, Papasan, Vinson, & Blackbourn, 1999; Hamson & Zukerman, 2002; Senge, 1990).

The challenge of applying systems thinking to education lies in uniting internal (i.e. organizational) and external (i.e. environmental) components together in some reasonable manner to enhance proactive planning and decision making. Sistrunk (1974) states that the leader who manages the decision making process rather than the decision is more effective. Further, Langford (1995) holds it is the job of leaders to work on the system and improve it continually. This requires leaders to adopt a proactive than a reactive approach when addressing those internal and external forces stressing the system.

This relationship between organization and environment often becomes integrated in an unproductive fashion. For example, many school districts fail to distinguish policy (which may emanate from environmental sources) and administration (which is organizational in nature). Individual school board members all too often become entrenched with policy which brings them into the administrative arena and leaves school administrators in a quandary as to how to implement these policy initiatives on a day-to-day basis. Part of this difficulty lies in systemic infrastructure and part in the linear cause and effect mindset the system imposes on organizational members (Rader & Rader, 1998). This mindset results in a fixation on events rather than processes.

Systems analysis, therefore, leaves us with a single question, “How much and what

types of stress can be placed upon our school system before the system collapses or becomes ineffective?” A systems analysis approach based on the concept of infrastructure is one way to examine the effect of this stress on the system.

Infrastructure Analysis

To paraphrase the Grigg (1998) definition, in an educational context, infrastructure would include the philosophical, economic, and physical foundations required to meet basic student needs in cognitive, affective, and psychomotor domains (Bloom, Englehart, Hill, Frust, & Kratwohl, 1956; Harow, 1972; Krathwohl, Bloom, & Masia, 1964). Operationally, this definition would translate into components that are commonly evaluated from a programmatic standpoint: personnel/facilities, curriculum, fiscal outlay (funding), and methodology/pedagogy. These four components are supported and underpinned by a fifth component, educational philosophy, which is foundational to the entire system.

As depicted in Figure 1 (see end of article), the four visible components of the educational infrastructure (personnel/facilities, curriculum, funding, and methodology/pedagogy) would not stand with the foundation of an educational philosophy. These four components are pillars which support the educational system but, by their very existence, further add stress to the system. The stronger and more flexible each component is, the more support will outweigh the added stress.

External variables, shown in Figure 1 as layers above the pillars, can also serve to add stress and/or support to the system as a whole. These external variables, more often than not, can be viewed as stresses, but this stress to the system can be mitigated as a function of the strength of the four component pillars supported

by a sound educational philosophy. Each major infrastructure component is discussed below, beginning with the least visible, but most important component, educational philosophy.

Philosophy

The philosophical foundations of a given educational entity are not as easily detectable as the other four infrastructure components. Yet, without an underlying philosophy, personnel decisions, facilities management, curriculum design, allocations of fiscal resources, and instructional methods would be implemented in a random or haphazard fashion. Essentially, the philosophical orientation of an educational system *drives* and *shapes* that system and the manner of implementation among the four pillars.

Adaptability, flexibility, and awareness are underlying themes to an effective philosophy of education. Within such a philosophical approach, excellence can be promoted in a variety of ways which meet the educational needs of all stakeholders (parents, students, teachers, administrators, and community members). It should be noted some theorists advocate a less flexible approach to excellence in education (Adler, 1982). However, such an approach ignores the obvious individual differences existing within educational organizations, the variety of external factors impacting organizations and the relationship of contextual understanding of individual educational organization's unique needs values, goals, and vision (Blackbourn & Center, 1999; Blackbourn, Hamson, & Walker, 2002; Blackbourn, Papasan, Vinson, & Blackbourn, 1999; Center & Blackbourn, 1993). In essence, a single track, inflexible philosophical approach will not address the varied dynamics or patterns of individual or group socio-biological behavior. These behaviors are constant interactions evolving into new and more complex patterns.

The variables produced modify structures and systems in unexpected and unpredictable ways. Only a flexible and adaptive philosophical foundation can address these stress-producing factors in an effective way.

Human Resources

Such philosophical approaches must be rooted in proactivity. Seeing "what's coming down the road" is a requisite skill for school leaders (Blackbourn, Edmundson, Dye, & Rose, 1996; Waterson, 1996). Responding appropriately ahead of the curve is a vital aspect of successful organizations. This orientation must not be the sole domain of the leadership, rather infused throughout all members of the organization. Effective human resource development is the key reaching this goal.

The human resource pillar of this model allows for the diffusion of the philosophical foundations into the organizational members. Baum (1991) states the most important of all resources are the human resources. The effective development of such resources tends to strengthen this infrastructural pillar, while ignoring the development and growth of individual organizational members will bring about the pillar's erosion.

Hamby, Blackbourn, Edmundson, Hampton, and Reardon (1997) describe human resource development that is evolutionary and builds upon the individual organizational members' ability to grow. They understand "growth opportunities" must be created for individual organizational members in an associated tenet of effective human resource development.

For the human resource pillar to be strong, the creation of a learning-based environment is critical. Such an environment supports risk taking, innovation, and failure. Essentially, organizational members are

empowered to become self-directed learners who translate what they have learned into their work, to apply their knowledge in active problem solving without fear of reprisal if they fail. If an educational system is supported by a human resource pillar composed of productive, self-directed personnel, every other support pillar will be positively affected.

Curriculum

Curriculum, or “the body of educational experiences sponsored by the school” has undergone many reform efforts in American educational history. The word “curriculum” is drawn from the Latin, “circuire,” to run a circuit. The word infers a restricted, limited course on one may traverse. While a multitude of variables shape what is taught in public schools, much recent curricular reform has been influenced by a “world view” in which the performance of American students is compared with students from other countries.

From an infrastructure standpoint, curricular reform must be internally driven, emanating from those resources most in touch with the educational system: students, parents, community stakeholders, and teachers. Those who are not charged with the daily delivery, planning, monitoring, or consumption of the curriculum (e.g. legislators, university faculty, administration, and special interest groups) have, in the recent past, had a disproportionate influence as change agents on public school curriculum. This is reflected in the authorization and reauthorization of P.L. 107-110, the *No Child Left Behind Act* in which the authors delineate the direction and extent of the expectations of university personnel, public school personnel, and the parents of public school children. Such influence is often translated as the basis for overall curricular change (Common Core Standards), and the practitioner in the field is often left with no clear

direction or specific strategy as to how to deliver the curriculum to students who are quite different from those the change agents are most associated with. To deal with the stresses of modern society, curricular design must be a “bottom up” process involving those with instructional expertise necessary to account for the variety of student types enrolled in our schools and those whose needs must be served.

Funding

Based on current data relative to school funding levels, it is clear that despite all of the recent rhetoric about improving education, the federal government is unwilling to seriously fund education at a level commensurate with the stresses on the educational system. It appears the value of a child’s public education has undergone “inflation” over the past thirty-plus years. The outcomes of this fact jeopardize the very fabric of democracy in this country for the next generation. The consequences for this inadequate federal support of education are already being felt. Little improvement in the dropout rates, “spotty” results (at best) in the war on drugs, a dramatic increase in youth crime, and an ever increasing number of prisons (often surpassing the number of new schools constructed on an annual basis) being built are indicators funding is not being utilized effectively for education of the nation’s young people.

There seems to be a sort of funding “cop out” whereby the federal government (typically predicated upon the position there is no constitutional guarantee to an education) expends a limited funding allocation for entitlement and sometimes research purposes. The federal government then passes the bulk of the responsibility for funding education on to the states. The states, in turn, due to mounting problems and needs, contribute an ever tighter share of the cost, primarily in the area of basic

skills instruction. The remainder of the cost of educating a child is passed on to the local education agency (LEA). Local school boards (not to mention teachers and administrators) are then faced with the dilemma of generating income (usually through property taxes) to make up for the fiscal shortfall from the bureaucratic “buck passing.” At a time where an aging American populace has a declining *direct* vested interest in the public schools and already feels overburdened with taxes, raising local property taxes to support the needs of the educational system is becoming less of an attractive alternative. When this fact is considered in combination with rising medical costs (and the stresses they bring to future federal and state budgets), as the “boomer” generation continues to age, grim times seem to be ahead for public education.

Current debates on funding reform (e.g. tax credits, vouchers) abrogate the role of the federal government as the leader in addressing our most valuable natural resource, and the most important national security issue: The education of American children and youth. Until our government invests in children at the rate it does in other programs, fad solutions involving “incidental” rather than “fundamental” change will not contribute to serious reform.

Methodology

Accommodating the learning needs of the diverse student population existing in the United States requires teachers to employ a variety of instructional methods. Thus, rather than teachers using just one or two instructional strategies over the course of a content unit, they must be creative and mold methodology to the learning needs of individual students as well as individual instructional groups. This creativity therefore, elevates the act of teaching to an “art of instruction” or pedagogy (Ornstein & Levine, 1989).

Unfortunately, to a great extent, educational reform has focused more effort on *what* we teach (e.g. curriculum) rather than *how* we teach it (e.g. methodology/pedagogy). Yet, to make the curriculum relevant and meaningful to an ever-changing school population, the methods used in the classroom are of critical importance if learning is to transpire. An idea as to how the student population can change in a relatively short time is evidenced in these figures:

- Between 1975 and 2002, the percentage of minority students in the public schools in the United States rose dramatically as illustrated by increases in African-American enrollment, from 15.5% to 19.3%; Hispanic enrollment, from 6.14% to 17.4%; and Asian-American enrollment, from 1.2% to 8.4% (National Center for Educational Statistics, 1976).
- The percentage of households in which children are raised by single parents rose from approximately 16.5% in 1975 to just over 51% in 2002 (United States Census Bureau, 1976, 2003).
- The percentage of children under 18 raised in a household where there is a working mother rose from less than 27.7% in 1975 to over 70% in 2002 (United States Census Bureau, 1976, 2003).
- Though years of decline have been transformed into a “flattened” profile, Scholastic Aptitude Test (SAT) scores in 2002 were 21 points lower than in 1975 (United States Census Bureau, 1976, 2003).

The varied student population, with a variety of learning needs, clearly adds stress to the already under-supported national endeavor of education. Policy makers (e.g. federal and state legislators, school boards) initiate curricular change to

upgrade the quality of education in the United States without providing educators with insight as to how this quality is supposed to be delivered to a diverse student population. In many instances, policy makers place hurdles before future teachers in the form of illogical degree requirements. Clearly, our teacher education departments and our instruction in the schools must reflect the pedagogical needs of an increasingly diverse student population.

Currently, the No Child Left Behind Act of 2002 (NCLB), has increased the focus on a standardization of practice and qualifications, particularly concerning the concept of “highly qualified teachers.” Such an emphasis on employee behavior of preparation rather than educational quality not only reflects a micro-objective, functionalist approach to the complex process of education (Skirtic, 1990), but it also perpetuates the reductionist, prediction and control perspectives of Frederick Taylor’s Scientific Management Theory (English, 2003). Many of Taylor’s theoretical constructs ignore systemic realities and profound knowledge (Deming, 1994) and simply serve to make the administrator’s job easier while complicating and frustrating the activities of teachers and students (Blackbourn 2003, 2004).

Indeed, many fully-certified special education teachers initially became “unqualified” by fiat under NCLB. These individuals taught students with disabilities at the secondary level and as they lacked a minimum of 18 hours in a content area could no longer hold a junior or senior high school position. It is highly unlikely the addition of an 18 content emphasis would make these persons more effective teachers of students with disabilities. In essence, the standardization process in NCLB eliminated many excellent, experienced teachers and reduced the public schools’ ability to effectively address human diversity.

Suggestions for Educational Infrastructure Reform

In this section, suggestions, not solutions, are offered. The status of education in the United States has been allowed to decay for such a length of time that, at this juncture, there are no “quick fix” solutions. But, swift and bold intervention is critical to keep the educational system supported and lay the foundation for ongoing improvement. The following are a minimal effort in reinforcing our educational infrastructure.

Suggestion #1: Provide a Federal Constitutional Guarantee to an Education.

The philosophical and pragmatic implications of this issue are paramount to “getting serious” about education (and deal with all the stresses placed on the educational system). A federal constitutional guarantee to an education in this country is a major component of a comprehensive systemic reform of education. Such a guarantee will force the political element to begin to fund education at a rate that is commensurate with the stress on the system. The combined effect of all the initiatives and research thus far in the field of education has resulted in outcomes such as a dropout rate of approximately one-third of our students, lower achievement test scores, and increasing violence in the schools.

While we have excellent research and policy initiatives that have potentially positive effects on isolated groups of students over a short-term, there is no evidence of any long-term, wide-spread systemic improvement (Blackbourn, 2004; Blackbourn, Hamson, & Walker, 2002). Dissemination of methodologies, materials, ideas, and procedures takes time and money for the training and re-training of educators. Until there is a federal drive to assist in this, the combined effect of the

research and development efforts in education will continue to be analogous to “spitting in the ocean.” In essence, this lack of seriousness is simply a means to “get by cheaply” at state and local levels because the federal government has no authority to intervene, except via court decisions or pinpointed legislation. Some communities possess far greater levels of wealth related to property values. These discrepancies only add to the dilemma due to the embellished norms generated. In the state of Mississippi, the gulf between the highest and lowest assessed values of a single mil is over \$1.3 million (Putnam, 2010). This differential is so askew the norm between the extremes offers no sense of reality in funding for either school district.

If it were not for *Brown v. Board of Education* or *Public Law 94-142* (both of which emanated from the federal branch of government), some states would likely still not have equal education opportunities for minority students, and some states would still deny access to the public schools for handicapped children. It is time for those *public servants* who are charged with the well-being of the country to be put to the litmus test: If leaders support quality in education, then they should support a constitutional amendment guaranteeing it.

Suggestion #2: Close the Gap Between Expressed Philosophical Statements and Realized Philosophical Outcomes:

Expressed philosophical statements are those pronouncements, usually emanating from national, state, or local educational agencies, in which an ideological view of education is established (e.g. “all students will achieve commensurate with their potentials”). Such mission and vision statements must have validity points related to short-term and long-term goals to ensure practice is related to vision and mission. In essence, what is proffered in any educational organization must be related via the

validity points to the organization’s mission/vision or it will not be considered. While these statements often reflect pure democratic principles (e.g. an egalitarian approach to education), in practice, exemplifying the mission or vision is often more difficult (e.g. “realized” outcomes). Educational agencies must be accountable, not for test scores improvement, but for fulfillment of their philosophical views.

Expressed philosophical statements can be compared with realized philosophical outcomes on the infrastructure pillars mentioned earlier. For example, if our philosophical statement reflects some achievement potential for all children, do we then allocate our personnel, fiscal, curricular, and pedagogical resources accordingly? To the extent we do not allocate accordingly, we cannot declare our expressed statements and realized outcomes are congruent.

Suggestion #3: Use Differentiated Salaries in Recruiting Teachers in Critical Need Areas.

In many occupations in this country, salaries are differentiated for the same job based on skill level required, perceived need, and market value. One need only examine the gap in salaries between university faculty members in a school of education to similar faculty in a school of business. It is commonly accepted knowledge that heart transplant specialists earn more than general practitioners, and quarterbacks make more than linemen who protect them. These differentiated salaries are acceptable due to specialized training and demand of the jobs.

It would therefore behoove the policy makers of our educational system to examine differentiated salaries rather than bemoan impotent attempts at attracting teachers to areas such as science, mathematics, or special

education. Here again, an opportunity arises for involvement by the federal government in subsidizing salary stipends or providing annual bonuses for teachers in high need geographical areas to augment recruitment efforts by the poorest local education agencies. These salary supplements would only be offered to those educators teaching in critical need areas who were fully certified to teach in those areas. Temporary or emergency certification would preclude involvement in the salary supplementary program. If our leaders are serious about employing instructors in areas of high demand with full certification (as espoused by NCLB), they must “raise the ante” in reinforcing this aspect of the educational infrastructure.

Suggestion #4: Infuse “Functionalism” Across the Curriculum.

In recent years there have been efforts to infuse processes such as written language across all curricular areas in an attempt to bolster the written communication skills of American youth. The adoption of the Common Core State Standards (CCSS) has further heightened the efforts for such inclusion of writing skills. While these efforts are laudable, they fail to address an issue more basic to the facilitation of skill building: relevancy.

In too many cases in American school, subjects are taught in abstract ways, with little attention to each other or to the “real world.” While curricular integration can encourage an interrelationship among subject disciplines, those disciplines must be made relevant to their applications in modern society. Despite data cited in this article and elsewhere on the changing needs of American children and youth, there still exists an erroneous assumption wherein all students come from a background sufficient and supportive enough to promote educational relevancy. It is no longer adequate

to merely teach a subject; students must be shown why the skills of that subject needs to be learned.

Infusion of functionalism, which has been a thrust in working with students with special learning needs, must be applied to the whole student population. Currently, models exist which promote functionalism through career education into existing subject areas. If teachers are to infuse functionalism into their instruction, then teacher preparation programs must lead the way by training teachers not only to teach a subject, but to also teach their students why the subject is import to society.

Suggestion #5: Promote the Acquisition of Process as Well as Content.

Recent reform initiatives have produced an educational environment wherein “content” (e.g. knowledge displayed on standardized tests) are valued at the exclusion of other education variables. Indeed, test scores have the “be all, end all” for most public schools administrators and board members. This deification of educational products has even spawned instances where “teaching to the test” (pedagogy taboo #1) is not only practiced, but encouraged. Yet, rational logic dictates that if a student is to gain some measure of educational content and attainment, then the student must activate the processes to learn and comprehend the nature of the content. It seems logical therefore, that as we teach students the content we also instruct them in the processes through which this content is most effectively acquired. Thus, applications of information processing can assist the student in learning requisite material while becoming a more proficient learner as well.

Suggestion #6: Use Teacher Writing Teams in Curricular Development.

Curricular change should not only reflect subject matter, per se, it should also apply to instructional methodology (i.e. how we teach the subject matter). A means to address both subject matter *and* methodology/pedagogy is to use teacher writing teams in developing new curricula. Advantages of the use of teacher writing teams are:

- unique instructional concerns can be addressed;
- the curriculum and instruction can be tailored to the needs of a specific school district of building;
- assessment processes tend to be more practical and instructionally relevant;
- if so constructed, the team can address the continuum of a subject, from elementary through high school.
- the team approach, itself, builds collegiality among professional educators who share common curricular interests; and
- a vested interest is conveyed to the curriculum because those who wrote it will be those who deliver it.

The major obstacle to using teacher writing teams focuses on the providing the release time needed for teachers to participate in the team process. To promote the concept of teacher writing teams, school districts must view the role of the teacher in a broader, more professional sense than solely someone who delivers instruction. As such, teachers must be perceived as professionals with expertise in curricular development and instructional

delivery who are links between theory and practice.

Suggestion #7: Increase Role of the Federal Government in Providing Fiscal Resources.

The federal government must take a more aggressive role in providing school districts with fiscal resources. The current contribution of between five and thirty percent (range of support provided to states through various Title Program involvement) of total school revenue is wholly inadequate with the stresses placed on the educational system from the federal perspective. Providing stipends to districts for hiring teachers in high need areas, or providing a supplement to teachers who are employed in inner-city or rural areas are examples of ways in which the federal government could support the educational infrastructure.

Forcing mandates on the schools (i.e. integration of minority students, the mainstreaming of handicapped students, or the assurance all students have a fully certified teacher) without backing up those mandates with adequate fiscal resources simply adds to the stress of an already stressed system.

Suggestion #8: Address the Effect of Research on Infrastructure.

Research-based instructional or curricular interventions should be analyzed from two perspectives. First, the traditional view of research should be addressed wherein the effect of procedures or materials on the performance of students is discussed from a statistical significance framework. In other words, did the procedures or materials bring about significant positive change in some pinpointed dependent variable? Currently, solid research, in most cases, addresses this issue. But, the question remains as to how best to export or replicate these procedures or materials.

An infrastructure analysis can follow the model depicted in Figure 1. Each infrastructure pillar, including the philosophical component, should be discussed from the standpoint of stresses or changes which must occur for successful replication of the procedures or materials to be enhanced. Thus, if retraining of faculty needs to be accomplished, the pillar of personnel / facilities should be analyzed as to how the added stress to the pillar can best be mitigated.

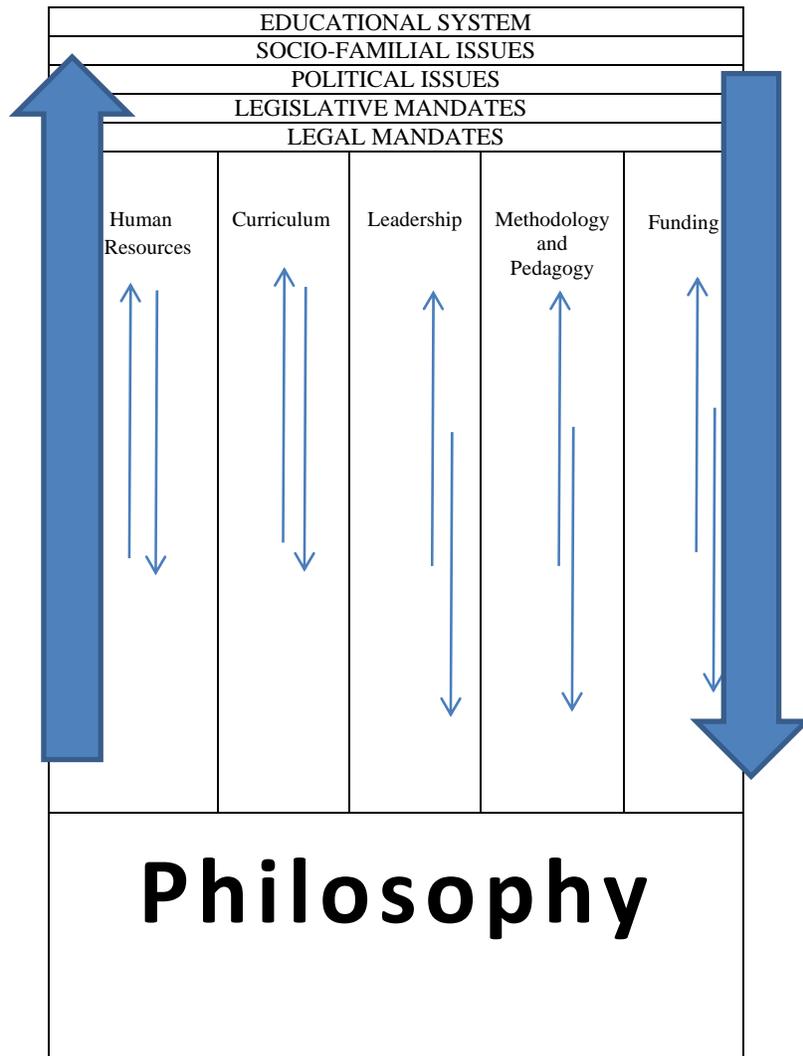
If research articles and presentations did not leave the educator “hanging” with a quandary of “how can we implement this in our school district?,” then the prospect for greater acceptance and adoption of significantly successful methods and materials would be facilitated. To this end, positive changes as a result of research efforts may extend their effect beyond isolated or limited instances.

Discussion

The infrastructure model presented above is offered not only as “food for thought,” but also as a means to address the stresses and pressures under which our educational system must operate. Through court decision, legislation, population changes, and other variables of influence, the educational system has become much more than a purveyor of the “3 Rs.” While expectations and responsibilities have been, in many cases, *forced* on the educational system, resources have not followed to bolster the system in supporting the additional weight or burden. Those policy makers who contribute to adding weight and stress to the system, in most cases, have had no “field experience” as a point of reference to understand the dynamics of the system over which they have substantial influence. In the political arena there is an unwritten rule wherein to achieve the nation’s highest offices, a person must have had a background in law, business, or the military (a

blend of the three is particularly helpful). In the future, those who seek political influence in the country will, increasingly, be called upon to substantiate their experiences in the classroom, because if we do not begin the process of reinforcing our nation’s educational infrastructure, the freedoms we enjoy in our democratic society will be in serious jeopardy.

Figure 1. An Infrastructure Model of Educational Systems



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