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Emily O’Hearn

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The Relationship Between the Boehm and AIMSweb on Kindergarten Student Achievement in One Northern Michigan Intermediate School District

by

Emily O’Hearn

Dissertation
Submitted to the Department of Leadership and Counseling
Eastern Michigan University
in partial fulfillment of the requirement for the degree of

DOCTOR OF EDUCATION

Dissertation Committee:
Ronald Williamson, Ed.D., Chair
Ella Burton, Ed.D.
Jaclynn C. Tracy, Ph.D.
Janet L. Fisher, Ed.D.

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Ypsilanti, Michigan

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DEDICATION

This dissertation is dedicated to my three sons: Jack, Maxwell, and Samuel, who have taught me patience, perseverance, love, and gratitude. May you each grow into inspired, engaged, forward-thinking learners who question, reason, and ponder the possibilities. Believe in yourself and others, just as I believe in you.
ACKNOWLEDGEMENTS

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ABSTRACT

Kindergarten students are asked to perform at a level formerly expected of first grade students and are expected to be well on their way to reading (Bassard & Boehm, 2007). With tight school budgets, site leaders must choose wisely about allocation of resources and determine the most effective means of helping students, especially those struggling in the area of reading. The purpose of this quantitative study was to determine what relationship, if any, exists between the Boehm test and AIMSweb Test of Early Literacy (TEL) administered to kindergarten students during the 2010-2011 school year. Data in this research were collected and stored by the local ISD and were analyzed ex post facto. Boehm data were collected during kindergarten round-up. All students selected for this research scored at the lowest achievement level on the Boehm (Level 3). These students were re-assessed using the identical Boehm test in February 2011, giving a posttest data point. Additionally, some schools participated in AIMSweb TEL screenings twice during the kindergarten year, while students in other schools did not. Student Boehm scores were compared with students who received AIMSweb TEL and students who did not receive AIMSweb TEL to determine the relationship. Statistics based on Boehm posttest scores for students at Level 3 indicated no difference in student growth between students who received the AIMSweb TEL assessments and those who did not. Gender did not have an impact on achievement, and students who scored low on the Boehm also scored low on the AIMSweb TEL assessments.
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CHAPTER 1- INTRODUCTION AND BACKGROUND

The research described in this study examined the results of a response to intervention (RtI) tool known as AIMSweb (Achievement Improvement Monitoring System), which screened and progress monitored kindergarten students during the 2010-2011 school year. Data collected were analyzed to determine what, if any, impact universal screening and progress monitoring had on kindergarten student achievement as measured by the Boehm Test of Basic Concepts (BTBC). Pre- and posttest scores of kindergarten students most at risk for school failure (those scoring at a Level 3) on the Boehm were compared to students who were progress-monitored using AIMSweb test of early literacy (TEL).

In 1977, federal regulation approved Public Law 94-142, the Education of All Handicapped Children Act, which stated that all children with special education needs must be provided a free and appropriate public education. Prior to this legislation, the quantity and quality of services for children with special needs was dictated by where one lived; some states offered programs while others didn’t (McNamara, 2007). PL 94-142 was reauthorized in 2004 as the Individuals with Disabilities Education Improvement Act (IDEA), and it was expected that the federal government would fund 40% of the excess cost of providing special education services. As reported by Burns and Gibbons (2008), the federal government currently pays for about 17% of the excess cost of special education related services.

Robert Pasternack, former Assistant Secretary of Education, estimated that the federal government would spend $80 million annually on special education. Needless to
say, the federal government is very interested in examining ways to prevent students from academic failure. Response to Intervention (RtI) is a system-wide approach to early identification and intervention that uses research-based and alternate forms of instruction within the general education environment (Gaither, 2008). The RtI approach addresses dissatisfaction with special education programming, promotes a better understanding of how students learn, assures increased knowledge of interventions, and culminates in the federal government’s role in funding special education and the United States’ push for increased school accountability (Burns & Gibbons, 2008).

Advantages of an RtI approach include earlier identification of learning problems, a stronger focus on prevention, and assessments with clearer implication for academic programming (Fuchs & Fuchs, 2006; Fuchs, Fuchs & Speece, 2003). IDEA 2004 allows school districts to use up to 15% of their special education monies to fund early intervention activities, which has implications for the number and type of children identified, the kinds of services available to struggling students, and in determining who delivers the interventions (Fuchs & Fuchs, 2006). It has been well documented that reading problems occurring by the end of first grade tend to persist despite remediation, making early identification and intervention a critical component of preventing and reducing reading problems (Johnston & Allington, 1991; Juel & Leavell, 1988; Kaminski & Good, 1996; Torgesen & Burgess, 1998).

The goal of RtI is to have instruction and evidence-based interventions in place that allow a child to have success rather than identifying children who are not successful
with the standard teaching approaches (Burns & Gibbons, 2008). In an RtI model, the
first tier of intervention comes from the general education teacher and involves quality
core instruction and benchmark assessments to monitor students’ progress in their
learning. Students who do not make adequate progress in the general curriculum despite
sound teaching practices receive additional support in tier II. Tier II interventions are
more intensive, have a smaller student-teacher ratio, and provide a struggling student
with direct instruction in areas needing remediation. Tier III is reserved for students who
do not adequately respond to interventions provided in tiers I and II and involves
individualized interventions with weekly progress monitoring data collected.

**Statement of the Problem**

A major change in current educational practice is the pressure for accountability
(Meisels, Steele, & Quinn-Leering, 1993). The No Child Left Behind Act of 2001, which
mandated that, by 2014, children need to be at grade level in reading by the end of third
grade, led to a *trickle-down* effect of academic expectations. Kindergarten students are
now asked to perform at the level once expected of first grade students and, at the end of
the school year, kindergarten students are expected to be well on their way to reading, if
not actually reading (Bassard & Boehm, 2007). Students at every grade level come to
school with a wide variety of skills necessary to be successful in a school setting. Adams
(1990) stated that some students have only sporadic exposure to pre-reading activities,
while others have had thousands of hours of such activities with their parents or in a
preschool setting. Being able to quickly and efficiently screen students is one way for
teachers to monitor their own teaching practices and make educational and curricular adjustments based on collected data.

The earlier a student can be identified as *at risk*, the sooner an intervention can be supplied, which will hopefully lead to academic success in the general education setting. Kaminski and Good (1996) asserted that assessing early literacy skills, before a child learns to read in a formal sense, is an important preventative measure. When students who have reading problems are given early and intensive instruction, many improve markedly in their reading ability (Torgesen, 1997). Interventions for struggling readers need to be more intensive, explicit, and supportive than the instruction usually provided by the classroom teacher (Torgesen, 2002).

Busch and Reschly (2007) wrote that the RtI model must depend on measures that are technically adequate, can be given often, and are sensitive to student growth. In the RtI framework, universal screening is the first critical step in identifying those at risk of failing to meet grade level expectations (Fuchs & Fuchs, 2005). Universal screening allows schools to quickly identify problems and intervene early, which increases the likelihood that academic difficulties will be successfully remediated (Francis, Shaywitz, Stuebing, Shaywitz, & Fletcher, 1996).

One universal screening tool appropriate for kindergarten students is the Boehm, a norm-referenced assessment of 50 basic receptive language concepts commonly used with children in kindergarten, first, and second grade (Boehm, 1971). The concepts tested in the Boehm are among the most useful and frequently occurring relational concepts that
appear in printed materials, reading and math curricula, and teachers’ spoken instruction to kindergarten through second grade students (Boehm, 1986, 2001). The Boehm has been accepted as a helpful screening instrument and guide for teaching (McCandless, 1972; Smock, 1970).

The Boehm assesses students in five curriculum areas: (a) following teachers’ verbal instructions; (b) developing reading skills; (c) learning math skills; (d) reasoning skills; and (e) communication skills (Boehm, 2001). Information gathered from the Boehm gives a teacher specific knowledge about individual student’s areas of weakness so that direct instruction can occur to fill the gaps. The Boehm consists of 50 multiple choice items presented in a test booklet format. The concepts assessed are classified into four categories: space, quantity, time, and miscellaneous.

The critical components of an RtI model include universal screening, early intervention, and scientifically-based instructional practices. The Boehm meets the criteria of a universal screener when given to all incoming kindergarten students. The data collected from the Boehm allow school staff to identify students who may not have the necessary skills to be successful in a school setting. Lennon and Slesinski (1999) found that when low-scoring and mid-scoring kindergarten students were given intensive, 1:2 ratio, supplemental reading instruction for 30 minutes, five times a week for ten weeks, significant growth was achieved. Their research supported previous findings of Ball and Blachman (1991) that early intensive intervention in reading is appropriate for kindergarten students.
Purpose and Significance of the Study

The purpose of this study was to gain an understanding of the relationship that exists between the universal screening tool of the Boehm, the progress-monitoring tool of AIMSweb, and the impact they have on kindergarten student achievement. The importance of the early years of school is emphasized by Boyer (1995), who stated that the success of an elementary school is judged by its students’ proficiency in reading. NCLB stressed that reading assessments need to be a continual and dynamic process that focus on the critical components of reading: phonemic awareness, print awareness, letter knowledge, vocabulary development, and comprehension (Bassard & Boehm, 2007).

AIMSweb TEL is a screening tool to identify students in kindergarten and early first grade who are at risk for reading difficulties. TEL measures students in four areas: letter naming fluency, letter sound fluency, phoneme segmentation fluency, and nonsense word fluency. Torgesen (2002) confirmed that kindergarten assessments should cover phonemic awareness and letter-sound knowledge, and Whitehurst and Lonigan (2001) asserted that “Poor phonological processing skills are the hallmark of poor readers” (p. 16).

The significance of this study lies in its potential to determine whether AIMSweb is an effective tool for helping schools to identify struggling kindergarten students. AIMSweb TEL and the Boehm provide schools with baseline data from which staff will be able to give at risk students early interventions targeted specifically at areas of weakness, thus reducing the number of students qualifying for special education services.
It is critical for teachers and building leaders to know if progress monitoring data, as gathered by AIMSweb TEL, have improved the literacy and basic concepts skills of low-performing/at risk kindergarten students.

This study sought to determine whether a student who scored poorly on the Boehm would also score poorly on AIMSweb TEL assessments. Both the Boehm and AIMSweb TEL were used as universal screening tools that can help correctly identify students most at risk for reading difficulties. NCLB Act (2001) mandated that all students must be assessed for reading achievement by at least grade three (P.L. 107-110, 2001), but Burns and Gibbons (2008) noted that, whereas having students reading proficiently by grade three is an admirable goal, students must be assessed long before third grade if they are to perform academically at grade level.

In this study, data from kindergarten students enrolled in AIMSweb schools were compared to data of kindergarten students in schools where AIMSweb was not used as a progress monitoring tool. The analysis of these findings may help school leaders determine the appropriateness of purchasing the AIMSweb program. The results of data collected in this research will give school leaders evidence of the value and necessity of AIMSweb as it relates to the time and costs associated with purchasing and administering AIMSweb assessments.
Research Questions and Null Hypotheses

The following research questions guided this study. The null hypotheses were investigated, and any difference was tested for significance (p < .05).

**Question One:** Do schools that implement AIMSweb TEL progress monitoring have more academic growth in low performing kindergarten students (score of Level 3 on pre-test Boehm) than schools that do not progress monitor using AIMSweb TEL?

**Null Hypothesis One:** There will be no significant relationship in low performing kindergarten students’ academic growth between classrooms using AIMSweb TEL and classrooms not using AIMSweb TEL.

**Question Two:** Is there a difference on Boehm posttest percent correct scores between male and female students who perform at Level 3?

**Null Hypothesis Two:** There will be no significant difference in Boehm concept attainment based on gender.

**Question Three:** Is there a correlation between Boehm posttest raw scores and low performance on AIMSweb TEL assessments?

**Null Hypothesis Three:** There will be no significant correlation between Boehm raw scores and low performance on AIMSweb TEL assessments.
Methods

This study examined the relationship between the universal screening tool of the Boehm, the progress-monitoring tool of AIMSweb, and the impact these tools have on kindergarten achievement. Data from schools that used AIMSweb assessments were compared to data from schools that did not use AIMSweb to see if there was a statistical difference in kindergarten student growth. Test of early literacy (TEL) assessments included letter sound fluency, letter name fluency, phoneme segmentation fluency, and nonsense word fluency. Kindergarten students who scored at a performance level of 3 on the Boehm 2010 spring assessment were retested in February 2011 using the same assessment tool (Boehm-3, Level 2, form E). The identical test was given at both testing times. A performance Level 3 means that the student’s knowledge of basic concepts is extremely low, and teacher and parent help is needed for the child to be successful in school (Boehm, 2001). The raw score range for a performance Level 3 on the Boehm is correctly answering between 1 and 37 of the 50 basic concepts.

The intermediate school district (ISD) early childhood coordinator and assistant superintendent of special education contacted the researcher to determine if there was interest in analyzing kindergarten Boehm scores. The researcher reflected on different RtI models being offered throughout schools in the ISD and knew that many sites were using the universal screening and progress monitoring tool, AIMSweb. The researcher wanted to analyze the data to determine the impact of AIMSweb on student achievement. Permission was granted by the local ISD to access preexisting data collected by the local
ISD (See Appendix A), and approval for the study was granted by the University Human Subjects Review Committ (See Appendix B).

The student data collected by the ISD were compiled and stored in Data Director, a web-based data and assessment management system, which allows data to be viewed, disaggregated, and analyzed. Data Director gives access to five years of individual student data, benchmark results, and demographic information such as language level, language fluency, ethnicity, and special education status.

**Research Design**

Quantitative research traditions and summative evaluation research were implemented in this study. Creswell’s (1994) definition stated that quantitative research explains phenomena by collecting numerical data that are analyzed using methods based on mathematics, statistics in particular. Reiser and Dempsey (2007) explained that summative evaluation of an instructional process occurs at the end of a unit or training. This form of evaluation allows the instructional designers to see how well the learners met or understood the learning objectives. In the case of this research, an experimental design employed a treatment group and a comparison group. A summative evaluation was done to compare the comparison group (students not receiving AIMSweb TEL assessment) with the treatment group (students receiving AIMSweb TEL assessment) to determine if there was a significant impact on student achievement.

Fundamental to this research were the data collected by the ISD from March 2010 through June 2011. Individual school sites entered student assessment scores into the
Data Director database. The study included data on 1,206 kindergarten students from 15 northwest Michigan school districts, which comprised 31 elementary buildings. Students selected for this study were enrolled in all-day, every week-day kindergarten programs for the 2010-2011 school year. Of the total number of students, 48% were male and 52% were female. Three hundred and thirty-five (27.7%) of the 1,206 students scored at a Level 3 on their pretest Boehm assessment (53.1% male and 46.9% female). Data relevant to these 335 students, who represented 12 of the possible 15 districts and 23 of the total of 31 elementary buildings, were analyzed for student growth as the basis for this research.

The independent or treatment variables were (a) classrooms where AIMSweb TEL was used at the kindergarten level and (b) the comparison group of classrooms, wherein AIMSweb was not used with kindergarten students. The dependent variables or outcomes of this research were the posttest (February 2011) scores of Level 3 kindergarten students on the Boehm. Student data included in this study were gathered between a pre-Boehm data point (kindergarten round-up, 2010) and a post-Boehm (February 2011) data point. The dependent variable (posttest-February 2011 Boehm results) was measured by comparing student scores from the treatment group to scores attained by students in the comparison group.

Students in the AIMSweb group received the AIMSweb test of early literacy (TEL) twice during the 2010-2011 school year: in the fall (September/October 2010) and in late spring (April/May 2011). The TEL consists of phonemic awareness assessments
for letter naming fluency, sound naming fluency, phonemic segmentation fluency, and nonsense word fluency. Letter naming was the assessment given in the fall (2010), and sound naming fluency, phonemic segmentation fluency, and nonsense word fluency were administered in late spring in conjunction with the letter naming fluency test. An ISD staff member or a district manager, who received AIMSweb training from a designated ISD AIMSweb trainer, provided training for accurate administration of the TEL test components in all sites that implemented the AIMSweb program.

Descriptive statistics describe the basic features of a given set of data (Trochim, 2006). Descriptive statistics were used to determine what, if any, relationship exists between the variables as stated in the hypotheses. Trochim (2006) noted that inferential statistics are used to make inferences from the data, which might be applied to more general conditions. In the case of this research, inferential statistics were used to make assumptions about the impact of the Boehm and AIMSweb and apply it to schools not currently using AIMSweb at the kindergarten level.

Validity

Internal validity is the ability to determine whether there is a cause and effect relationship between variables. This research sought to determine if AIMSweb TEL was the main factor in whether struggling kindergarten students who were progress-monitored have improved academic growth compared to struggling kindergarten students who were not progress-monitored using AIMSweb TEL. Trochim (2006) wrote that internal validity concerns causality, whether outcomes can be attributed to the treatment or
intervention (i.e., AIMSweb) and not to other factors. Data collected for this research involved kindergarten students who had a pre- and posttest of data on the Boehm.

Major internal threats to validity in this research included the following:

- A selection history threat is any other event that occurs between pre-test and posttest that the treatment and comparison groups experience differently; it means the groups differ in some way (Trochim, 2006). Obvious differences among treatment and comparison groups used in this research are the expertise and experiences of the kindergarten teachers. Other differences between the treatment and comparison groups include class size variations, differing home environments of the students, behavioral issues within the classroom, student attendance, curriculum used, professional development opportunities, teacher collaboration, classroom aid assistance, and interventions available that were specific to a building and/or room.

- A selection testing threat may occur when a posttest difference in scores is the result of the same test being given as both the pre- and posttest assessment. For example, rather than the AIMSweb being the factor that improved scores, students may have learned from the Boehm pre-test. This circumstance could be a threat to the internal validity of this research, as students received the Boehm 3, Level 2, form E, as both the pre- and posttest selection.
Trochim (2006) noted that external validity is the extent to which conclusions from a particular set of research data can be applied and hold true to other people, in other places, and at different times. The students selected to participate in this research came from a variety of backgrounds, opportunities, and experiences, with the only criteria for participation being eligible for kindergarten and being five years old by December 1. Students were assigned to be in the AIMSweb or nonAIMSweb group based on whether their elementary building participated and implemented the AIMSweb TEL assessment. With regard to location, it could be argued that results from this research would not be applicable to other locations, as the data were collected in rural northern Michigan. Finally, the timing of the research was conducted when there were no offerings of free preschool for students regardless of economic standing. Some students come to school with preschool experiences, while others have limited or no preschool opportunities. There is no way to control for such variations in a child’s background, and there will always be variations in the unique skills and experiences that students bring to school.

Conceptual Framework

This research sought to determine by analysis of pre- and posttest Boehm scores if the use of AIMSweb TEL in some kindergarten classrooms led to increased student growth when compared to students who were not assessed using AIMSweb TEL. Using the theory of formative assessment and the theory of response to intervention, it seemed reasonable to expect that students whose teachers have more achievement data from
AIMSweb TEL results would have increased growth compared to students who were not progress monitored using AIMSweb TEL.

Figure 1 represents the conceptual framework used in this research, including the theory of response to intervention (RtI), the components of universal screening and progress monitoring, formative assessment, and constructivism.

Figure 1. Conceptual Framework

**Response to intervention theory.** The National Center on Response to Intervention defined RtI as the integration of assessment and intervention within a
multilevel prevention system to maximize student achievement. With RtI, schools identify students at risk for poor learning outcomes, monitor student progress, provide evidence-based interventions, and adjust the intensity and nature of those interventions depending on a student’s responsiveness. From a policy perspective RtI is meant to ensure that students who truly have a learning disability are correctly identified. With tight school budgets, districts are looking at all costs associated with educating students. The price tag of educating special education students is $12,000 per year, whereas cost for serving students in general education is approximately $6,500 (Chambers, Parrish, & Harr, 2002).

The RtI approach, as it is most commonly known today, is a modification by Fuchs (1995) and Fuchs & Fuchs (1998) to an approach first introduced more than a decade earlier by a National Research Council report (Heller, Hotlzman, & Messick, 1982). Fuchs operationalized the Heller et al.’s framework by incorporating three assessment tiers. In tier I, all students are assessed, and the rate of growth is documented to determine whether the rate of student responsiveness to the general education curriculum is sufficient to produce expected student progress. The objective of tier II is to identify and offer assistance to students who may be at risk and have possible learning disabilities, as indicated by a lack of adequate responsiveness to the generally effective and high quality curriculum (assuming a high quality curriculum is in place). Students who are responsive to tier II interventions exit and return to the tier I status, whereas
students who fail to make gains in performance or rate of improvement are transitioned to tier III.

Tier III consists of an individual plan of remediation developed with a small student-to-teacher ratio. The target of tier III intervention and assessment is to identify if, and with what types of intervention supports, the general education setting can become a learning environment for students most at risk for a learning disability (LD) label. Student progress is monitored on a weekly basis to determine changes in performance level and rate of improvement. If little or no student growth is achieved at tier III, the RtI team determines whether a special education evaluation is appropriate. The assumption is that, if tier III adaptations to the general education curriculum cannot effect an expected level of academic growth, then the student has some intrinsic deficit/disability, making it difficult to derive benefit from the instructional environment that benefits the overwhelming majority of students (Fuchs & Vaughn, 2005).

The National Association of State Directors of Special Education (NASDSE) in 2007 believed that effective RtI implementation contains seven components:

1. *Effectively teach all children.* RtI practices are founded on the assumption and belief that all children can learn.

2. *Intervene early.* Early intervention is the best approach when learning problems are relatively small. Solving small problems is more efficient and more successful than working with more intense and severe problems.
3. *Use a multi-tier model of service delivery.* Efficient, needs-driven resources are matched to the instructional needs of the student. For all students to be successful, instruction in classrooms must be differentiated in nature and intensity. To differentiate instruction, tiered models of delivery are a critical component of an RtI system.

4. *Use research-based, scientifically validated interventions/instruction.* NCLB and IDEA require the use of scientifically based curricula and interventions. This ensures that students are exposed to curriculum and teaching that has demonstrated effectiveness.

5. *Monitor student progress to inform instruction.* The use of assessments that can be collected frequently and are sensitive to small changes in student behavior are recommended. Determining the effectiveness of an intervention early is essential to maximize the impact of the intervention with the student.

6. *Use data to make decisions.* A data-based decision regarding student response to intervention is central to RtI progress. Decisions are based on professional judgment informed directly by student performance data. This requires that ongoing data collection systems are in place and that the data collected are used to make informed instructional decisions.

7. *Use assessment for three different purposes.* In RtI, three types of
assessment are used: (a) screening of all children to identify those who are not making academic or behavioral progress at expected rates, (b) diagnostic to determine what children can and cannot do in academic domains, and (c) progress monitoring to determine if academic or behavioral interventions are producing desired effects.

**Universal screening.** Jenkins and Johnson (n.d.) stated that all RtI models require early screening to identify students who are likely to experience academic difficulties. The idea of universal screening draws on prevention science and allows school professionals and parents to assist students instead of waiting for them to fail before giving additional help. Screening approaches should satisfy three criteria (Jenkins, 2003). The first is classification accuracy—a good screen correctly identifies students as at risk or not at risk for reading failure. The second criteria is efficiency—the screening must not be too costly, time-consuming or cumbersome to implement, and the third criteria is consequential validity—the overall effect for students must be positive (Messick, 1989).

Early identification of students at risk for poor learning outcomes can begin as early as kindergarten. This research looked at the universal screening tool of the Boehm administered to all incoming 2010-2011 kindergarten students in one northern Michigan intermediate school district. Students who scored at a performance level of 3 were identified as potential at risk learners and received the identical Boehm assessment in
February 2011. Individual schools and kindergarten classroom teachers were able to choose whether to use the Boehm test results to guide instruction.

Another universal screening and progress monitoring tool implemented by some kindergarten classrooms was the AIMSweb test of early literacy (TEL), which assessed four components of phonological awareness: letter fluency, sound fluency, phoneme segmentation fluency, and nonsense word fluency. Again, individual classroom teachers made decisions on how to use the data collected from the TEL to determine courses of action for at risk students.

The Boehm and AIMSweb TEL were used as universal screening tools to give classroom teachers information that met the criteria set forth by the NASDSE (2007) with regard to effective RtI implementation: assessment use for three different purposes, using data to make decisions, and monitoring student progress to inform instruction.

Kindergarten classrooms that implemented AIMSweb TEL screened all kindergarten students twice a year—fall and spring—to monitor students’ level of performance and rate of improvement (Tier I of Fuch’s RtI model, 1995).

Theory of formative evaluation. The second critical concept that guides the conceptual framework for this research is the theory of formative evaluation. Assessments must consider the broad range of competencies and accurately capture a student’s set of complex skills and deep knowledge that we expect them to attain, even as early as kindergarten. Assessments should measure levels of achievement (students’ strength and weaknesses) and provide information about students who perform below
expectations. The theory of formative assessments views assessments as a reflection of the teacher’s instructional practices rather than the results belonging solely to the student. Results reflect the student’s learning and describe what a student can do across and within content areas. Data collected are meant to inform the education process and access a broad range of a student’s cognitive abilities by capturing critical thinking skills and the integration of knowledge, all of which are necessary skills to be successful in our changing economy (Gipps, 1994).

Psychometric testing was the norm in schools until the late 1950s. Highly influenced by the theory of intelligence, which viewed intelligence as innate and fixed, psychometric tests were norm referenced, meaning that an individual’s score was compared to the scores of peers for an easy way to group students as high, medium, or low. Wood (1986) referred to Glaser’s 1963 paper on criterion-referenced testing as the defining moment in educational history, which challenged psychometric testing and moved scholars toward thinking about educational measurement. This shift in testing theory was a direct result of the criticism and shortcomings found in psychometric rules and regulations.

Educational measurement sought to look at students as individuals and used the results of tests to identify a student’s strengths and weaknesses. Wood’s (1986) definition of educational measurement included the following concepts: (a) deals with an individual’s achievement relative to himself rather than to others; (b) seeks to test for competence rather than intelligence; (c) takes place in relatively uncontrolled conditions;
(d) looks for *best* rather than *typical* performances; (e) is most effective when rules and regulations characteristic of standardized testing are relaxed; (f) embodies a constructive outlook on assessment where the aim is to help rather than sentence the individual (p. 194). Educational measurement practices shifted the role of the teacher to one directly involved in the assessment process rather than simply the test administrator. Educational measurement test results are used to support curriculum, learning, and assessment, the three components of teaching and learning.

Whereas changes in what assessments are used and how assessment of student learning is welcomed and aligned with higher standards and skills necessary for the workplace, these assessments do not conform to the psychometric principles of reliability and standardization. Thus the dilemma arises; the demands for testing at a national level for comparability and accountability purposes collide with the increased understanding of cognition and learning. “We must develop and propagate a wider understanding of the effects of assessment on teaching and learning, for assessment does not stand outside of teaching and learning but stands in dynamic interaction with it” (Gipps, p. 15).

AIMSweb TEL is a type of formative evaluation that gives teacher and student specific areas of the individual’s strengths and weaknesses. Teachers use information received from formative assessments to understand the details of the misunderstanding and to adapt instruction to fit the need(s) of the student. Students as young as kindergarten use feedback from the assessment and from the teacher to positively affect learning. Black and Wiliam (1998) found that students learn more when they receive
feedback about particular qualities of their work along with recommendations on what they can do to improve. The researchers concluded that formative assessments produce significant learning gains more so for low achievers than for normally achieving students. These findings are particularly striking because the Boehm and AIMSweb TEL are intended to help the teacher make instructional decisions about the lowest achieving students in a classroom.

The theory of formative assessment, according to William and Thompson (2007), draws on Ramaprasad’s (1983) three processes in learning and teaching: establishing (a) where the learners are in their learning, (b) where they are going, and (c) what needs to be done to get them there. AIMSweb TEL and the Boehm give the teacher information critical for formative assessment to have a significant impact on student learning and achievement. Black and William (1998) offered perhaps the most widely quoted definition of formative assessment:

…refers to all those activities undertaken by teachers, and by the students in assessing themselves, which provide information to be used as feedback to modify teaching and learning activities in which they are engaged. Such assessment becomes formative when the evidence is actually used to adopt the teaching to meet needs. (p. 2)

AIMSweb TEL is sensitive enough to show student growth and can be used by the teacher to diagnose students’ misconceptions and misunderstanding. The teacher develops and creates learning opportunities for the student to work on reducing
weaknesses with the student being aware of his or her deficiencies. A diagnostic assessment (such as the Boehm and AIMSweb TEL) helps teachers make instructional decisions about how to guide student learning so that the student is able to construct meaning and make newly presented information relevant.

**Theory of constructivism.** Constructivism is the third and final theory that constitutes the conceptual framework of this research. Piaget (1977) and Vygotsky (1978) are well known for studies that developed this theory. The constructivist philosophy focuses on the information and personal experiences students carry into the classroom, and it is these unique experiences that have a tremendous impact on how students view the world. Students come to school with an extensive variety of knowledge, feelings, and skills, and learning should begin based on experiences held by a child. Individualized knowledge exists within the student and develops as the individual interacts with peers, teachers, and the environment. Learners construct understanding or meaning by making sense of their experiences and fitting their own ideas into reality (Schulte, 1996).

Constructivism is a paradigm shift from education based on behaviorism to education based on cognitive theory. Piaget (1977) asserted that learning occurs when an individual plays an active role in the construction of meaning rather than by being a passive recipient. He explained that when learners encounter an experience or a situation that conflicts with their current way of thinking, a state of disequilibrium is created. The learner must then alter his or her thinking to restore equilibrium. To bring things into balance, the learner tries to make sense of the new information by associating it with
something he or she already knows, by attempting to assimilate it into existing knowledge. When learners are unable to do this, they accommodate the new information to their old way of thinking by restructuring the present knowledge to a higher level of thinking.

Fosnot (1989, 1996) described four assumptions at the heart of constructivist learning:

1. Learning depends on what we already know.
2. New ideas occur as we adapt and change our old ideas and involves inventing ideas rather than accumulating facts.
3. Knowledge is socially constructed by learners who convey their meaning to others.
4. Knowledge is constructed by learners who try to explain things they don't completely understand, by rethinking these ideas and coming to new conclusions about ideas that conflict with old ideas.

The theory of constructivism is intertwined with concepts presented in this research because participants in this study come to school with a vast variety of knowledge, feelings, skills, and prior learning experiences. As cited by Hunt (1969), constructivist theorists Piaget (1977) and Vygotsky (1978) believed that learning and development occur when young children interact with their environment and the people around them. Constructivists view children as active participants in the learning process and believe that young children initiate most of the activities required for learning and development. Educators influenced by constructivism gave much thought to the physical
environment and the details of an early childhood curriculum. Constructivist-designed rooms are often organized into different learning centers and stocked with developmentally appropriate materials for young children to manipulate. Teachers have direct conversations with students, children actively move between centers, and daily activities are made meaningful by the teacher incorporating children's experiences into the curriculum (North Central Regional Educational Lab, NCREL).

**Definition of Terms**

**AIMSweb (Achievement Improvement Monitoring System)**—a benchmark and progress monitoring system based on direct, frequent, and continuous student assessment with results reported from a web-based data management system.

**AIMSweb test of early literacy (TEL)**—a program of tests for assessment of four components of phonological awareness: letter fluency, sound fluency, phoneme segmentation fluency, and nonsense word fluency.

**Boehm Test of Basic Concepts**—an assessment tool which measures students’ understanding of fifty basic concepts occurring most frequently in kindergarten, first, and second grade curriculums.

**Curriculum Based Measures (CBM)**—assessments designed for individual progress monitoring of student performance, which enable teachers to evaluate the effectiveness of their instructional interventions and make timely modifications to accelerate student achievement (Deno, 2003).
Progress monitoring—a scientifically based practice used to assess students’ academic performance and evaluate the effectiveness of instruction (National Center on Student Progress Monitoring).

Response to Intervention (Rti)—a process in which schools identify students at risk for poor learning outcomes, monitor student progress, provide evidence-based interventions and adjust the intensity and nature of those interventions depending on a student’s responsiveness (National Center on Response to Intervention).

Limitations and Delimitations

Limitations. Limitations were imposed on this study by the large number of kindergarten teachers who were involved with the collection of data along with massive variations in the quality, quantity, and curricular materials used to teach reading and other kindergarten objectives. In these circumstances there was no way to control or monitor the teaching strategies used by individual classroom teachers or the interventions used with students identified as at risk learners. This research did not investigate specific strategies or interventions implemented with at risk kindergarten students. Test results obtained on both the Boehm and AIMSweb TEL are snapshots of what a child can do at a given moment in time and may not accurately represent their full capabilities.

Delimitations. Preexisting data gathered by the intermediate school district were used in this study. Factors related to the background of the children or their home environments were not considered for the purposes of this study. The scope of this study was narrowed by looking only at kindergarten students who initially scored at a Level 3
on the Boehm administered during kindergarten round-up screening sometime between March and June 2010. Kindergarten students scoring at a Level 1 or 2 were not analyzed for growth because they were not given the Boehm in February 2011; therefore, there were no posttest Boehm data points for comparison. Research related to the impact of AIMSweb growth as determined by the Boehm was not reviewed, as literature searches failed to produce any studies linking the two concepts.

Summary

The impetus for districts to change their approach of educating students with potential learning disabilities from a *wait to fail* model to a process based on prevention and early intervention, also commonly referred to in education as RtI, is briefly described in this chapter. Schools are being held more accountable for progress and growth of every student; building leaders need to have timely, reliable, and accurate information about the most effective way(s) to identify students at risk for failing in the area of reading. This chapter included the purpose of the research, which was to gain an understanding of the relationship, if any, that exists between the Boehm and the AIMSweb TEL assessments, research questions, and hypotheses, a brief overview of the research methods, the design of the study, definition of terms, limitations, and delimitations of the study.
CHAPTER 2-REVIEW OF RELATED LITERATURE

Elliott (2008) wrote that response to intervention (RtI) is the practice of providing high quality instruction and intervention matched to individual student needs, frequent monitoring to inform decisions about changes in instruction or goals, and the application of student response data to inform educational decisions. “In essence, RtI expands the practice of looking at students' risk of learning and behavioral failure beyond the student, and takes into consideration a host of factors” (Elliot, 2008, p. 1). The purpose of this study was to gain an understanding of the relationship, if any, that exists between the universal screening tool of the Boehm, the progress-monitoring tool of AIMSweb Test of Early Literacy (TEL), and their impact on kindergarten student achievement.

The review of literature is divided into five sections. The first section traces the government’s focus on accountability and laws leading to the No Child Left Behind Act of 2001 and the emergence of RtI, specifically the components of universal screening and progress monitoring; the second portion focuses on the research and influences of curriculum-based measures (CBM) and the role of CBM within an RtI framework. The third segment addresses the development and influence of AIMSweb, a tool used by schools to screen and monitor student growth and progress achieved on CBMs; the fourth section focuses on an analysis of the Boehm Test of Basic Concepts (BTBC) assessment, a universal screening tool used to help identify incoming kindergarten students who may
struggle with reading and reading related skills; and the fifth portion of this literature review explores best practices for reading instruction with kindergarten students.

History of RtI

Public education funded by the citizens makes issues of accountability paramount. In 1975, the Education for all Handicapped Children Act, PL 94-142 (EHA, 1975), became the first federal law to clearly define the rights of disabled children aged 3 to 21. Regardless of the status of the disability, a free and appropriate public education (FAPE) was mandated, which required school systems to include parents when meeting about the child or making decisions about his/her education. The law included an Individualized Education Program (IEP) for every student, which had to include long- and short-term goals for the student and assurance that necessary services and products were available to the student. This law also required placement of students in the least restrictive environment (LRE), which means placing the student in the most normal setting possible (Law and Exceptional Students, 1998).

With the passing of PL 94-142, the identification of disabled children steadily and greatly increased. By the late 1980s, the effectiveness of special education programs were called into question, particularly for students with mild disabilities such as learning disorders and behavioral disorders (NASDSE, 2007). As a result of the questions raised and the research findings, policymakers initiated a complete reform of PL 94-142, and in 1997, this law was re-authorized as the Individuals with Disabilities Education Act (IDEA).
IDEA and NCLB. On December 3, 2004, then-President George W. Bush signed the Individuals with Disabilities Educational Improvement Act, which reauthorized IDEA. The revisions to IDEA and language declared in the No Child Left Behind Act of 2001 (NCLB) were intended to create better outcomes for all children and to create procedures backed by strong scientific research that schools could apply to a wide range of decisions involving the education of children, including but not limited to the eligibility of specific learning disabilities. The intent of the specific language found in IDEA and NCLB regarding the use of scientifically based interventions was to make certain that students were exposed to effective curriculum and instructionally sound teaching practices (NASDSE, 2007). These revisions extended issues of accountability from special education programs to include accountability for student learning in general education programming.

IDEA was concerned specifically with the education of disabled students, whereas NCLB addressed the goals and accountability for students in K-12 education. The purpose of IDEA and NCLB was to enhance student achievement, provide ways to determine progress, and ensure accountability. IDEA and NCLB both support research-based instruction, effective interventions, and functional assessment measures sensitive to instruction. IDEA 2004 introduced the step-by-step process of first assessing a students’ response to quality and research-based classroom instruction to identify students at risk for failure, who would then receive more intensive and targeted instruction. Students who do not make adequate progress are then considered for a special education evaluation.
This approach is commonly referred to as RtI, although these exact words are not used in the law (International Reading Association, 2009 brochure).

**A model based on prevention and early identification.** The National Association of State Directors of Special Education, NASDSE (2007), recommended that students with disabilities first be considered general education students, focusing more on a model of prevention rather than on a model of failure. Jenkins and Johnson (n.d.) wrote that RtI draws on the idea of prevention science, wherein schools don’t wait for students to fail before coming to their assistance. The IRA Commission (International Reading Association, 2009) made it clear that the idea of Response to Intervention is not a specific program and that RtI will look different from school to school. RtI is a framework for schools to identify and support students with learning difficulties before the problems become more serious and to focus on optimizing instruction and interventions rather than assuming that the student has learning disabilities.

**Universal screening.** A central component of an RtI model is the early screening of all students to identify students most at risk for academic difficulties (Jenkins & Johnson, n.d.). The driving force of universal screening is that students identified as being at risk will receive additional supports that will give them the necessary skills to be successful (Hughes & Dexter, n.d.).

According to Jenkins, Hudson, and Johnson (2007), universal screening should satisfy three criteria: (a) classification accuracy—a good screen accurately identifies a student as at risk; (b) efficiency—a screening tool must not be too costly, time-consuming,
or too cumbersome to implement; and (c) consequential validity—the net effect for students must be positive (Messick, 1989).

In this research, the Boehm served as a universal screen because it was given to all incoming kindergarten students. It meets the three classification components identified by Jenkins et al. (2007), as it gives students a performance score of 1 (the highest Level), 2 (the middle Level), or 3 (the lowest Level), which designates at-risk students. The Boehm is an efficient tool for screening, as it is relatively inexpensive, takes approximately 20 minutes to administer, and does not require any specialized training. The Boehm has a positive effect on students; it gives parents information on concepts they can incorporate into daily activities during the summer and throughout the school year. Teachers use information from the Boehm to help plan activities that are beneficial on the first day of kindergarten.

The AIMSweb TEL assessment also served as a universal screen (for schools using the program); all students in the school were screened. It, too, meets the classification criteria, as students fall into a high, medium, or low category, is cost-effective, and is an efficient tool for screening (one minute per child). The benefit of having two universal screening tools (AIMSweb TEL and the Boehm) is that two separate assessments can identify students at risk for learning difficulties, which alleviates false positives (results that deem students to be at risk when, in fact, they are not). “For a prevention system to work effectively, procedures for determining risk must yield a high percentage of true positives while identifying a manageable risk pool by
limiting false positives” (Fuchs et al., 2007, p. 312). Over-identifying students as at risk can tax precious school resources, but even more alarming is the potential of overlooking students who can’t succeed without additional interventions.

Universal reading screens consist of quickly administered assessments that focus on target skills such as phonological awareness, which have demonstrated high correlations to future achievement outcomes (Jenkins, 2003). AIMSweb TEL assessments used in identified kindergarten classrooms in this research can accurately be described as a universal screening tool. Universal screening quickly identifies potential at risk learners, allowing schools to intelligently allocate instructional resources. Research from Jenkins and Johnson (n.d.) supported the understanding that kindergarten-aged students develop phonemic awareness, letter and sound knowledge, and vocabulary, thus making AIMSweb TEL a developmentally appropriate assessment to predict later reading outcomes. Pool and Johnson (n.d.) wrote that the needed early core literacy skills for young children are phonological awareness (ability to identify and manipulate sounds), alphabet knowledge (awareness of individual letters and letter names), concept of word (ability to segment spoken sentences/phrases into words and to match spoken words to text), and grapheme-phoneme correspondence (ability to identify correspondence between letters and sounds).

AIMSweb TEL universally screens all kindergarten students in the areas of letter naming fluency, letter sound fluency, phonemic segmentation fluency, and nonsense word fluency. O’Connor and Jenkins (1999) distinguished at risk and typically
developing kindergarteners better by using a combination of measures (letter name fluency, phonemic segmentation, and syllable elision) than any single measure. The most successful screening measures in kindergarten have used various combinations of letter naming fluency, letter sound identification, blending onset-rimes, phoneme segmentation, and sound repetition (Foorman et al., 1998; O’Connor & Jenkins, 1999). A screening tool that does not comprehensively examine all the early literacy skills, as described by Pool and Johnson (n.d.), may be ineffective for identifying children who display limitations in a particular area of early literacy (Justice, Invernizzi, & Meier, 2002).

**Progress monitoring.** As noted by the NASDSE in 2007, progress monitoring is believed to be one of seven critical components of effective RtI implementation. According to Mahdavi and Haager (n.d.), progress monitoring fulfills two main purposes: to assess students’ academic progress and evaluate the effectiveness of an intervention. In order to fulfill the purposes of progress monitoring, data points need to be collected frequently, which allows teachers to continually monitor progress towards a specific learning goal. AIMSweb TEL was the progress-monitoring tool used in this research for students attending schools implementing the AIMSweb TEL assessments. All students in identified kindergarten classrooms were monitored twice (fall 2010 and spring 2011) during the 2010-2011 school year. Some students, such as those coming into kindergarten with a special education label or students identified as at risk, could have been progress monitored a third time, during the winter of 2011. Because the third data point did not apply to all students, it was not considered in this research.
According to the AIMSweb TEL manual, only letter naming fluency (LNF) is administered in the fall, as the students are just beginning school. The other three assessments (letter sound fluency (LSF), phonemic segmentation fluency (PSF), and nonsense word fluency (NWF), were developmentally inappropriate for students just beginning kindergarten, as many students do not yet have these skills. In the spring assessments LSF, PSF and NWF were administered along with LNF.

Progress monitoring assessments are short, address a specific area of need, and can be given frequently. The National Center on Response to Intervention wrote, “progress monitoring is used to assess students’ performance over time, to quantify student rates of improvement or responsiveness to instruction, to evaluate instructional effectiveness, and for students who are least responsiveness to effective instruction, to formulate effective individualized programs” (p. 6). Data collected through progress monitoring tools such as AIMSweb TEL allow teachers to be more effective and efficient because they know what skills a child already has and which skills need to be developed, enabling a teacher to create an intervention package precisely tailored to a child’s needs (Mahdavi & Haager, n.d.).

The benefits of progress monitoring are plentiful. Kay (2012) wrote that the benefits of progress monitoring include (a) accelerated learning because students are receiving more appropriate instruction, (b) more informed instructional decisions, (c) documentation of student progress for accountability purposes, (d) more efficient communication with families and other professionals about students’ progress, (e) higher
expectations for students by teachers, and (f) fewer special education referrals. Data collected from progress monitoring tools such as AIMSweb TEL allow teachers to target their instruction based on unique student needs, which moves all students to quicker attainment of state standards of achievement.

**Curriculum-based measures (CBMs)**

In the late 1970s and early 1980s, the research of Stanley Deno and Phyllis Mirkin at the University of Minnesota’s Institute for Research on Learning Disabilities (IRLD) concentrated on field testing the technical adequacy of potential measures of curricular performance in an attempt to validate their use in decision-making. Out of this research, Jenkins, Deno, and Mirkin (1979) created what are now commonly referred to as curriculum-based measurements (CBM). They looked at a number of characteristics considered desirable for monitoring student progress, which included the need for the measures to be (1) tied to the student’s curricula, (2) short in duration so that frequent administration by teachers could occur, (3) capable of having multiple forms (4) inexpensive to produce in terms of time in production and in expense, and (5) sensitive to the improvement of student achievement over time. An additional key component of CBM was the identification of academic behaviors in basic skills areas that could be measured reliably and with validity.

Curriculum-based measurements (CBM) are a set of methods for indexing academic competence and progress (Deno, 1985). The creation of CBM established a system that (a) teachers could use efficiently; (b) would produce accurate, meaningful
information with which to index standing and growth; (c) could answer questions about
the effectiveness of programs in producing academic growth; and (d) would provide
information that helped teachers plan better instructional programs.

With the use of CBM, improvements are made in instructional quality, and
student achievement increases by using absolute benchmark qualifiers to determine
which students may need an intervention (Fuchs, Deno, & Mirkin, 1984; Fuchs & Fuchs,
1986; Fuchs, Fuchs, Hamlett, & Stecker, 1991). For the child progressing as expected,
CBM assessment is administered three times per school year. For students with below
average progress, assessments are done more frequently to provide the instructor with
immediate feedback, measuring mastery of basic skills and an efficient means of
monitoring short-term and long-term student progress in key academic areas.

CBMs are a standardized measurement tool; the procedures used for creating the
tests, administering and scoring, summarizing, and interpreting the data are prescribed.
By relying on standardized methods and by sampling the annual curriculum on every test,
CBMs produce a broad range of scores across individuals of the same age (Fuchs &
Fuchs, 2003). Good, Simmons, and Kame’enui (1989) found that the rank ordering of
students on CBM data correlates with rank ordering on other important criteria of student
competence. This finding shows that students who score high (or low) on CBM tests also
score high (or low) on state tests and demonstrate that CBMs are reliable and valid
(Marston, 1989). Whereas each CBM test assesses a multitude of skills found in the
annual curriculum, CBM test results give teachers information about each child’s areas of strengths and weaknesses.

In this sense, CBM can be viewed as a performance indicator because it reveals a range of individual scores from students who are the same age, and rank orders the students. The ranking allows the teacher to identify discrepancies in performance between individuals and peer groups, which helps to inform teacher decisions. The use of group CBM data strengthens instructional planning by allowing the teacher to focus on the class report in addition to an individual student’s report. The class report groups skills by problem type for each student, allowing the teacher to quickly make instructional decisions about overall trends in the classroom and adjust instruction.

Additionally, CBM reports, such as those generated by the AIMSweb TEL assessments, strengthen teacher instruction by reporting students in the bottom 25%, those who were most improved across the last few weeks, students who could benefit from targeted instruction, and students who are not on track to meet end-of-year benchmarks (Fuchs & Oxaal, n.d.). At an individual planning level, CBM data provide teachers with trends of student progress. These individualized data inform the teacher of his or her effectiveness (or ineffectiveness) and about whether to make a change in teaching strategy. If a teaching change is made, teachers can track progress from the date the teaching change started to determine if the new approach is more or less effective.

A responsibility of schools is to teach children the academic skills necessary to be productive members of society. Schools must also make sure that children have mastered
the skills that have been presented. By assessing what a child has learned or hasn’t learned, a teacher can make instructional decisions on what material to present next and where remediation is needed. In the past, classroom assessments have commonly involved commercially prepared tests, which often relied on mastery measurement. In mastery assessment, the test assesses mastery of a single skill; after mastery is achieved, the next sequenced skill is assessed. Mastery measurement includes the following concerns: hierarchy of skills is logical, not empirical; performance on a single skill test can be misleading; single skill assessment does not reflect maintenance or generalizability of knowledge; the reliability and validity of the test is unknown, as it is designed by a teacher or sold with the textbook; and the number of objectives mastered by the student does not relate well to high stakes test performance (Fuchs & Oxaal, n.d.).

Moreover, mastery measurement has unknown reliability and validity and fails to provide information on whether students have maintained the previously mastered skills (Fuchs & Fuchs, 2003). At various times of the school year, different skills are assessed, which means that test scores from September cannot be compared to test scores from December because the nature of the test assesses different skills. Because different elements of learning are assessed throughout the school year, it is impossible for educators to quantify or describe a student’s rate of progress.

With CBM, each assessment covers a broad range of skills by sampling dimensions from the annual curriculum on each test. Each assessment is in an alternate form of equivalent difficulty, assessing the same constructs. CBMs are grade-level
specific and sample concepts that would be covered over the course of a given year. This permits CBMs to avoid a skills hierarchy and single-skill test by automatically assessing maintenance and or generalization skills. CBM tests have a known reliability and validity, all of which relate well to positive performance on high stakes tests (Fuchs & Oxaal, n.d.). Thus, scores earned in September can be compared to scores in December and or March to determine if a student’s competence is increasing (Fuchs & Fuchs, 2003).

**AIMSweb Described**

AIMSweb (Achievement Improvement Monitoring System) is a benchmark and progress monitoring system with screenings available three times a year for students progressing on grade level. AIMSweb is based on the research and findings of CBMs, the method of monitoring student progress through brief, direct, and continuous assessments of basic skills. Although AIMSweb is appropriate for assessment in reading and/or fluency, math, writing, and spelling, this research specifically focused on the reading assessments administered to kindergarten students.

The National Reading Panel (2000) identified critical pre-reading skills that should be assessed in kindergarten and early first grade to help identify students at risk for reading difficulties. Phonemic awareness (PA) is the understanding that phonemes are the smallest units composing spoken language, and instruction in PA involves teaching students to focus on and manipulate phonemes in spoken syllables and words. Bond and
Dykstra’s (1967) analysis found that the ability to discriminate between phonemes was the second best predictor of first grade reading achievement.

Specific assessments of phonemic awareness include correct identification of letter names and sounds, phoneme segmentation, and the ability to read nonsense words. AIMSweb TEL assesses these phonemic awareness areas through letter naming fluency (LNF), letter sound fluency (LSF), phonemic segmentation fluency, (PSF) and nonsense word fluency (NWF). Ball and Blachman (1991) found a direct correlation between the effects of phonemic segmentation with kindergarten students and their reading and spelling skills. Table 1 describes what the student is required to do for each TEL assessment and the length of the assessment.

Table 1

Test of Early Literacy (TEL) Measures Described

<table>
<thead>
<tr>
<th>Name of TEL assessment</th>
<th>What student must do</th>
<th>Length of assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Letter naming (LNF)</td>
<td>Say names of visually presented letter</td>
<td>1 minute</td>
</tr>
<tr>
<td>Letter sound (LSF)</td>
<td>Say sounds of visually presented letter</td>
<td>1 minute</td>
</tr>
<tr>
<td>Phonemic Segmentation (PSF)</td>
<td>Identify the specific phonemes in orally presented words</td>
<td>1 minute</td>
</tr>
<tr>
<td>Nonsense word fluency (NWF)</td>
<td>Say the sounds of visually presented nonsense words</td>
<td>1 minute</td>
</tr>
</tbody>
</table>
AIMSweb TEL assessments were used in this research as a universal screening tool and as a progress monitoring tool. Universal screening performance was measured on either accuracy or fluency. Jenkins (2003) wrote that accuracy is based on a student’s percentage of correct responses to tasks, and fluency is the student’s number of correct responses per minute. Accuracy imparts knowledge of a student’s individual knowledge, whereas fluency shows a student’s knowledge and rate of processing (Hughes & Dexter, n.d.). Although knowledge of letter names is a good predictor of reading success, Tunmer, Herriman, and Nesdale (1988), and Walsh, Price, and Gillingham (1988) found that the speed with which students can name individual letters is also a strong predictor of success in pre-reading students and a strong correlate of reading achievement among beginning readers (Biemiller, 1977-1978; Blachman, 1984).

Adams (1990) elaborated on four reasons why individual letter familiarity is a good measure of predicting reading success: First, the speed and accuracy of naming a letter is an indicator of the confidence in which the letters have been learned; a child who can easily and with confidence name letters will have an easier time learning about letter sounds and word spellings. Second, the speed in which a letter can be named is an index of the automaticity of letter recognition; “Children who automatically see the letters as wholes will see the words as patterns of letters. Children who do not, will have to work on the patterns of the individual letters as well” (Chall, Jacobs, & Baldwin, 1990, p. 63). Third, in general, the names of letters are similar to the sounds they make. Being comfortable with letter names allows a child to remember the sound the letter makes.
Finally, quickly naming letters is the ability to respond to visual stimuli rapidly. Blachman (1984) and Denckla and Rudel (1976) found that good and poor readers differed in the speed in which they could name colors, numbers, and objects in addition to naming letters.

**AIMSweb research.** The National Center on Student Progress Monitoring, funded by the U.S. Department of Education Office of Special Education, released its first review of tools used in frequent progress monitoring. A set of seven criteria developed by the Standards for Educational and Psychological Testing, were used to evaluate progress-monitoring tools such as AIMSweb. The American Educational Research Association (AERA), American Psychological Association (APA), National Council on Measurement Used in Education (NCMUE), and Individuals with Disabilities Education Act (IDEA) appointed a joint committee that created the seven standards used to evaluate progress-monitoring tools which included (1) sufficient number of alternative forms with evidence of equal difficulty, (2) rates of improvements specified, (3) benchmarks specified, (4) evidence of improved student learning or teacher planning, (5) sensitivity to student improvement, (6) reliability, and (7) validity.

In a report released in 2008, AIMSweb TEL measures met six of the seven standards set forth by the criteria measurements. The missing standard was data showing the reliability of alternative forms of assessments. The lack of data was due to the relative newness of the testing materials and insufficient data collected or analyzed at the time of publication. The information supplied by the National Center on Student Progress
Monitoring provided evidence that AIMSweb TEL is a reliable and valid progress monitoring tool. Information gathered via the AIMSweb TEL helps building and district leaders make the best decisions to positively impact student achievement at a minimal cost in teacher time and resources.

Normative data were collected through AIMSweb TEL assessments. School sites can use national norms to determine how their students compare to other similar grade and or age students. Student data gathered from AIMSweb are given in terms of a percentile that can be related to a specific site, county, state, or at a national level. The default for AIMSweb at risk students are those students whose abilities fall below the 25th percentile rank, but individual schools can determine what percentile they consider to indicate at risk students. The intent of universal screeners and progress monitoring is that students at risk for reading difficulties can be identified early and given interventions that will lead to academic success.

**Boehm Test of Basic Concepts (BTBC)**

Considering the high accountability required of schools, it is critical that educators make use of tools for early detection of students who might be considered at risk for reading-related problems. As children progress through school, difficulties in reading affect their ability to participate in many classroom activities (Hausner, 2000). Boehm (1967) and Davis’s (1974) research found that students who start out behind tend to stay behind, and that the gap between high and low achievers increases over time. Vellutino, Scanlon, Small, Fanuele, and Sweeney (2007) wrote, “Early intervention to
institute foundational literacy skills in children identified as at risk for early reading difficulties at the beginning of kindergarten can significantly improve such skills and, thereby, help to prepare them for first grade reading instruction” (p. 195).

The assessment tool used in this research to assess incoming kindergarten students for indicators of at risk factors was the Boehm Test of Basic Concepts (BTBC). The Boehm is designed to measure children’s mastery of basic concepts considered necessary for achievement in the first years of school (Boehm, 1967). Concepts are an essential element of thinking and are used to describe or explain events, to facilitate communication, and help people organize experiences (Boehm, 1990). One purpose of the Boehm is to identify children whose overall level of concepts mastery is low and who, therefore, may need special attention. The Boehm is a norm-referenced assessment, which identifies an individual child’s conceptual strengths and weaknesses compared to similar students from around the nation, based on 50 important relational concepts necessary for success in a school setting. The relational concepts tested with the Boehm include size, direction, position in space, time, quantity, classification, and general. Boehm (1991) maintained that basic concepts help children describe objects; quantities, and experiences and to express ideas and feelings. They are also essential for making comparisons and classifying; they serve as building blocks for more complex concepts and are essential for problem solving.

Basic concepts, as defined by Boehm (1991), involve the child’s ability to make relational judgments, either among objects, persons or situations, or in reference to a
standard. As a child develops, basic concepts are used to order, make comparisons, to classify, and to conserve. Boehm contended that knowledge of relational decisions is necessary in a school setting in the following ways: following instructions (“Go to the front of the line”); comprehension of stories, (“When the dog was scared, she hid under the chair”); describing situations or events (“I went to bed early because I was tired”); facilitating communication with others (“I want the long train”); and describing thoughts and feelings (“My sister moved far away,” (p. 242). Braken (1986) asserted that basic concepts significantly extend the relative importance of vocabulary development and are essential concepts that represent the fundamental, functional vocabulary necessary to understand classroom conversations and teacher directions.

The concepts tested in the Boehm are among the most useful and frequently occurring relational concepts that appear in printed materials, reading, and math curricula, and teachers’ verbal instruction for kindergarten, first, and second graders (Boehm, 1986, 2001). According to Boehm, the test can be used for the following:

- To identify students who know most concepts, but demonstrate difficulty understanding a few key concepts, which can be embedded in instruction;
- To identify concepts that need to be targeted for instruction in the classroom, including those needed for problem-solving, classroom routines, and activities;
- To compare a student’s performance to normative information for grade-level peers;
• To identify students who are at risk for learning problems and who may need referral for additional testing;

• To conduct pre- posttesting to help determine a student’s progress as a result of teaching or intervention.

Rhyner and Bracken (1988) and others conducted research supporting Boehm as a pre-reading screening tool. They found that basic concept acquisition is strongly correlated to vocabulary development and language development (Zucker & Riordan, 1988), intelligence (Howell & Bracken, 1992; Laughlin, 1995), school readiness, and achievement (Breen, 1985; Panter, 2000; Panter & Bracken, 2000). The National Education Goals Panel (1991) brought the concept of school readiness to the forefront by stating in their first goal, “All children in America will start school ready to learn” (p. 3).

Reading readiness, as defined by Olinger (1979), is the combination of concepts, attitudes, and interests upon which reading ability is built. Reading readiness tests assess skills related to the mechanics of reading; tasks such as visual discrimination, auditory discrimination, auditory blending, and letter recognition (Gallivan, 1988). Gallivan asserted that measures of basic concepts predict reading achievement scores as well as or even better than reading readiness tests.

Gallivan (1988) gave 122 children from Nova Scotia, Canada the Gates-MacGinitie Readiness Skills test and the Boehm in September of their first grade school year. In May of that same year, students were given Level A, Form 1 of the Gates-
MacGinitie Reading Test, Canadian Edition. The same students were given the Gates-MacGinitie reading test, Level D, Form 1 as fourth grade students. The results indicated the Boehm has utility as a predictor of reading achievement, which extended at least to fourth grade. The results of this study confirmed that the Boehm is just as good a predictor of reading scores as a reading readiness test. These findings have practical implications for schools wanting to know about students’ readiness skills, as the Boehm is easy to administer, can be done whole group or individually, is efficient, taking about 20 minutes to administer, and is relatively inexpensive when compared to other reading readiness assessments.

Language and cognitive abilities are frequently assessed in early childhood as indicators or predictors of the probability of success in academic learning (Lerner, 1976; Mercer, 1979; Safford, 1978). The Boehm, in relation to predicting later school achievement in kindergarten, first, second, and third grade, has been demonstrated repeatedly (Beech, 1980, 1981; Busch, 1980; Piersel & McAndrews, 1984; Steinbauer & Heller, 1978). The Boehm has also been found to have adequate reliability for Hispanic and non-Hispanic kindergarten students (Powers, Rossman, & Douglas, 1986).

Beech (1981) reviewed the concurrent validity of the Boehm by comparing it to the tests of linguistic and cognitive abilities. The Test for Auditory Comprehension of Language (TACL) was used to measure receptive language, while the Carrow Elicited Language Inventory (CELI) was used to assess expressive language. Sixty kindergarten students were tested, and the results concluded that the strongest correlation of the
Boehm was with the test of receptive language as measured by the TACL. These findings suggest that the Boehm measures receptive language abilities of students, is appropriate as a tool to indicate a child’s ability to comprehend verbal concepts, should be used as a screening tool for children in need of further testing, and is a valuable source of information on children with language deficits, as it measures comprehension abilities not strongly related to expressive abilities.

Piersel and McAndrews (1984) investigated the relationship of performance on the Boehm to kindergarten readiness skills and to first grade achievement. One hundred twenty-three kindergartners living in the southwest U.S., primarily of lower-middle and lower socioeconomic status, were tested during the week prior to starting school and again at the end of the school year as part of a school district’s screening to identify students who may have future learning difficulties. The Boehm and the McCarthy Scales of Children’s Abilities, a measure of visual-motor integration and non-verbal concept learning, were the primary measures used in the screening. The results of this study supported the use of the Boehm to predict current as well as future academic achievement in first grade.

Steinbauer and Heller (1978) found strong associations between deficiencies in early concept mastery, as measured by the Boehm, and academic achievement in second and third grade by comparing kindergarten Boehm scores to scores attained by second and third grade students on the Stanford Achievement Test (SAT), Form W. Forty-three second grade students and 51 third grade students from a suburban New Jersey school
district participated in the study. Test scores were correlated to determine if students who scored low on the Boehm as kindergartners were the same students who experienced greater academic difficulty as measured by the Stanford Achievement Test as second and third grade students. Data analysis showed that the Boehm clearly predicted achievement in the areas of paragraph meaning, spelling, word study skills, language, arithmetic computation, and arithmetic concepts. The results concluded that the Boehm successfully predicted school achievement in multiple curriculum areas.

In an additional study, Estes, Harris, Moers, and Woodrich (1976) found there was a significant relationship between knowledge of basic concepts and later school achievement, as measured by the Stanford Achievement Test (SAT). The researchers examined the relationship between performance on the Boehm and achievement in first grade. The Boehm was administered in September and the SAT in May to first grade students. The results supported the predictive validity of the Boehm and academic achievement in the early years of school.

**Best Practices for Kindergarten Reading Instruction**

Success of an elementary school is judged by its students’ proficiency in reading (Boyer, 1995), and society demands proficient and advanced readers for demanding jobs (Green & Dixon, 1996). Stanovich (1986) suggested that it is the amount of reading that differentiates low achieving students from high achieving students. Reading is an important part of the first years of a child’s experience, and it is imperative to define reading in a comprehensive way. Excerpts from national and state standards reflect the
belief that reading is a complex, interactive process, where one uses basic skills and advanced strategies to make meaning of words (Braunger & Lewis, 1998).

The National Literacy Act of 1991 defined literacy as “an individual’s ability to read, write, and speak English and compute and solve problems at levels of proficiency necessary to function on the job, in the family of the individual and in society” (Section 3 of P.L.102-73 as cited in “What do low literacy…” n.d.).

The International Reading Association (IRA) and the National Council of Teachers of English (NCTE) (1996) stated that being literate in society means being active, critical, and creative users not only of print and spoken language but also of the visual language of film and television, commercial and political advertising, photography, and more.

Clay (1991) defined reading as, “a message-getting, problem-solving activity which increases in power and flexibility the more it is practiced. My definition states that within the directional constraints of the printer’s code, language and visual perception responses are purposefully directed by the reader in some integrated way to the problem of extracting meaning from cues in a text, in sequence, so that the reader brings a maximum of understanding to the author’s message” (p. 6). Guthrie (1997), as cited in Hausner (2000) asserted that “reading is not merely a skill, it is an engagement of the person in a conceptual and social world” (p. 17), while Morrow (1996) described the engaged reader as one who is strategic, knowledgeable, motivated and social in their approach to learning and using literacy.
It is clear from these varied opinions on what reading involves that the process of learning to read is complex, complicated, and mixed, depending on your personal perspectives and experiences. The National Reading Panel (NRP) was created in 1997 and charged with creating a report to assess the status “of research-based knowledge, including the various approaches to teaching children to read” (NRP, p. 1). The Panel consisted of 14 individuals including reading research scientists, professors from colleges of education, reading teachers, education administrators, and parents. The NRP report was released and found five critical components essential to the teaching of reading: phonemic awareness, phonics, reading fluency, vocabulary development, and reading comprehension.

**Phonemic awareness.** The National Institute for Literacy and the U.S. Department of Education united to form the Partnership for Reading (2001). They defined phonemic awareness as the ability to identify, hear, and manipulate the individual’s sounds in spoken words. Manipulating the sounds found in words includes blending, stretching, and deleting sounds to otherwise change a word. Phonemic awareness involves teaching children to focus on and manipulate phonemes (the smallest units composing spoken language) in syllables and words.

Lennon and Slesinski (1999) confirmed that one critical skill for kindergarteners to master is the ability to segment phonemes, a key indicator of future success or failure in reading. Other important elements for kindergarten students to master are letter sound identification, the alphabetic principle (the recognition of the relationship between
spoken sound and letters), and beginning decoding skills (blending letters into words). Chall (1967) and Bond and Dykstra (1967) found that the best predictor of beginning reading achievement is a child’s knowledge of letter names. Students who can perform these tasks understand the phonemic elements in words leading to accurate and fluent decoding (Gunn, Biglan, Smolkowski, & Ary, 2000). Adams (1990) and Chall (1967) found that the ability to correctly name letters is a strong indicator of current reading development and a good predictor of future reading progress.

A National Reading Panel (NRP) meta-analysis found that teaching children to manipulate sounds is a highly effective strategy under a variety of teaching conditions, among a variety of learners, and across differing grades and age levels. The Panel found strong and significant effects on reading and spelling development and phonemic awareness training lasted well beyond the end of the training. It is critical to understand that phonemic awareness does not comprise a complete reading program; rather phonemic awareness instruction provides children with essential knowledge of the alphabetic system. The findings regarding the positive impact of phonemic awareness by the NRP support the use of AIMSweb TEL assessment of phoneme segmentation fluency (PSF) with kindergarten students.

**Phonics.** The NRP meta-analysis found that systematic phonics instruction, that is a sequential set of phonics elements taught in an explicit manner, enhanced a child’s success in learning to read. The findings showed that systematic phonics instruction was beneficial to learning disabled (LD) students, low achieving non-LD students, and low
socioeconomic status (SES) students. Phonics is the understanding, by the learner of the relationship that exists between the sounds of the spoken language and the letters that represent those sounds in written language. Children must be taught the individual sounds of each letter and the sounds that letters make together. This understanding of the relationship between letters and sounds allows children to automatically recognize familiar words and decode new words (www.readingrockets.org). “To be able to make use of letter-sound information, children need phonemic awareness. They need to be able to blend sounds together to decode words and they need to break spoken words into their constituent sounds to write words” (NRP, p. 10). Research and findings from the NRP support the use of the four AIMSweb TEL assessments as appropriate kindergarten screening tools.

**Fluency.** Fluency is the third pillar identified by the NRP as a pivotal component in learning to read and is comprised of three key elements: *accurate* reading of connected text at a conversational *rate* with appropriate *prosody* or expression, according to Hudson, Mercer, and Lane (as cited in Hudson, Lane, & Pullen, 2005). Fluency includes a student’s ability to divide text into meaningful chunks, knowing when to pause appropriately within and at the ends of sentences, and when to change emphasis and tone. The ability to read fluently plays an important role in comprehending what has been read, because if a child reads too slowly he or she struggles to remember what has been read and finds it challenging to make meaning from the words (Hasbrouck, 2006). At the kindergarten level the AIMSweb TEL assessments of nonsense word fluency (NWF),
letter sound fluency (LSF), and letter name fluency (LNF) are appropriate tools that assess a student’s rate and accuracy of basic phonics skills developmentally appropriate for kindergarten students.

**Vocabulary development and comprehension.** The final two pillars of research-based reading instruction fall under the category of comprehension but are divided into two crucial factors: vocabulary development and reading comprehension strategies. Within vocabulary are two types: oral and print. When readers come to an unfamiliar word in a book, they decode the word into speech. If the word is a part of their oral vocabulary, they understand the meaning. If the word is not a part of their oral vocabulary, readers must use other strategies to determine the meaning of the unfamiliar word. NRP findings suggest the best ways to enhance and expand children’s vocabulary is through direct and indirect teaching, which can be accomplished by learning words before reading the text, repeated exposure to new vocabulary in a variety of contexts, and via technology.

Harris and Hodges (1995) defined comprehension as the “intentional thinking during which meaning is constructed through interactions between text and reader” (p. 207). NRP analysis found that a reader’s understanding of text is heightened when the reader actively related the ideas presented in the text to his or her own knowledge and experiences. Specific reading comprehension strategies identified by NRP for improving comprehension instruction include comprehension monitoring, cooperative learning, use of graphic and semantic organizers, question answering, question generation, story
structure, and summarization. Learning comprehension strategies help students recall key portions of the story, answer questions about the text, think more deeply about the reading, and summarize the overall meaning from the reading. When used together, these skills can improve scores on standardized comprehension tests (NRP, 2000).

Summary

The review of literature covered a broad range of topics related to the research focus of this dissertation. The literature helped to underscore the significance of universal screening and progress monitoring as it relates to the RtI movement and how it was used in the context of this research. The Boehm and AIMSweb TEL were both used as universal screening tools to help identify kindergarten students who may be at risk learners. AIMSweb TEL was also used as a progress monitoring tool in addition to being a universal screener inasmuch as identified students were assessed twice during their kindergarten year. Since AIMSweb TEL is derived from curriculum-based measures, these assessments allowed schools to quickly, reliably, and with validity assess kindergarten student growth in concepts essential to learning to reading.

This literature review showed that the universal screening tool of the Boehm relates positively to accurate prediction of later academic achievement. By using the Boehm to identify students at risk for learning failure, schools can target resources to support the neediest children, beginning on the first day of school. Site leaders who have the Boehm results prior to first day of school can work to group similar students and use the information from the Boehm to target their instruction.
The complex process of learning how to read was addressed in this chapter because kindergarten students are learning necessary skills to become proficient readers. The intent of universal screeners such as the Boehm and progress monitoring assessments like AIMSweb TEL is for early identification of students who may struggle with learning to read. Through early identification and multiple avenues of assessment, teachers can identify areas of weakness and give targeted interventions to improve reading and thus increase overall school achievement and success.
CHAPTER 3- RESEARCH DESIGN AND METHODS

The purpose of this chapter is to describe the methods used to examine the relationship, if any, that exists between the universal screening tool of the Boehm, the progress-monitoring tool of AIMSweb TEL, and the impact on kindergarten student achievement. Included in this chapter are sections that address (a) research traditions, (b) research questions and null hypothesis, (c) data sources, (d) research subjects, (e) limitations and delimitations, and (f) data analysis.

Research Traditions

Creswell (1994) stated that quantitative research explains phenomena by collecting numerical data that are analyzed using methods based on mathematics, in particular statistics. This quantitative study emphasized measurement of student growth, and evaluated specific reading assessment tools to determine impact upon test scores between groups of kindergarten students within a defined period of time.

Data from this study were analyzed after students had completed kindergarten using existing data that had been collected and housed by the Intermediate School District. A summative evaluation was conducted, a process defined by Reiser and Dempsey (2007) as that which occurs at the end of a unit or training and allows instructional designers to see how well the learners met or understood the learning objectives. Findings from this research will help school leaders make informed decisions based on research about the merit of the educational assessment tool AIMSweb TEL and the universal screening tool of the Boehm.
The Research Questions and Null Hypotheses

The following research questions guided this study; the null hypotheses were investigated, and any difference was tested for significance (p < .05):

**Question 1.** Do schools that implement AIMSweb TEL progress monitoring have more academic growth in low performing kindergarten students (score of Level 3 on pre-test Boehm) than schools that do not progress monitor using AIMSweb TEL?

**Null Hypothesis 1.** There will be no significant relationship in low performing kindergarten student’s academic growth between classrooms using AIMSweb TEL and classrooms not using AIMSweb TEL.

**Question 2.** Is there a difference on Boehm posttest percent correct scores between male and female student who perform at Level 3?

**Null Hypothesis 2.** There will be no significant difference in Boehm concept attainment based on gender.

**Question 3.** Is there a correlation between Boehm posttest raw scores and low performance on AIMSweb TEL assessments?

**Null Hypothesis 3.** There will be no significant correlation between Boehm raw scores and low performance on AIMSweb TEL assessments.

Data Sources

This study took place in a northwest Michigan intermediate school district (ISD) where 23 elementary buildings were represented from 18 school districts. Data about student achievement were collected from March 2010 through June 2011 from
kindergarten students enrolled in all-day every weekday kindergarten. For purposes of confidentially, school names and individual student scores were not used. Participants in the AIMSweb group were students who scored at performance Level 3 on their spring 2010 Boehm assessment and who attended a kindergarten classroom where AIMSweb TEL was administered twice during their kindergarten year. A total of 335 students, 45.2% female and 54.8% male, comprised this group. The comparison group was students who scored at a performance Level 3 on their spring 2010 Boehm assessment and attended a kindergarten classroom that did not use AIMSweb TEL. A total of 76 students, 53.9% female and 46.1% male, comprised this group.

**AIMSweb TEL Procedures Used in the Research Design.**

Access to the data used in this research was secured and approved from the ISD assistant superintendent of general and career & technical education. All data used were derived from the 2010-2011 school year. Individual school sites collected Boehm and AIMSweb TEL data from their kindergarten students, which were then submitted to the ISD, with all data stored in *Data Director*. At no time did the researcher work directly with students; rather this research was the analysis of already attained and housed data.

This research focused only on students who scored at a performance Level 3 on the Boehm given at 2010 kindergarten round-up, as they were the only students for which there was a pre- and post data point and because students who score at the Level 3 are the most at risk for possible school failure. Students were then sorted based on whether they attended a school where AIMSweb TEL was used at the kindergarten level. Students who
attended an AIMSweb TEL school were a part of the treatment group. Students who attended a school where AIMSweb TEL was not administered were part of the comparison group. Students in both groups had pre-test and posttest Boehm data points. Students who scored at a performance level 1 or 2 on the Boehm pre-test were not posttested in February 2011; therefore, they had no second data point for comparison.

The comparison group did not receive any AIMSweb TEL assessments during their kindergarten year. The AIMSweb TEL assessments (the treatment) was administered twice during the 2010-2011 school year. Students in both groups (those using AIMSweb and those not using AIMSweb) who scored at a performance level of 3 on their Spring 2010 Boehm test, were retested using the identical Boehm during the month of February 2011. Student growth comparing pre-Boehm scores versus post Boehm scores were analyzed to determine if students in the AIMSweb group had more growth on the Boehm (as indicated by their raw score) than students who were in a school that did not use AIMSweb TEL.

Individual schools determined the scores that identified students for potential difficulties with reading. It was up to individual schools of students in both groups to determine what, if any, interventions were used with students who lacked phonemic awareness skills, as determined by AIMSweb, and or scored at a performance Level 3 on the Boehm.

**Test of early literacy.** AIMSweb TEL assessments are standardized tests; therefore, specific directions ensure reliability, validity, and comparability. Training to
correctly administer and record data gathered from AIMSweb TEL assessments was provided to kindergarten classroom teachers either directly from the ISD AIMSweb data manager or via a district representative who attended an AIMSweb training with the ISD data manager, prior to the TEL tests being administered.

All students in the AIMSweb group were given the AIMSweb TEL in late September-early October, giving baseline data of individual student’s levels of phonemic awareness. Students in the AIMSweb group, were given the assessment twice during the kindergarten year, during the fall 2010 and in late spring 2011. During the fall assessment students were assessed only with letter naming fluency (LNF). During the spring assessment windows, kindergarten students were assessed in letter naming fluency (LNF), letter sound fluency (LSF), phoneme segmentation fluency (PSF), and nonsense word fluency (NWF). Working with students individually, tests isolating specific tasks are administered in one minute segments. Table 2 shows characteristics and process for each assessment test (Shinn & Shinn, 2002, (See Appendixes C-F).
### Table 2

**AIMSweb Tests of Early Literacy (TEL)**

<table>
<thead>
<tr>
<th>Assessment Process</th>
<th>Letter Naming Fluency</th>
<th>Letter Sound Fluency</th>
<th>Phonemic Segmentation Fluency</th>
<th>Nonsense Word Fluency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Teacher</strong></td>
<td>Identical copy of upper &amp; lower case letters.</td>
<td>Identical copy of lower case letters.</td>
<td>Copy of words read aloud to the student.</td>
<td>Identical copy of nonsense words</td>
</tr>
<tr>
<td><strong>Student</strong></td>
<td>Identical copy of upper &amp; lower case letters.</td>
<td>Identical copy of lower case letters.</td>
<td>Student is asked to listen and correctly identify sounds in the word read aloud by the teacher.</td>
<td>Identical copy of nonsense words</td>
</tr>
<tr>
<td><strong>Length</strong></td>
<td>Correctly name as many letters during 1 minute.</td>
<td>Correctly identify lower case letter sounds during 1 minute.</td>
<td>Correctly name as many sounds in a word during 1 minute.</td>
<td>Correctly read individual sounds or the nonsense word as a whole in 1 minute.</td>
</tr>
</tbody>
</table>
Table 2  AIMSweb Tests of Early Literacy (TEL) continued

<table>
<thead>
<tr>
<th>Assessment Process</th>
<th>Letter Naming Fluency</th>
<th>Letter Sound Fluency</th>
<th>Phonemic Segmentation Fluency</th>
<th>Nonsense Word Fluency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coding</td>
<td>(/) for incorrect answers. If student does not supply letter in 3 seconds, teacher supplies the letter name, marks it incorrect and prompts to next letter.</td>
<td>(/) for incorrect answers. If student does not supply letter sound in 3 seconds, teacher says the letter sound, marks it incorrect and prompts to the next letter.</td>
<td>(/) for each sound segment that was incorrect. If student does not supply sound in 3 seconds, teacher prompts to next word and gives a score of zero.</td>
<td>(/) for each sound segment that is incorrect. If student does not supply sound in 3 seconds, teacher supplies the sound gives a score of zero.</td>
</tr>
<tr>
<td>Scoring</td>
<td>1 point for every correct letter named</td>
<td>1 point for every correct letter sound</td>
<td>1 point for every sound correctly identified.</td>
<td>1 point for every sound correctly identified.</td>
</tr>
<tr>
<td>Ending</td>
<td>If no correct letter name is given in the 1st row (10 letters).</td>
<td>If no correct letter sound is given in the 1st row (10 letters).</td>
<td>If no correct sound segments are given within the first five words.</td>
<td>If no correct sound segments are given within the first five words.</td>
</tr>
<tr>
<td>Administered</td>
<td>Fall, Winter, Spring</td>
<td>Winter, Spring</td>
<td>Winter, Spring</td>
<td>Winter, Spring</td>
</tr>
</tbody>
</table>
AIMSweb reliability. According to updated reports from the National Center on Response to Intervention (2011), Table 3 shows coefficients for each of the AIMSweb TEL based on alternate forms kindergarten reliability, inter-rater reliability, and test-retest reliability. Coefficients for validity of performance scores for each of the assessments are determined by scores of other assessments at later dates. All of the coefficients related to data in this study had acceptable levels of validity and reliability (Elliot, Lee, & Tollefson, 2001).

Table 3

Coefficients of Reliability and Validity for AIMSweb TEL

<table>
<thead>
<tr>
<th>Reliability and Validity Indicators</th>
<th>Letter Naming Fluency</th>
<th>Letter Sound Fluency</th>
<th>Phonemic Segmentation Fluency</th>
<th>Nonsense Word Fluency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternate forms kindergarten reliability</td>
<td>.80</td>
<td>.82</td>
<td>.84</td>
<td>.83</td>
</tr>
<tr>
<td>Inter-rater reliability</td>
<td>.94</td>
<td>.82</td>
<td>.87</td>
<td>-</td>
</tr>
<tr>
<td>Test-retest reliability</td>
<td>.90</td>
<td>.83</td>
<td>.85</td>
<td>-</td>
</tr>
<tr>
<td>Validity of the performance score</td>
<td>First grade DIBLES nonsense word fluency with range of .63 to .78</td>
<td>Kindergarten test of phonological awareness with median coefficient of .68</td>
<td>May of kindergarten DIBLES nonsense word with a range of .37 to .49</td>
<td>May of first grade CBM reading coefficient median of .73</td>
</tr>
</tbody>
</table>
**Boehm-A Pre- and Posttest Assessment Tool**

The Boehm Test of Basic Concepts (BTBC-3), Level 2, form E was used as both the pretest and posttest selection. The Boehm-3 pre-test was administered from March 1, 2010 through November 1, 2010 to eligible kindergarten students throughout the northwest Michigan ISD. The posttest window was from February 1, 2011 through February 28, 2011; the posttest was administered only to students who initially scored at a performance Level 3 on the pre-test Boehm. Sixty ISD speech and language pathologists (SLP) administered the Boehm during both the initial assessment window (March 2010-November 2010) and during the February 2011 window.

**Boehm reliability.** Issues of Boehm reliability focused on three types of reliability estimates. The first consideration was that of inter-rater reliability. In March 2010 all 60 SLPs received a half-day training about proper administration of the Boehm. The intent of this training was to ensure accurate and consistent administration of the Boehm to incoming kindergarten students and that consistent estimates of the same phenomenon were recorded by the SLPs.

The second consideration to address reliability was the use of test-retest reliability, which assumed there were no substantial changes in the construct being measured between the two measures. The test-retest reliability coefficients by grade (kindergarten, first, and second grade) and form (form E and form F) ranged from .08 to .89, and alternative forms of reliability (between form E and form F) showed that 94% of students who participated in the alternative forms study had a difference of four or less.
raw score points from one form to the other. Form E, Level 2 of the Boehm-3 was administered at both the initial kindergarten round-up screening and during the February 2011 assessment.

The third reliability consideration was internal consistency, which looked at the consistency of results across items. The coefficient alphas for the Boehm-3, as reported in the technical manual ranged from .80 to .91. An alternative measure of reliability can be assessed using the Standard Error of Measurement (SEM). “The smaller the SEM, the greater the level of confidence attributed to the accuracy of test scores” (Boehm, 2008, p. 4). The SEM for the Boehm-3 ranged from 1.14 to 2.43, which indicates overall low variability.

**The Research Participants**

Participants in this study came from the 2010-2011 total school year enrollment (N=1,206) of kindergarten students in a northern Michigan intermediate school district. At kindergarten round-up, students were administered the Boehm; students who missed kindergarten round-up and who enrolled in the fall 2010, were tested with the identical Boehm with the cut-off date being November 1, 2010. Children who entered kindergarten with an early childhood developmental delay (ECDD) label or who qualified for special education under a different label (such as other health impairments (OHI), or speech and language (SLP) were included in this study. Of the initial 1,206 screened kindergarten students, 335 (27.7%) received a Boehm performance level score of 3 (the lowest possible score). This research focused on that specific population of 335.
Data Analysis

**Rational for Statistics used in Research Question One**

**Question 1.** Do schools that implement AIMSweb TEL progress monitoring have more academic growth in low performing kindergarten students (scores of Level 3 on pre-test Boehm) than schools that do not progress monitor using AIMSweb? Null hypothesis one posited no significant relationship in low performing kindergarten student’s academic growth between schools using AIMSweb TEL and schools not using AIMSweb TEL.

The data elements considered to answer the first research question were the schools using AIMSweb or not using AIMSweb and students’ posttest Boehm raw scores. The t-test was used to compare the dichotomous variable of the schools’ choice of using AIMSweb vs. not using AIMSweb, with the continuous variable along with the point-biserial correlation for the effect size, a measure of the importance of findings.

The chi-square test, a statistical means of comparing two categorical/nominal variables, was used to compare schools using AIMSweb or not using AIMSweb with the Boehm Level. The Cramer’s V test was added to provide a measure of the strengths of the relationship (effect size), the Pearson product-moment correlation between two categorical/nominal variables (Ravid, 2010).
Rational for Statistics used in Research Question Two

Question 2. Is there a difference on Boehm posttest percent correct scores between male and female students who perform at Level 3? Null hypothesis two predicted no significant difference in Boehm concept attainment based on gender.

The data elements considered to answer research question two were students’ Boehm raw scores and gender. The $t$-test for independent means is the correct test because it is used to compare a dichotomous independent variable, gender, with a continuous dependent variable; Boehm raw scores (Ravid, 2010). In addition, the point-biserial correlation is the Pearson product-moment correlation between the dichotomous independent variable, gender, with the continuous dependent variable; Boehm raw score. The Pearson product-moment correlation was used as a supplemental test to the $t$-test because it provided a measure of the strength of the relationship (effect size) between the two variables.

Rational for Statistics used with Research Question Three

Question 3. Is there a correlation between Boehm posttest raw scores and low performance on AIMSweb TEL assessments? Null hypothesis three assumed no significant correlation between Boehm raw scores and low performance on AIMSweb TEL assessments.

The data elements considered to answer research question three were student achievement levels on the four AIMSweb TEL assessments and students’ Boehm raw scores. Frequencies and percentages were used to determine the number of students who
were at the various levels on the AIMSweb at posttest. Pearson correlation was chosen because this test is used to determine the extent of the linear relationship between two continuous variables (Ravid, 2010). The two continuous variables for research question three were students’ Boehm raw scores and their raw scores on the four AIMSweb TEL assessments.

**Summary**

The research methods and research traditions chosen for the design of this study, including the quantitative perspective and summative evaluation applied were discussed in this chapter. Context of the data collected were kindergarten students in a northwest Michigan intermediate school district (ISD). Determination of how students were selected and sorted for analysis was reviewed as well as the statistical applications used to address the research questions.
CHAPTER 4-RESULTS

Boyer (1995) emphasized the importance of the early years of school and stated that the success of an elementary school is judged by its students’ proficiency in reading. No Child Left Behind (2001) stressed that reading assessments need to be a continual and dynamic process that focus on the critical components of reading which include phonemic awareness, print awareness, letter knowledge, vocabulary development, and comprehension (Bassard & Boehm, 2007). The purpose of this study was to gain an understanding of the relationship, if any, that exists between the universal screening tool of the Boehm, the progress-monitoring tool of AIMSweb Test of Early Literacy (TEL), and their impact on kindergarten student achievement. School records for 335 students from 23 elementary schools in northern Michigan were used for this study.

The concepts tested in the Boehm are among the most useful and frequently occurring relational concepts that appear in printed materials, reading and math curricula, and teachers’ verbal instruction to kindergarten through second grade students (Boehm, 1986, 2001). The Boehm is a norm-referenced assessment of 50 basic receptive language concepts commonly used with children in kindergarten, first and second grade (Boehm, 1971). The Boehm consists of 50 multiple choice items presented in a test booklet format. Students are assessed in five curriculum areas: (a) following teachers’ verbal instructions, (b) developing reading skills, (c) learning math skills, (d) reasoning skills, and (e) communication skills (Boehm, 2001). The concepts assessed are classified into four categories: space, quantity, time, and miscellaneous. Information gathered from the
Boehm gives a teacher specific knowledge about individual student’s areas of weakness so that direct instruction can fill the gaps.

AIMSweb (Achievement Improvement Monitoring System) is a benchmark and progress monitoring system with screenings available three times a year for students progressing on grade level. AIMSweb is based on the research and findings of curriculum based measurements (CBM), the method of monitoring student progress through brief, direct, and continuous assessments of basic skills. AIMSweb TEL is a screening tool to identify students in kindergarten and early first grade who are at risk for reading difficulties. AIMSweb TEL measures students in four areas: letter naming fluency, letter sound fluency, phoneme segmentation fluency, and nonsense word fluency; specifically, students identify letter name, letter sound, consonant-vowel-consonant (CVC, (dog) or vowel consonant (VC) in combinations, and nonsense word combinations (/m/o/t/).

Universal screening draws on prevention science and allows schools to assist students when weaknesses are identified instead of waiting for students to fail before providing additional help. The Boehm and AIMSweb TEL were used as universal screening tools to give classroom teachers information that meets the criteria set forth by the National Association of State Directors of Special Education (NASDSE, 2007) with regard to effective RtI implementation; namely assessment use for three different purposes (screening, diagnostic, and progress monitoring), using data to make decisions, and monitoring student progress to inform instruction.
Torgesen (2002) confirmed that kindergarten assessments should cover phonemic awareness and letter-sound knowledge, and Whitehurst and Lonigan (2001) asserted, “Poor phonological processing skills are the hallmark of poor readers” (p.16). AIMSweb TEL and the Boehm provide schools with baseline data from which further decisions can be made. This study sought to determine whether students who scored poorly on the Boehm would also score poorly on AIMSweb TEL assessments. It is critical for teachers and building leaders to know if progress monitoring data as gathered by AIMSweb TEL, has improved the literacy and basic concepts skills of low performing/at risk kindergarten students. If it can be determined that the AIMSweb is an effective tool for helping schools identify struggling kindergarten students, then staff will be able to give those students early interventions targeted specifically at areas of weakness, thus reducing the number of students qualifying for special education services.

No Child Left Behind (2001) mandated that all students must be assessed by at least grade three (P.L. 107-110, 2001), but Burns and Gibbons (2008) noted that while having students reading proficiently by grade three is an admirable goal, students must be assessed long before third grade if they are to be at grade level. In this study both the Boehm and AIMSweb TEL were used as universal screening tools that can help correctly identify students most at risk for reading difficulties.

Data from this study can help school leaders determine the appropriateness of purchasing the AIMSweb TEL program. The results of data collected in this research will give school leaders evidence of the value and necessity of AIMSweb TEL as it relates to
the time and costs associated with purchasing and administering AIMSweb TEL assessments.

**Methods**

This study examined the relationship between the universal screening tool of the Boehm, the progress-monitoring tool of AIMSweb, and the impact these tools have on kindergarten student achievement. Data from kindergarten students enrolled in AIMSweb schools was compared to data of kindergarten students in schools where AIMSweb was not used as a progress monitoring tool to determine whether there was a statistical significant difference in kindergarten student growth. Kindergarten students, who scored at a performance level of 3 on the Boehm 2010 spring assessment, were retested in February 2011 using the same assessment tool (Boehm-3, Level 2, form E). A performance level of 3 means that the student’s knowledge of basic concepts is extremely low, and that teacher and parent help is needed for the child to be successful in school (Boehm, 2001). The raw score range for a performance Level 3 on the Boehm is correctly answering between 1 to 37 of the 50 basic concepts. Students who had a pre-test score of Level 3 on the Boehm were selected for this data analysis because they are the most at risk for reading difficulties and only Level 3 students were progress monitored using the Boehm assessment in February 2011, thus giving a pre- and post data point.

Pre- and posttest results of kindergarten test scores achieved on the Boehm were analyzed by comparing the independent variables (AIMSweb schools vs. non-AIMSweb schools). Preexisting data used in this study were gathered from March 2010 through
June 2011. The participants were 1,206 kindergarten students in 31 elementary buildings located in 15 northern Michigan school districts that are part of one northern Michigan intermediate school district (ISD). Three hundred thirty-five (27.7%) of the total 1,206 students tested scored at a Level 3 (the lowest possible scores) on their pre-test Boehm assessment. These 335 students represented 12 of the possible 15 school districts and were housed in 23 out of a possible 31 elementary buildings. The scores of the 335 were the focus of this study and were analyzed for student growth.

Individual elementary school sites entered AIMSweb TEL kindergarten student data directly into DataDirector, a web-based data and assessment management system that allows data to be viewed, disaggregated, and analyzed. Boehm assessments were administered, scored and collected by individual elementary sites, which were then sent to the early childhood director at the ISD for input into Data Director. The data were analyzed with the help of SPSS®, version 20.0 for Windows, software. Data Director stores five years of individual student data, benchmark results, and demographic information such as language level, language fluency, ethnicity, and special education status.

Results

The following tables report the findings from the data analysis: Table 4 displays the frequency counts for selected variables, which included gender, whether a student received special education services, whether the student attended an AIMSweb school, raw score categories for spring 2010 Boehm score, and winter 2011 Boehm scores.
Frequency counts show there were somewhat more males (53.1%) than females (46.9%) in the sample. Seventeen percent of students in this study received special education services. Seventy-seven percent of the students attended a site where AIMSweb was administered during the kindergarten school year. By design, all students selected to be included in this study had a Level 3 Boehm category score at the spring 2010 pre-test testing period, but only 29.0% were still at Level 3 at the winter 2011 posttest. Only students who scored at a Level 3 on the spring 2010 Boehm were selected to be in this study, as they were the most at risk students for reading difficulties, and it was only Level 3 students who were given the Boehm in February 2011, thus giving a pre- and post data point from which to determine student growth.
Table 4

*Demographics of the Population—Frequency Counts for Selected Variables (n = 335)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Female</td>
<td>157</td>
<td>46.9</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>178</td>
<td>53.1</td>
</tr>
<tr>
<td>Receive Special Education Services</td>
<td>No</td>
<td>277</td>
<td>82.7</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>58</td>
<td>17.3</td>
</tr>
<tr>
<td>Received AIMSweb</td>
<td>No</td>
<td>76</td>
<td>22.7</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>259</td>
<td>77.3</td>
</tr>
<tr>
<td>Spring 2010 Raw Score Categories</td>
<td>3. Knows few concepts</td>
<td>335</td>
<td>100.0</td>
</tr>
<tr>
<td>Level 3 – chosen for analysis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter 2011 Raw Score Categories</td>
<td>1. Knows the concepts</td>
<td>98</td>
<td>29.2</td>
</tr>
<tr>
<td>Levels</td>
<td>2. Knows most concepts</td>
<td>140</td>
<td>41.8</td>
</tr>
<tr>
<td></td>
<td>3. Knows few concepts</td>
<td>97</td>
<td>29.0</td>
</tr>
</tbody>
</table>

Table 5 displays the descriptive statistics for selected variables that include student’s Spring Boehm raw score, student’s Winter Boehm raw score, their gain score
and their age in months. Student pre-test Spring 2010 raw scores ranged from 0 to 37 ($M = 30.34$, $SD = 5.71$) and posttest Winter 2011 raw scores ranged from 15 to 50 ($M = 39.99$, $SD = 5.59$). Gain scores (winter score minus the spring score) averaged 9.65 ($SD = 5.46$). The ages of the students (in months) ranged from a low of 62 month (5 years, 1 months) to a high of 79 (6 years, 5 months) ($M = 67.93$, $SD = 3.84$).

Table 5

*Student Gains on the Boehm—Descriptive Statistics for Selected Variables ($n = 335$)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring 2010 Raw Score</td>
<td>30.34</td>
<td>5.71</td>
<td>0.00</td>
<td>37.00</td>
</tr>
<tr>
<td>Winter 2011 Raw Score</td>
<td>39.99</td>
<td>5.59</td>
<td>15.00</td>
<td>50.00</td>
</tr>
<tr>
<td>Gain Score: Winter minus Spring</td>
<td>9.65</td>
<td>5.46</td>
<td>-4.00</td>
<td>49.00</td>
</tr>
<tr>
<td>Age in Months</td>
<td>67.93</td>
<td>3.84</td>
<td>62.00</td>
<td>79.00</td>
</tr>
</tbody>
</table>

**Findings Related to Research Questions**

**Question 1.** Do schools that implement AIMSweb TEL progress monitoring have more academic growth in low performing kindergarten students (scores of Level 3 on pre-test Boehm) than schools that do not progress monitor using AIMSweb? Null hypothesis one posited no significant relationship in low performing kindergarten student’s academic growth between schools using AIMSweb TEL and schools not using AIMSweb TEL.
Table 6 displays the \( t \)-tests for independent means for the pre-test, posttest, and gain scores based on whether the students used AIMSweb. None of the three tests were significant. The data elements considered to answer the first research question were the schools using AIMSweb or not using AIMSweb and students’ posttest Boehm raw scores. The \( t \)-test for independent means was used to compare the dichotomous variable of the schools’ choice of using AIMSweb vs. not using AIMSweb, with the continuous variable along with the point-biserial correlation \( (r_{pb}) \) for the effect size, a measure of the importance of findings (Ravid, 2010).

Table 6

Comparison of Scores Based on Whether the Student Received AIMSweb, as indicated by Boehm Score \((n = 335)\)

<table>
<thead>
<tr>
<th>Score</th>
<th>AIMSweb</th>
<th>( n )</th>
<th>( M )</th>
<th>( SD )</th>
<th>( r_{pb} )</th>
<th>( t )</th>
<th>( p )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring 2010 Raw Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>76</td>
<td>30.04</td>
<td>5.16</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>259</td>
<td>30.43</td>
<td>5.87</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter 2011 Raw Score</td>
<td>0.09</td>
<td>1.64</td>
<td>.10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>76</td>
<td>39.07</td>
<td>6.87</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>259</td>
<td>40.26</td>
<td>5.14</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gain Score: Winter minus Spring</td>
<td>0.06</td>
<td>1.13</td>
<td>.26</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>76</td>
<td>9.03</td>
<td>4.64</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>259</td>
<td>9.83</td>
<td>5.68</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 7 displays the results to the chi-square test comparing whether the student used AIMSweb with their winter posttest category level. The chi-square test was used to
compare the type of school with the Boehm Level. This is the test to use when comparing two categorical/nominal variables. The test was not significant ($p = .11$). This combination of findings provided support to retain the null hypothesis. The Cramer’s $V$ test was added to provide a measure of the strengths of the relationship (effect size).

Cramer’s $V$ is a measure of association between two categorical/nominal variables (Ravid, 2010).

Table 7

**Student Growth on Boehm–Winter 2011–Comparison of Winter Score Category Based on Whether the Student Received AIMSweb TEL ($n=335$)**

<table>
<thead>
<tr>
<th>Winter Score Category</th>
<th>None</th>
<th></th>
<th>AIMSweb</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$n=76$</td>
<td>$n %$</td>
<td>$n=259$</td>
<td>$n %$</td>
</tr>
<tr>
<td>1. Knows the concepts</td>
<td>23</td>
<td>30.3</td>
<td>75</td>
<td>29.0</td>
</tr>
<tr>
<td>2. Knows most concepts</td>
<td>25</td>
<td>32.9</td>
<td>115</td>
<td>44.4</td>
</tr>
<tr>
<td>3. Knows few concepts</td>
<td>28</td>
<td>36.8</td>
<td>69</td>
<td>26.6</td>
</tr>
</tbody>
</table>

$X^2 (2, n=335) = 4.01, p = .14$. Cramer’s $V = .11$.

**Question 2.** Is there a difference on Boehm posttest percent correct scores between male and female students who perform at Level 3? Null hypothesis two predicted no significant difference in Boehm concept attainment based on gender.

To answer research question two, a $t$-test was used to show the independent means for the pre-test, posttest and gain scores based on gender. Girls had significantly higher scores at pre-test ($p = .02$) and tended ($p = .06$) to have higher scores at posttest.
However, no significant differences ($p = .69$) were found based on gain scores. This combination of findings provided partial support to retain the null hypothesis. The data elements considered to answer research question two were student’s Boehm raw score and gender. The $t$-test for independent means was the appropriate test because it was used to compare a dichotomous independent variable (gender) with a continuous dependent variable (Boehm raw scores) (Ravid, 2010). In addition, the point-biserial correlation was the Pearson product-moment correlation between the dichotomous independent variable (gender) with the continuous dependent variable (Boehm raw score). It was used as a supplemental test to the $t$-test because it provided a measure of the strength of the relationship (effect size) between the two variables, gender and Boehm raw scores. These findings are displayed in Table 8.

**Table 8**

*Gender and Boehm Score – Comparison of Scores Based on Student Gender (n = 335)*

<table>
<thead>
<tr>
<th>Score</th>
<th>Gender</th>
<th>$n$</th>
<th>$M$</th>
<th>$SD$</th>
<th>$r_{pb}$</th>
<th>$t$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring 2010 Raw Score</td>
<td>Female</td>
<td>157</td>
<td>31.09</td>
<td>4.90</td>
<td>.12</td>
<td>2.27</td>
<td>.02</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>178</td>
<td>29.68</td>
<td>6.28</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter 2011 Raw Score</td>
<td>Female</td>
<td>157</td>
<td>40.61</td>
<td>5.22</td>
<td>.10</td>
<td>1.91</td>
<td>.06</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>178</td>
<td>39.44</td>
<td>5.86</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gain Score: Winter minus Spring</td>
<td>Female</td>
<td>157</td>
<td>9.52</td>
<td>4.51</td>
<td>.02</td>
<td>0.40</td>
<td>.69</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>178</td>
<td>9.76</td>
<td>6.20</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Question 3.** Is there a correlation between Boehm posttest raw scores and low performance on AIMSweb TEL assessments? Null hypothesis three assumed no significant correlation between Boehm raw scores and low performance on AIMSweb TEL assessments.

Table 9 displays the relevant Pearson correlations. The Boehm posttest score had significant positive correlations with all eight AIMSweb TEL assessment measures at the $p < .001$ level. This combination of findings provided support to reject the null hypothesis. The rationale for using Pearson correlation was because this test is used to determine the extent of the linear relationship between two continuous variables (Ravid, 2010), students’ Boehm raw scores and their raw scores on the four AIMSweb TEL assessments.
Table 9

Relationship of Boehm to AIMSweb TEL assessments—Pearson Correlations between Boehm Posttest Scores and AIMSweb TEL Assessments (n = 335)

<table>
<thead>
<tr>
<th>AIMSweb Assessments</th>
<th>Boehm Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNF Winter</td>
<td>.30</td>
</tr>
<tr>
<td>LNF Spring</td>
<td>.31</td>
</tr>
<tr>
<td>LSF Winter</td>
<td>.26</td>
</tr>
<tr>
<td>LSF Spring</td>
<td>.25</td>
</tr>
<tr>
<td>PSF Winter</td>
<td>.29</td>
</tr>
<tr>
<td>PSF Spring</td>
<td>.32</td>
</tr>
<tr>
<td>NWF Winter</td>
<td>.33</td>
</tr>
<tr>
<td>NWF Spring</td>
<td>.35</td>
</tr>
</tbody>
</table>

Note. All correlations were significant at the p < .001 level.

Codes: LNF = Letter Name Fluency; LSF = Letter Sound Fluency; PSF = Phoneme Segmentation Fluency; NWF = Nonsense Word Fluency.

Additional findings. Additional analyses included the use of two multiple regression prediction models, which tested two primary outcome variables, the amount of gain in students’ scores (Table 10), and students’ winter posttest scores (Table 11). Each of the regression models was focused on the amount of gain on each outcome variable.

The primary independent variable for this research was whether a student received AIMSweb. Additional analysis, through use of the multiple regression models, sought to determine if the same relationship between two outcome measures (gain score
and winter score) existed, while controlling for gender, special education, and age. This was done to rule out other possible explanations for the student’s academic performance.

The multiple regression model predicting the student’s gain score was not significant (\( p = .80 \)) and accounted for 0.5\% of the variance in the dependent variable. Inspection of the beta weights found no significant predictors.

Table 10

*Prediction of Boehm Based on Gender, Special Education Status, & Age—Prediction of Gain Score Based on Selected Variables (\( n = 335 \))*

<table>
<thead>
<tr>
<th>Variable</th>
<th>( B )</th>
<th>( SE )</th>
<th>( \beta )</th>
<th>( p )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>10.74</td>
<td>6.94</td>
<td>.12</td>
<td>.80</td>
</tr>
<tr>
<td>Gender ( a )</td>
<td>0.15</td>
<td>0.61</td>
<td>.01</td>
<td>.81</td>
</tr>
<tr>
<td>Received Special Education Services ( b )</td>
<td>0.39</td>
<td>0.84</td>
<td>.03</td>
<td>.64</td>
</tr>
<tr>
<td>Age (in months)</td>
<td>-0.02</td>
<td>0.08</td>
<td>-.02</td>
<td>.77</td>
</tr>
<tr>
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<td>0.82</td>
<td>0.72</td>
<td>.06</td>
<td>.25</td>
</tr>
</tbody>
</table>

Full Model: \( F (4, 330) = 0.41, p = .80 \). \( R^2 = .005 \).

\( a \) Gender: 1 = Female 2 = Male.

\( b \) Coding: 0 = No 1 = Yes.

In Table 11, the posttest winter score was significantly predicted (\( p = .001 \)) and accounted for 8.2\% of the variance in the dependent variable. Inspection of the beta weights found that the winter posttest score was higher for students who did not receive special education services (\( \beta = -.26, p = .001 \)).
Table 11

*Special Education and Non Special Education Predictions on the Boehm—Prediction of Winter Score Based on Selected Variables (n = 335)*

<table>
<thead>
<tr>
<th>Variable</th>
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</thead>
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<td>Intercept</td>
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<td>-0.07</td>
<td>0.21</td>
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<td>-0.26</td>
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<tr>
<td>Age (in months)</td>
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<td>0.08</td>
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<td>Received AIMSweb b</td>
<td>1.00</td>
<td>0.71</td>
<td>0.07</td>
<td>0.16</td>
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</tbody>
</table>


a Gender: 1 = *Female*  2 = *Male*.  
b Coding: 0 = *No*  1 = *Yes*.

**Summary**

This study examined the relationship between the universal screening tool of the Boehm, the progress-monitoring tool of AIMSweb and the impact that those assessments had on kindergarten student achievement. School records for 335 students in 23 elementary schools were used for this study. Gains in student achievement were not related to participation in AIMSweb or the student’s gender. However, the posttest Boehm scores were significantly related to all eight AIMSweb assessment scores. The student’s gain score could not be predicted based on the combination of gender, special education status, age, or whether they used AIMSweb. However, the student’s posttest winter score was significantly higher for non-special education students.
CHAPTER 5- SUMMARY, RELEVANCE OF LITERATURE, IMPLICATIONS, AND RECOMMENDATIONS

This chapter begins with a review of the purpose and importance of this study and the questions and null hypotheses that guided the research. A summary of findings is followed by a discussion of the relevance of literature to this study and implications for practice. The final sections of this chapter are devoted to recommendations for future research, including ways that limitations of this study may be ameliorated with enhancements of research data and or methods, policy recommendations, practitioner recommendations.

Purpose and Importance of the Study

This study examined the relationship between the universal screening tool of the Boehm, the progress-monitoring tool of AIMSweb Test of Early Literacy (TEL), and their impact on students identified as at risk for reading difficulties as determined by a performance Level 3 on the Boehm. The potential for an effective tool that will identify kindergarten students who may be at risk for reading disabilities is of great importance to teachers, who can target interventions at areas of weakness early in the learning process and reduce the need for special education services.

Research Questions, Null Hypotheses, and Conclusions

**Question 1.** Do schools that implement AIMSweb TEL progress monitoring have more academic growth in low performing kindergarten students (scores of Level 3 on pre-test Boehm) than schools that do not progress monitor using AIMSweb? Null
hypothesis one tested for significance at < .05 posited no significant relationship in low
performing kindergarten student’s academic growth between schools using AIMSweb
TEL and schools not using AIMSweb TEL.

No significant findings emerged from three t-tests of the data, indicating no
difference on the students’ pre-test, posttest and gain scores based on use of AIMSweb.
The results of the chi-square test showed no significant findings (p = .11) between
students who did or did not receive AIMSweb and their winter posttest category level.
This combination of findings provided support to retain the null hypotheses.

**Question 2.** Is there a difference on Boehm posttest percent correct scores between male
and female students who perform at Level 3? Null hypothesis two tested for significance
at < .05 predicted no significant difference in Boehm concept attainment based on
gender.

Data gathered indicated that female students had significantly higher scores at the
pre-test (p = .02) and tended to have higher scores at posttest (p = .06) than male
students; however, no significant differences (p = .69) were found on gain scores. This
combination of findings provided partial support to retain the null hypothesis.

**Question 3.** Is there a correlation between Boehm posttest raw scores and low
performance on AIMSweb TEL assessments? Null hypothesis three tested for
significance at < .05 assumed no significant correlation between Boehm raw scores and
low performance on AIMSweb TEL assessments.
The Boehm posttest scores had a significant positive correlation with all eight AIMSweb TEL assessment measures at the $p < .001$ level. This combination of findings provided support to reject the null hypothesis. Data analysis found that if a student scored poorly (Level 3) on the Boehm, it was likely they did not have a solid understanding of the letter name or letter sound relationship. By extension, if a student doesn’t understand that letters have specific names and make specific sounds, they do not understand that when put together letters make words (i.e. /d/o/g/ says dog) nor can they put letter sounds together to make or understand nonsense words (i.e. /m/o/t).

**Relevance of Literature**

The use of AIMSweb TEL as a tool to progress monitor kindergarten students performing at low levels is supported by O’Connor and Jenkins (1999), who better distinguished at risk and typically developing kindergarteners by using a combination of measures (letter name fluency, phonemic segmentation, and syllable elision) than by any single measure. The most successful screening measures in kindergarten have used various combinations of letter naming fluency, letter sound identification, blending onset-rimes, phoneme segmentation, and sound repetition (Foorman et al., 1998; O’Connor & Jenkins, 1999). The use of multiple measures of kindergarten students’ understanding of early literacy concepts was assessed via the AIMSweb TEL assessments, which looked specifically at letter name fluency, letter sound fluency, phoneme segmentation fluency, and nonsense word fluency. Jenkins (2003) wrote that skills such as phonological awareness have a demonstrated high correlation to future achievement outcomes. While
knowledge of letter names is a good predictor of reading success, Tunmer, Herriman, and Nesdale (1988), and Walsh, Price, and Gillingham (1988) found that the speed with which students can name individual letters is also a strong predictor of success in pre-reading students and a strong correlate of reading achievement among beginning readers (Biemiller, 1977-1978; Blachman, 1984). These findings correlate with AIMSweb TEL assessments as each of the four assessments requires student to name as many letters, sounds, phonemes, and nonsense words as possible in one minute.

Adams (1990) and other researchers concurred on four reasons that individual letter familiarity is a good measure of predicting reading success:

1. The speed and accuracy of naming a letter is an indicator of the confidence in which the letters have been learned. A child who can easily and with confidence name letters will more easily learn about letter sound and word spellings.

2. The speed in which a letter can be named is an index of the automaticity of letter recognition, “Children who automatically see the letters as wholes will see the words as patterns of letters. Children who do not, will have to work on the patterns of the individual letters as well” (Chall et al., 1990, p. 63).

3. In general, the names of letters are similar to the sounds they make. Being comfortable with letter names allow a child to remember the sound the letter makes.
4. Quickly naming letters is the ability to rapidly respond to visual stimuli.

Blachman (1984) and Denckla and Rudel (1976) found that good and poor readers differ in the speed in which they name colors, numbers, and objects in addition to naming letters.

The tool used in this research to assess incoming kindergarten students for indicators of at risk factors was the Boehm Test of Basic Concepts (BTBC). The Boehm was designed to measure children’s mastery of basic concepts considered necessary for achievement in the first years of school (Boehm, 1967). As children progress through school, difficulties in reading affect their ability to participate in many classroom activities (Hausner, 2000). “Early intervention to institute foundational literacy skills in children identified as at risk for early reading difficulties at the beginning of kindergarten can significantly improve such skills and, thereby, help to prepare them for first grade reading instruction” (Vellutino et al., 2007, p. 195).

The Boehm (1991) assessment identifies children who demonstrate low mastery of basic concepts. Bracken (1986) confirmed that basic concepts are important to the development of vocabulary as well as a foundation to understand classroom conversations and teacher directions. The work of Rhyner and Bracken (1988) affirmed that basic concept acquisition is strongly correlated to vocabulary development, language development (Zucker & Riordan, 1988), intelligence (Howell & Bracken 1992; Laughlin 1995), school readiness, and achievement (Breen 1985; Panter, 2000; Panter & Bracken, 2000). Their findings are congruent with the findings in this study that if students do not
have a strong understanding of basic concepts, such as those assessed in the Boehm, they will also have a low performance on AIMSweb TEL assessments.

These data reinforce that when students lack understanding in the categories of space, quantity, and time, students will also lack understanding of phonemic concepts necessary for beginning reading and language development. The importance of early identification and intervention was the reason that only students who scored at performance Level 3 on their Spring 2010 Boehm assessment were included in this study. Additionally, students who scored at a Level 3 were progress monitored in February 2011, giving a pre- and post data point and allowing for student growth comparisons to be determined.

The extensive review of literature resulted in no related studies that looked specifically at the relationship between AIMSweb, the Boehm, and predicting student achievement. Therefore, this research contributes additional knowledge to the literature of early literacy assessments and early childhood screenings via the Boehm assessment tool.

**Implications for Practice**

AIMSweb TEL gives teachers important information about a student’s understanding of phonological awareness components; however, AIMSweb TEL assessments do not have a significant impact on kindergarten scores assessed by the Boehm. This study concludes that student growth does not significantly improve if students are screened and progressed monitored twice a year using the AIMSweb TEL
assessments. For the lowest performing kindergarten students, as indicated by a pre-test performance Level 3 score on the Boehm, AIMSweb TEL is not a deciding factor in achievement during the course of their kindergarten year.

Conclusions drawn from this research suggest that it may not be prudent for school leaders to commit financial and human resources in the AIMSweb TEL program for use in kindergarten classrooms. Precious school budgets may be better spent on something other than the purchase of AIMSweb TEL assessment tool. The time it takes for teachers and/or instructional aides to give each student the one-minute letter naming fluency, letter sound fluency, phoneme segmentation fluency and nonsense word fluency assessments may be better spent in different ways. Results from this research can inform individual school sites, districts, and intermediate school districts about expenditures for universal screening and progress monitoring resources that will have a positive impact on increasing kindergarten reading achievement.

Findings from this research indicate that the Boehm is a useful, cost effective, and appropriate universal screening tool for incoming kindergarten students. Kindergarten teachers can use the data generated from the Boehm to create class lists, target basic concept instruction, and create a baseline data point prior to the beginning of the first day of school, which will allow growth of individual students to be measured and documented.

From the perspective of the intermediate school district, results of this study suggest a need for specific, direct, and comprehensive training and or activities to be
created to help teachers develop concrete ways to incorporate basic concepts into their daily routines and procedures. Kindergarten classroom activities and curriculum are full of opportunities for teachers and students to manipulate, practice, and apply basic concepts. By giving kindergarten teachers the opportunity, knowledge, and training on how, when, and where to incorporate Boehm concepts into direct and indirect instruction, at risk students can be served by intentional and conscious teaching. Data from this research are also an opportunity for the intermediate school district (ISD) to interact positively and cooperatively with school-based and locally operated preschool establishments to help guide those programs in beneficial ways through integration and incorporation of basic concepts into the curriculum.

From a district or school building perspective, data from this study could be used to form the basis of a year-long, in-depth look at incorporating Boehm concepts into kindergarten classrooms via a professional learning community (PLC) study group. Resources to help target Boehm concepts could be gathered and shared among kindergarten teachers, classroom visits could be arranged, and a monthly or weekly concept schedule could facilitate goals for the PLC group. With time and opportunity, kindergarten teachers could specifically study how and when to integrate Boehm concepts into the current curriculum without adding content. Data collected from the Boehm about the current kindergarten students would be the driving force for teachers to be cognizant and deliberate about instruction to best meet the needs of the most at risk
students, and growth could be monitored and assessed by the February screening of performance Level 3 students.

**Recommendations for Future Research**

We know that early assessment of students’ understanding of phonological awareness have demonstrated high correlations to future achievement outcomes (Jenkins, 2003), and that the most successful screening measures in kindergarten use various combinations of letter naming fluency, letter sound identification, blending onset-rimes, phoneme segmentation, and sound repetition (Foorman et al., 1998; O’Connor & Jenkins, 1999). The literature also confirmed that the Boehm was designed to measure children’s mastery of basic concepts considered necessary for achievement in the first years of school (Boehm, 1967). Yet, the findings of this study indicated that AIMSweb and the Boehm together do not have a significant impact on increasing student achievement.

Therefore, future research might analyze student Boehm scores sorted by teacher to determine kindergarten teachers who had the most gains in student performance. Further analysis might investigate the specific teaching pedagogy and practices of individual teachers to pinpoint differences leading to increases in achievement of the most at-risk students. Hattie (2003) suggested that excellence in teaching is the single most powerful influence on student achievement. Future research studies would be beneficial if precise practices of excellent kindergarten teachers could be analyzed, described, and duplicated.
An additional research effort could examine the specific interventions with at risk kindergarten students, and perhaps compare specific interventions at individual elementary sites, and to determine, monitor, and assess the various interventions as they pertain to increased achievement in the area of reading.

Parents are a child’s first and most important teachers; therefore, another area to explore might be ways to actively involve parents in activities that could help their children attain greater school achievement. An example could be a game to play at home wherein parents are given instruction about words to emphasize, developmentally appropriate student responses, and opportunities for expansions.

**Discussion of Limitations.** There was no standard curriculum nor were there common instructional strategies used among the 15 school districts and 31 elementary buildings schools in this study. Many kindergarten teachers were involved in the collection of data used in this study which equated to massive variations in the quality, quantity, and curricular materials used to teach kindergarten objectives. Further, test results obtained on both the Boehm and AIMSweb TEL represent snapshots of what children can do, at a given moment in time and may not accurately represent students’ full capabilities. There was no way to control for the preschool experiences or home environments of the kindergarten children whose test scores were part of this study.

The limitations to this study could be minimized if data related to socio economic status and preschool experiences were known, weighted, and factored into statistical tests. Likewise, when considering the effectiveness of a kindergarten teacher, it would be
helpful to have a greater depth of knowledge; years of experience as a kindergarten teacher, highest degree attained, college major, training, and resources made available through their principal. An additional enhancement to this study would be to conduct a longitudinal follow-up to these kindergarten students, as they progress through 3rd, 5th, and 7th grades, to see if they make academic gains as they progress through school as determined by Northwest Evaluation Association (NWEA) test results.

**Policy Implications**

Boehm (1967) and Davis’s (1974) research found that students who start out behind tend to stay behind, and that the gap between high and low achievers increases over time. Currently, some children enter kindergarten having had two full years of a school-based preschool program. They are able to identify most of the letters and the letter sounds, able to count to at least 20, and understand the expectations of what learning looks and feels like. In comparison, some students have little or no knowledge of the relationship of letters and sounds, lack the ability to count, and are unfamiliar with the expectations of a school setting. The disparity of skills among kindergarten students, as demonstrated in this study may encourage policy-makers to consider the option of providing free, universal preschool for all families with children aged 3-5 years.

Literature related to this study emphasized that delivery of reading readiness assessments and progress monitoring of achievement is crucial to decision-making regarding instruction and intervention. Therefore, policy-makers may consider an endorsement in both child development (ZA) and reading (BT), which would ensure that
kindergarten teachers are professionally prepared for gathering and using assessment data and have the prerequisite knowledge of developmentally appropriate activities to help children become strong, confident, and successful readers.

**Recommendations for School Leaders**

While the findings from this research did not identify a positive correlation between AIMSweb and the Boehm, information gathered from phonological assessments such as letter naming fluency, letter sound fluency, phoneme segmentation, and nonsense word fluency are important pieces of information about individual student’s understanding of phonemic awareness, phonics, and developing literacy concepts. Recommendations for local elementary principals and kindergarten teachers include that a teacher’s time and effort can be better spent assessing students’ working knowledge and understanding of these critical pieces of literacy though authentic assessment, such as reading a simple book with a student and observing what and how they proceed when they come to an unknown word. Because there is a commitment from the ISD to continue with the Boehm at kindergarten round-up screenings each spring, I recommend that kindergarten teachers use the Boehm data to help create class lists for the fall, to red-flag students who might need additional support, and to identify key basic concepts that can be incorporated into the daily structure of the kindergarten classroom.

Further, I recommend that elementary principals encourage kindergarten teachers to focus on how they can improve and incorporate basic concepts into daily activities, to allow teachers to focus their PLC goals on incorporation of basic concepts and how to
track and monitor student understanding and use of phonemic awareness concepts through authentic assessment. Building leaders should reach out to strong kindergarten teachers and give them time to share their successful teaching practices and strategies through classroom visits with kindergarten colleagues. Classroom visits would also allow teachers to share activities and interventions for at risk students for reading difficulties. A further recommendation would be to allocate building funds for continued professional development workshops, conferences, and trainings.

Summary

This chapter included a review of the purpose, research questions, hypotheses, and conclusions. Related literature led to a discussion of implications for practice, possible topics for further research and recommendations. The results of this study should be used as a basis for additional research in the areas of specific teaching pedagogy and practices of individual teachers to pinpoint factors with potential for increasing the achievement of the most at risk students. Continued research in the area of teacher pedagogy would be beneficial to both students and teachers, as it would positively impact student achievement of all kindergarten students.
REFERENCES


APPENDIX
Appendix A: Approval of Traverse Bay Area ISD

October 26, 2011

Emily O’Hearn
Assistant Principal/Literacy specialist
Central Grade School
301 W. Seventh Street
Traverse City, MI 49684-2428

Dear Emily:

This letter serves as an official confirmation and acknowledgement of our organization’s formal approval for you to access assessment data for the Boehm Test of Basic Concepts and the AIMSweb Test of Early Literacy and to utilize the aforesaid as per your dissertation project.

On behalf of the Traverse Bay Area Intermediate School District – Good Luck with your research. It is our pleasure to support you in your efforts to increase the body of knowledge in this area.

Please don’t hesitate to contact me at 922-6280 if you need additional assistance.

Sincerely,

[Signature]

Jason Jeffrey, Ed.D
Assistant Superintendent for General & Career and Technical Education
Appendix B: University Human Subjects Review Committee Approval

EASTERN MICHIGAN UNIVERSITY
Education First
University Human Subjects Review Committee @ Eastern Michigan University @ 200 Boone Hall
Ypsilanti, Michigan 48197
Phone: 734.487.0042 Fax: 734.487.0050
E-mail: human.subjects@emich.edu
www.ord.emich.edu (see Federal Compliance)
The EMU UHSRC complies with the Title 45 Code of Federal Regulations part 46 (45 CFR 46) under FWA00000050.

UHSRC
July 16, 2012
INITIAL APPROVAL
To: Emily O’Hearn
Leadership and Counseling
Re: UHSRC #120704 Category: EXEMPT #4
Approval Date: July 16, 2012
Title: The relationship between the Boehm Test of Basic Concepts and AIMSweb on kindergarten student achievement in one Northern Michigan Intermediate School District
The Eastern Michigan University Human Subjects Review Committee (UHSRC) has completed their review of your project. I am pleased to advise you that your research has been deemed as exempt in accordance with federal regulations.
The UHSRC has found that your research project meets the criteria for exempt status and the criteria for the protection of human subjects in exempt research. Under our exempt policy the Principal Investigator assumes the responsibility for the protection of human subjects in this project as outlined in the assurance letter and exempt educational material.
Renewals: Exempt protocols do not need to be renewed. If the project is completed, please submit the Human Subjects Study Completion Form (found on the UHSRC website).
Revisions: Exempt protocols do not require revisions. However, if changes are made to a protocol that may no longer meet the exempt criteria, a Human Subjects Minor Modification Form or new Human Subjects Approval Request Form (if major changes) will be required (see UHSRC website for forms).
Problems: If issues should arise during the conduct of the research, such as unanticipated problems, adverse events, or any problem that may increase the risk to human subjects and change the category of review, notify the UHSRC office within 24 hours. Any complaints from participants regarding the risk and benefits of the project must be reported to the UHSRC.
Follow-up: If your exempt project is not completed and closed after three years, the UHSRC office will contact you regarding the status of the project and to verify that no changes have occurred that may affect exempt status. Please use the UHSRC number listed above on any forms submitted that relate to this project, or on any correspondence with the UHSRC office.
Good luck in your research. If we can be of further assistance, please contact us at 734-487-0042 or via e-mail at human.subjects@emich.edu. Thank you for your cooperation.
Sincerely,
Deb de Laski-Smith, Ph.D.
Administrative Co-Chair
University Human Subjects Review Committee
Appendix C: AIMSweb® Letter Naming Fluency

Benchmark Assessment #1 (Kindergarten - Fall)

Teacher Copy

Given To:____________________ Given By:____________________ Date:_______

u D P S R A X y l n / 10 (10)
C V g W A G J z c E / 10 (20)
r W Z F M c L t u f / 10 (30)
g c T Y U b d p S o / 10 (40)
c G S U J d a T K m / 10 (50)
R T G I k S q n u A / 10 (60)
R k L K s j f E h q / 10 (70)
K h b U T I D s l a / 10 (80)
N K k v l Z a u A F / 10 (90)
k X O T e h g M B W / 10 (100)

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AIMSweb® Letter Naming Fluency

Benchmark Assessment #1 (Kindergarten - Fall)

Student Copy

u D P S R A X y l n
C V g W A G J z c E
r W Z F M c L t u f
g c T Y U b d p S o
c G S U J d a T K m
R T G I k S q n u A
R k L K s j f E h q
K h b U T I D s l a
N K k v l Z a u A F
k X O T e h g M B W
Appendix D: AIMSweb® Letter Sound Fluency

Benchmark Assessment #1 (Kindergarten - Fall)

Teacher Copy

Given To:____________________  Given By:____________________  Date:________

t d n r p c z v w k / 10 (19)
m b t f v z i c d p / 10 (20)
v y e l b j s t f a / 10 (30)
c n f r m b t h z s / 10 (40)
j k p s f h i r o m / 10 (50)
s z p i j r e d g o / 10 (60)
j g a t s h c r k l / 10 (70)
j u k y a s z e i v / 10 (80)
m s d g f l b v j c / 10 (90)
t e m l w j y z f v / 10 (100)
AIMSweb® Letter Sound Fluency
Benchmark Assessment #1 (Kindergarten - Fall)

Student Copy

t d n r p c z v w k
m b t f v z i c d p
v y e l b j s t f a
c n f r m b t h z s
j k p s f h i r o m
s z p i j r e d g o
j g a t s h c r k l
j u k y a s z e i v
m s d g f l b v j c
t e m l w j y z f v

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### Appendix E: AIMSweb® Phoneme Segmentation Fluency

**Benchmark Assessment #1 (Kindergarten - Winter)**

**Teacher Only Copy**

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## Appendix F: AIMSweb® Nonsense Word Fluency

### Benchmark Assessment #1 (Kindergarten - Winter)

Teacher Copy

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# AIMSweb® Nonsense Word Fluency

Benchmark Assessment #1 (Kindergarten - Winter)

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