Toward the Development of an Observation Measure of Interest and Attention for Literacy Tasks in Kindergarten Students

Kelly A. Coughlan

A dissertation

submitted in partial fulfillment of the

requirements for the degree of

Doctor of Philosophy

2012

Reading Committee:

Susan B. Nolen, Chair

Robert Abbott

Dianne Lattemann

Deborah McCutcheon

Program Authorized to Offer Degree:

Educational Psychology

University of Washington

Abstract

Kindergarten students (N = 95) in three schools and seven classrooms were observed for on-task versus off-task behavior during three literacy instruction opportunities; small group instruction, whole group instruction and the less structured library setting over the 2011 – 2012 school year. Students' early literacy skills were assessed before and after observations in order to determine whether students who were observed to be visually on task during literacy would have greater improvement in literacy skills over the kindergarten year. No differences in visual attention by observation of eye gaze were found between students who made low improvement, moderate improvement or high improvement over the school year. A teacher's ability to engage students is a benchmark of effectiveness under President Barack Obama's Federal Race to the Top Education Reform Initiative. Implications for use of observed student engagement as a measure of teacher classroom effectiveness and alternative strategies for gauging teacher effectiveness are discussed.

Kelly A. Coughlan

Chair of the Supervisory Committee:

Professor Susan B. Nolen

Educational Psychology

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACKNOWLEDGEMENTS

The author expresses sincere appreciation to Professor Susan B. Nolen for her guidance through multiple research endeavors, including this work, and to the College of Education and the Graduate School for approval in extending my time frame for completion. The leave I took to work in schools has greatly enriched my learning experience as well as enhanced my potential to contribute to the field.

Special thanks is due Superintendent Richard Stewart who always tries to say yes, and did so, and also to the kindergarten teachers whose classrooms I've stalked.

DEDICATION

"Praise God from whom all blessings flow…"
Thomas Ken (1637-1711)

To my parents Doyle Edward Coughlan and Janet Alda Dever Coughlan who always encouraged me to read and learn, and from whom I learned, by example, the importance of caring for others—especially children.

To my homeschooled daughters Jessica, Sarah, and Samantha who were patient as I learned how to facilitate their best learning as youngsters and who became successful learners in college and life.

To my youngest, Samantha--who has lived with a student-mom since she was a toddler-- I look forward to graduating from UW with you in June!

Kindergarten!

The first day of school for 5-year-old kindergartener Sarah, and her parents, is a mixed bag of excitement, apprehension, and perhaps outright fear. Sarah may be nervous or fearful about school rules, fire drills, eating in the crowded cafeteria, and getting on the wrong bus at the end of the day. Sarah's parents may also be concerned about what Sarah will do if she accidentally breaks a school rule, cries during a fire drill or spills her milk in the cafeteria. Sarah's parents may also secretly wonder whether Sarah will be able to "keep up" with the other kids at school.

Whether our children can keep up is a common fear for parents of young children. For most parents, their fears are relieved when the first big smiley faces, stickers and stars come home on class work, soon followed by a positive conference and good report card. Parents of up to a third of our kindergarten students will have a different experience. Their children may struggle with basic skill sets such as remembering how to count, using a pencil and scissors and answering simple questions. They may be overwhelmed when asked by the teacher to follow a seemingly simple multi-step instruction. A routine direction such as "Get your folder out of your backpack, put your lunch box on the shelf and hang up your coat" can be excruciatingly complex for a youngster with an unidentified receptive language disorder, memory deficit or a hearing problem. To the classroom teacher, Sarah's inability to process the directive may appear more like shyness or noncompliance. However, an incorrect or failed response may also be the first hint of impending academic difficulty.

The kindergarten teacher watches Sarah closely and considers her options. She can speak to Sarah's parents about her concern but of course, she doesn't want to alarm them in these first few days of school. She can make a referral to remedial or special education but these are for the most severe problems—and Sarah doesn't appear to have a disability. If Sarah doesn't get "tuned in" by the end of the year, the teacher can always fall back on retention and hope that another year of development and

academic reinforcement will give Sarah the boost she needs. What should Sarah's teacher do? What are the options? Will Sarah's teacher make the right decision?

Child Find

If Sarah had come to school on the first day with an obvious disability that explained her difficulty, such as Down Syndrome or epilepsy, her teacher would have known exactly what to do. She would have made a referral for an evaluation. According to Federal Law (IDEA 300.111) "(1) The State must have in effect policies and procedures to ensure that--(i) All children with disabilities residing in the State, … and who are in need of special education and related services, are identified, located, and evaluated…"

What is not so clear is predicting, in a beginning kindergarten student like Sarah, what skill deficits are due to a disability versus a lack of exposure to experiences found to enhance skill development and learning. A youngster who has never been allowed to use scissors at home during her first five years of life may function similarly to a student who has an impairment or disability in fine motor coordination. Likewise a youngster who has not been exposed to activities requiring verbal and cognitive flexibility (e.g. riddles, poems, silly songs, story time, et cetera) may appear like a child with language impairment or even mental deficiency to the classroom teacher. The challenge for many educators is determining whether a student's functional skill level is impacted most by lack of exposure or a true disability.

Many students, who are referred for an evaluation, ultimately are found not eligible for special education services. In the case of our kindergarten student Sarah, she would have to be at least two standard deviations below the mean in one developmental area or one and one-half standard deviation below the mean in two developmental areas in order to be eligible for services as a student with a

Developmental Delay. The gap between a teacher's concern and special education eligibility can be wide.

Retention

When a psycho-educational evaluation does not identify a disability that would allow both the student and the teacher to get some assistance, the teacher may recommend the student be retained in the same grade for an additional year. Some kindergarten teachers recommend retention as a first line "intervention" even prior to or without additional psycho-educational evaluation data, based solely on classroom performance. Studies over the last decade have shown the retention intervention has failed to produce desired results. Jimerson has found that retention is associated with increased costs and adversely impacts socio-emotional adjustment in students (Jimerson, 2001a, 2001b). Hong & Raudenbush selected data from the Early Childhood Longitudinal Study Kindergarten cohort (ECLS-K) released by the US National Center for Education Statistics. They found that students who had been retained as kindergarteners demonstrated less growth in both reading and math at third grade than they would had they been promoted (2005). In spite of this and many studies failing to show long-term advantages of retention, and increasing numbers of studies showing an adverse impact, retention continues to be an accepted, and sometimes preferred, intervention by some educators and policy makers.

The transition to school—through the kindergarten doors—although exciting for many students, can be fraught with learning challenges for others. Primary options for addressing needs of the struggling kindergarten students often include retention and/or referral for a comprehensive evaluation even though, as discussed previously, neither option has a high likelihood of improving the student's academic or social outcome. School practitioners are in need of a tool to help predict much earlier which students are at risk of not benefitting from classroom instruction so that efforts toward interventions and differentiated instruction can move a student's learning forward and before gaps develop. The goal of the present study

is to develop a context-based student observation screening instrument to augment teaching strategies toward the early identification of struggling literacy learners. Such an instrument should be drawn from multiple domains of development in young children—social, language, literacy, attention, and print motivation. An effective observation screening instrument would also demonstrate robust predictive qualities for advancing literacy development in the kindergarten population.

Development in Young Children

Social Development

Human babies are born with an intrinsic desire to learn and to interact with others. Some of the most effective learning comes from watching others. Andrew Meltzoff notes:

> "A wide range of behaviors—from tool use to social customs—are passed from one generation to another through imitative learning. In western cultures, toddlers hold telephones to their ears and babble into the receivers. The children of Australian aborigines would not do this, one suspects. There is no innate proclivity to treat pieces of plastic in this manner, nor is it due to Skinnerian learning. Imitation is chiefly responsible" (Meltzoff, 2005, p.55).

Infant imitation has been studied in many contexts over the last 30 years. The range of acts that can be imitated (as documented in published studies) include mouth opening, hand movements, emotional expressions, head movements, lip and check movements, eye blinking and two types of tongue protrusion (Meltzoff, 2005).

Meltzoff also found that infants as young as 6 weeks are able to perform deferred imitation after a 24 hour delay (2005). To study this, infants were shown a human facial gesture followed by a passive face. The infants initiated an imitative response within the next 2.5 minutes. In a second study, the infants had a pacifier in their mouths when shown a human facial gesture. The infants were also able to imitate the gesture when shown a passive face 24 hours later.

In studying the process of delayed imitation experiences, after being shown the delayed passive face, infants were noted to quiet the non-involved muscles and activate the muscles required to produce the imitation (2005). This lead Meltzoff to believe that even very young infants know *what* area of the

body to move, even if they can't exactly recall *how* to move it. This line of research suggests that in humans there is an innate observation—execution pathway (Meltzoff, 2005).

Imitation of others shows that infants have the ability—at some neurocognitive level—to map the actions of another onto their own body. Meltzoff calls this "me relevance." That is, to an infant: "That seen event is like this felt event." As infants develop they have increasing goals and act intentionally. By approximately 18 months of age, children are experienced with both fulfilled and unfulfilled goals in intentions and most linguistically label their experiences. Among an infant's first words are "gone," to signify disappearance; "uh oh" and "no" (U. S.) "oh bugger" (England) "oy" (Yiddish) to signify failure and "there" and "did it" means success. Young children seem to be particularly motivated to communicate these meanings to others (Meltzoff, 2005, Gopnik & Meltzoff, 1986).

The studies support the idea that the youngest children are interested and motivated to interact socially and communicate with others. This interest sets the foundation for meaningful interaction between the infant and caregiver which expands over time to include the child's greater social milieu.

Language and Literacy Development

Infants' language development progresses over time in developmentally predictably ways from the initial mouth imitation described above, to cooing and babbling followed by short vowel words such as "da-da." More complex words phrases and sentences are soon to follow with their mean length of utterances expanding with the child's development. By the time a child is ready for kindergarten (around 5 years old) a typically developing child will have a several thousand word vocabulary and can both understand and express relatively complex ideas. Pragmatics—the social aspects of language—are also relatively well understood at this age and language development—which may have begun as simple oral imitation--has progressed in quantity and quality across a number of language-based domains and are ready for the written form. Upper preschool aged children may be demonstrating this readiness through

their patterns of usage of written materials such as children's storybooks and basic writing tasks such as writing their own name or drawing wavy lines to represent the adult cursive handwriting they have seen older family members use.

In a series of studies of 2 through 5 year olds Sulzby (1985) found a distinct pattern of pre-literacy development that progresses from treating individual pages of storybooks as if they are discrete units, to treating the book as a unit, using speech that builds a story across the book's pages. In her research, Sulzby asked children to "read" (retell) to an adult from a familiar or favorite book at the beginning and end of kindergarten. Over this time there was no formal instruction in reading or writing. She then analyzed how the children "read." Sulzby noted:

> "Once children are weaving stories across the book, this speech can be seen to have characteristics more appropriate either to oral or to written language with some fluctuation between the two before becoming highly "written" in nature. Characteristics of "written language" that can be found in children's storybook reading speech include (a) wording that is more appropriate for written rather than oral discourse, and (b) intonation patterns that sound like reading rather than conversing or storytelling" (Sulzby, 1985, p. 478-479).

The "reading" behaviors in these studies were stable across storybooks indicating that the behavior is generalized and not just a stimulus-response pattern to a particular book. Additionally, the patterns differed predictably at each age including over the kindergarten year indicating a pre-literacy developmental sequence (Sulzby, 1985).

Indirect effects of oral language have been found to have an important influence on later reading skills. Storch and Whitehurst (2002), in a longitudinal study of 626 students from preschool through 4th grade (all students started the study as Head Start students) found that oral language skills in preschool

had a significant indirect effect on kindergarten code-related skills (standardized coefficient for indirect effect = .72), first grade reading ability (.55), grade 2 reading ability (.58), grade 3-4 reading accuracy (.43) and reading comprehension (.65). Oral language skills in kindergarten had a weaker indirect effect on first grade reading (.24), second grade reading (.25), third and fourth grade reading accuracy (.19) and third and fourth grade reading comprehension (.43). In each case, the indirect effect was a combination of the relationship between oral language skills and code-related skills and between code-related skills and later achievement.

Although oral language skills are critical as students transition between their preschool experience to kindergarten, as children begin formal schooling the relationship between oral language and code-related domains diminishes. By the end of Kindergarten a student's print knowledge and phonological awareness will play a critical role in beginning reading skills and this is predictive of later reading skills. Additionally, second grade reading skills are highly predicted by a student's code-related skills at the end of kindergarten (Storch & Whitehurst, 2002).

The two literacy domains of oral language skills and code related skills are most likely acquired through different domains and opportunities. The acquisition of oral language is inherently social—requiring at least two people to have a conversation. Two people holding each other's attention in the give-and-take of meaningful communication. Code-related instruction in kindergarten is likely to occur within a whole group setting of 20-30 students to one teacher and minimal opportunity for individual interaction or feedback. Regardless of the mechanisms of acquisition, both oral language learning and code-related learning are critical curricular benchmarks for advancing literacy skills across a student's educational experience.

Neurobiological Development: Attention and Executive Functioning

A prominent concern for kindergarten teachers and parents is how well new kindergarten students can pay attention to the teacher. Teachers are aware that students with poorly developed attention spans are more likely to struggle in school. According to the Centers for Disease Control, up to 5.2 million students between the ages of 3-17 in the United States have been diagnosed with attention-related conditions such as Attention Deficit Hyperactivity Disorder (ADHD). This represents 8.4% of all children in this age range (11.2% male, 5.5% female). Attention problems are such a significant concern that millions of children are medicated in an effort to improve their executive functioning and learning at school (CDC, 2012). The mechanisms for social, oral language and literacy development as described previously are under executive control. Therefore, it's important to consider basic executive functioning processes when studying developmental changes in tasks which have a relatively heavy cognitive load such as learning to read.

The attention system can be divided into three primary networks that involve orienting, alerting and executive control of attention. Alerting is defined as achieving and maintaining a state of alertness. Orienting is selecting information from sensory input. Executive control is defined as resolving conflict among responses and it provides the basis for voluntary behavior (Fan, J., McCandliss, B.D., Sommer, T., Raz, A., & Posner, M.E., 2002). In the classroom setting, alerting could be Sarah hearing her name called by the teacher. Sarah then orients to the stimuli—she stops what she is doing and simultaneously turns to look at the teacher. Sarah demonstrates well developed executive control if she is able to completely attend to what the teacher is saying to her and she is able to cease processing other stimuli simultaneously. For example, she is able to tune out her friend Jessica who was also talking to her, and not be distracted by the stack of blocks that Steven just knocked over. A child with under-developed executive control may not listen to the teacher long enough to get the message because he was distracted

by several other--perhaps more interesting--stimuli than the teacher. Such a student may be a candidate for an ADHD evaluation and is at high risk of being placed on potent medications known to improve attention.

Brain-attention studies provide evidence for the development of an executive network during early childhood. Studies have shown that executive functioning correlates with effortful control at several ages during childhood: 24-, 30-, 36-month olds 3- and 5-year-olds, and for 7-year-olds. Effortful control in children is related to the ability to delay an action, and also the ability to avoid behaviors such as lying or cheating when given the opportunity in laboratory studies (Posner, 2008). High levels of effortful control and conflict resolution abilities are related to fewer antisocial behaviors such as truancy in adolescents. Empathy is also highly correlated to effortful control. Overall, executive attention likely contributes to the socialization process by increasing the chance of learning important behaviors related to self-regulation and understanding the feelings and emotions of others (Posner & Rothbart, 2009; Posner & Fan, 2004).

Dopamine is a neurotransmitter known to be active in the process of reward-driven learning. Individuals with ADHD are believed to have deficits of Dopamine in some brain regions. Dopamine is also associated with many substances such as cocaine, amphetamines and alcohol and is responsible for "runner's high." Dopamine has also been linked to visual activity and visual selection. Elderly Parkinson's patients treated with a synthetic Dopamine replacement to reduce Parkinsonian symptoms were incidentally found to spot winning strategies in a gambling activity at a faster rate. When these individuals won a bet they experienced a "Dopamine high" in the form of a neurochemical reward/happiness which helped them to remember how to make a winning choice on subsequent opportunities. Dopamine is considered so critical to human functioning, it was once correlated to the origins of human intelligence due to its contribution to learning and memory and its role in executive

functioning, language production and working memory (Arias-Carrion,O, Poppel, E., 2007; Rothbart, M.K., & Posner, M. I. 2005; Tripp, G, Wickens, J. R., 2008).

In a review and synthesis of studies involving attention, emotion and motivation, Raymond documented evidence for multiple and differentiated brain regions being responsible for various aspects of these domains and interactions between them (2009). Studies of monetary gain versus loss found gain-specific modulation and loss-specific modulation occurred within different brain regions. This suggests the possibility that distinct neural networks influence value (positive/negative) and the positive feedback may be moderated by a visual cognitive process (as seen with the gambling Parkinson's patients). This evidence supports the possibility that motivation contributes to visual selection and may also explain the mechanism whereby students with poor attention in the classroom have difficulty learning and remembering.

Although there is good empirical support for the motivation/visual selection/improvement sequence in laboratory-based studies, there has not yet been an established link between visual selection and attention during literacy instruction in a classroom context and additional research is needed to determine whether students' visual selection (or lack thereof) is predictive of learning in a classroom environment—especially in the youngest students where social and academic challenges, once established, can be difficult to overcome.

Adjustment to Kindergarten

Teachers and parents try to create a positive and meaningful transition for kindergarten students—preparation which begins well before the first day of school. Preparation may include participation in a kindergarten screening activity, back-to-school and meet-the-teacher events as well as opportunities to gather the needed school supplies, new clothes/PE shoes a backpack and lunch box. Kindergarteners, like Sarah, typically enjoy choosing the just-right backpack and are proud to show it to

their siblings and new friends at school. Such activities help prepare prospective kindergarteners for the transition to school.

However, Sarah's transition to school also means she no longer has access to her primary and often exclusive caregiver and advocate during most of the day. She must establish a new replacement advocate to ensure her social and physical needs are met during the long school day. It is understandable then that young children come to school with a need to form positive relationships with their teachers and achieve a sense of belonging (Nolen, 2001; Wenzel, 1999; Connell & Wellborn, 1990). This new student-teacher relationship is often established—and frequently tested--within the first few days or weeks of school. Many kindergarten teachers are acutely aware of this sensitive time for young children and their parents, and embed many social activities including "getting to know you" types of activities to begin establishing peer relationships. Kindergarten students are often seated together at tables so they may share supplies and help each other.

Upon entering kindergarten, students also have a new kind of pressure. They have spent the last five years negotiating relationships at home with parents, grandparents and siblings and with friends in the neighborhood, daycare and preschool. Most have strong social bonds which have developed since early infancy. Now for perhaps the first time, these youngsters are without their primary supporter, the caregivers that would guide them from one level--to the next across multiple developmental domains, while at the same time not making light of their efforts. They have no such guarantee when they walk into kindergarten and their caregiver leaves them at the door.

Kindergarten teachers also feel a certain responsibility and pressure to ensure 5-year-olds make a successful transition to school behaviors and norms so their students will be ready for the more academically intensive first grade program. Deborah Stipek surveyed kindergarten and first grade teachers to learn more about learning-related behavior in kindergarten and first grade students. Teachers

who participated in this study completed a Teacher Rating Scale of School Adjustment. Stipek found that teacher ratings of children working independently, seeking challenge, accepting responsibility and being tuned in to what's going on in the classroom are strongly predictive of letter-word recognition and reading comprehension at third grade (Stipek, Newton & Chudgar, 2010). What remains unclear is what being "tuned in" looks like to kindergarten teachers and how much "tune in" is needed for a student to be academically successful.

Motivation for Literacy in Kindergarten

Although studies of literacy motivation in kindergarten-age students is somewhat limited, when asked, kindergarteners have definite ideas about what they like and dislike and what makes them feel successful at school. John Nicholls, an early school-based motivation researcher, found that a kindergartener will feel successful if they try hard and are able to complete a task. A kindergartener typically will not ask a peer for feedback in deciding whether they were successful at a task suggesting that 5-year-olds remain adult-dependent for cues, feedback, and guidance (Nicholls, 1989).

In an effort to further advance our understanding of kindergarteners' motivation for literacy, Susan Nolen asked a group of kindergarten students to choose whether they liked or disliked reading similar to a puppet model. Most children chose a "very positive" response on all but one out of 13 opportunities (2001). In light of Wenzel's research (1999), it could be that these children were primarily interested in pleasing the interviewer by giving responses they believed an adult would expect to hear from a student at school. This response set could also represent internalization of school norms by the students. Interest development—even well-developed individual interest--without support or possibilities for challenge may go dormant, regress or disappear altogether over time causing a student's learning rate to deteriorate and adversely impact identity development as a reader as well (Renninger, 2009). This should be a significant warning for educators-- if the students in Nolen's study were expressing their true

feelings about learning to read the challenge for educators then, may not involve increasing a disengaged student's motivation for literacy and reading but instead we should be compelled to sustain the motivation for school and reading that students had when they first walked through the schoolhouse doors.

Overall, due to kindergarten student's limited insight, limited expressive language skills as relates to expressing complex or "mixed" feelings, and their need to build and maintain positive social relationships with adults at school it can be particularly challenging to interview kindergarten age students about their personal motivations. Therefore, an approach to attempt to understand young students' interest in literacy through direct observation of students in context-specific (literacy) tasks, could be useful in understanding how much visual attention and interest relate to literacy gains over the kindergarten year.

Emerging Models for Research: Context Specific & Microgenetic

In 1997, Educational Psychologist published a volume which focused on motivation to read. Articles within this volume call for future academic achievement motivation research to be subject-, context-, student-, and teacher-specific (McCombs, B. 1997; Wigfield,A. 1997). Susan Nolen (2001) reiterated that concern noting that "It's necessary to study domain-specific motivation patterns" adding: "Even within domains, researchers are striving to understand the relation between general patterns of achievement behavior and characteristics of particular materials, tasks, and social settings" (Nolen, 2001, p.96). Turner and Patrick have proposed several concerns with some aspects of current motivation research. First, psychologists tend to treat persons and situations as dichotomies. This is problematic as it assumes all situations (e.g. classrooms) are experienced similarly by all students. A second problem, they argue, is that much of current motivation research over generalizes. They provide the example that there is a tendency to interpret that a students' belief about English class generalizes to a student's motivation about English in general. However people are likely to feel and behave differently in different contexts.

They note that change is the premise of motivation intervention research "when context changes, so does motivation" (2010). Over time, studies and models consistent with these callings have emerged.

Renninger has proposed an inductive model in which interest and identity development goes hand in hand through development. Renninger's proposed model suggests that information about the phase of a learner's interest and age-related expectations for identity development could inform instructional practice in disciplinary content areas. In earlier phases of interest development, learners most likely benefit from external supports such as group work and meaningful content. This will help to sustain interest. In later phases of interest development, learners will be challenged to stretch their thinking and ideas about the content. To the degree they identify with the content they are not likely to be vulnerable to comparisons with the competencies of others. As John Nicholls (1989) found in his research with kindergarteners, young students are not likely to use a comparison of their skills with peers but instead their motivations and interest stem from working hard and completing the task. It could be possible then, that kindergarten-age students are "immune" from the adverse effect of competency comparison in their identity development around literacy. If so, emphasis during the kindergarten year should be on the external instructional supports and meaningful content to sustain interest (Renninger, K. 2009).

Wenzel proposes that models of socialization might be well-suited for understanding student's goals at school. In her study with older children, Wenzel found some students outright reject adult goals. Other students have internalized them, understand the value, and pursue these goals regardless of competing expectations. A third group merely complies with the expectations giving the appearance of interest in achieving, when, in fact, they are not. She noted that socialization models are important for studying motivation at school given that successful students must achieve social and academic objectives that are imposed externally by adults and thus are in the social domain (Wenzel, 1999). Although Wenzel's work was with older children, this study provides an example of motivation research in context.

Developmental researchers have recently attended to the notion of the microgenetic method for studying development. This practice involves observations over the span of changing competence during which density of observations is high relative to rate of change of the phenomenon of interest, and intense analysis proceeds with a goal of inferring the processes that leads to the change. Seigler has suggested that this method could play a critical role in understanding the process of learning although notes this type of research is labor intensive (Seigler, 2005, Fogel, 2009).

Similarly, Nolen and Ward endorse situated approaches to studying motivation. That is, individuals under study are "part and parcel of their social contexts and social contexts to be activity systems, meaning systems, or figures worlds continually co-constructed and negotiated by their members." The interactions of social context and interest must be examined together (2008).

In summary, the transition to kindergarten may represent a critical period in neurological and learning development. During the kindergarten transition, significant changes begin. First, the students are expected to make a transition from an oral representation of language to a written representation. Second, students' primary mode of learning has been through dyadic oral language and their own experience, and experiments. In kindergarten they are expected to learn by listening and following directions. Third, students previously spent much of their day interacting with one or more caring adult(s) parent, grandparents and likely enjoyed mutually engaging social experiences. Upon transition to kindergarten students are grouped together and are led by someone who is most likely a stranger to them. Social equity on the first day of school begins low and must be negotiated between each teacher and student at the same time allowing little opportunity for each to forge those important connections. Fourth, a child's free time may have been more self-directed at home or daycare. In Kindergarten there is a schedule and sequence of other-directed activities.

Some students—perhaps those more socially astute and with good language skills—will have no problems with the kindergarten transition. For others, this will present a significant challenge that has the potential to reach far beyond the kindergarten year. Language and early childhood researchers have found that interest and attention go hand in glove. Multiple previously described studies of early language development have suggested the presence of an innate observation—execution pathway which may be integral for learning. It should also follow then that young students who are seen attending to instruction may learn more than students who appear to be less engaged.

Approaches to characterize kindergarten learning and motivation, such as interviews and questionnaires have proven somewhat difficult to interpret with the kindergarten population. Currently, there is no context-specific statistically reliable and valid observational measure for assessing students' attention or interest in kindergarten literacy content during this important transition year. It is possible that an observation tool could help to better understand kindergartener's attention as a measure of interest in literacy-related tasks. The goal of this study is to determine whether growth in reading skills can be reliably predicted by systematic, context-based individual observations, in the kindergarten environment.

Theoretical Model of the Interest-Attention-Learning Sequence

The model diagrammed in Figure 1 is derived from the development, learning, literacy, motivation, and neurobiological/attention network literature described previously. The model represents the integrated theoretical framework of the present study.

The model is cyclical and begins when a stimulus is produced which in the case of the present study is literacy instruction or a literacy activity. When instruction begins, the neurologic system should perceive this through seeing and hearing, and a typically developing child would orient to the stimulus (looking at the teacher, what the teacher is doing, what the teacher is gesturing toward, etc.). Following orientation, the executive functioning system is recruited. If the student understands the stimulus, the stimulus has interest or value to the student and there is not another dominant stimulus to attend to, the result should be attentional behavior (maintaining more than a fleeting gaze toward the stimuli). If the student attends to and/or understands and/or interacts with the stimulus, the result should be sustained attention and consequently learning. If the student does not attend to the stimuli or is unable to attend due to perceptual difficulties, skills mismatch or executive functioning disorder; learning may be limited occur or is missed completely. If the student is unable to reach the skill acquisition step, yet stimuli of increasing difficulty are continuing to be presented, frustration may result for the student as well as the teacher. A result may be the student may attempt to withdraw from the activity and associated social milieu (internalizing behavior) to avoid failure or social stress or may choose alternatively more rewarding behaviors such as getting out of seat, being active, talking out/off topic, distracting others, playing with non-toy objects (externalizing behaviors).

For students able to complete the cycle, as they learn, the stimulus becomes more complex and builds upon previously learned material necessitating increasing recruitment of the executive functioning domain. Students who struggle are unlikely to absorb as much information thus they are less prepared for increasing complexity in stimuli. Over time, this effectively widens the gap for students who have slipped behind. The learning model as outlined below incorporates neurobiological substrates, social and content stimuli within a literacy acquisition context. As development progresses toward adulthood although the major features would remain the same, the content within, including competing stimuli, would become increasingly complex.

The present study is an attempt to further understand the connection between attention for literacy and actual literacy growth in a school context. Broadly, students who are neuroanatomically intact (functional hearing/vision, cognition, etc.) when presented with adequate literacy instruction and materials at their instructional level should learn. Attention difficulties are currently diagnosed in 8.4% of students age 3-17. Attention difficulties have a high comorbidity with learning disabilities (Reynolds, C.R., Vannest, K. J., Harrison, J.R., 2012; Thorkilsen, T.A., 2002.) (For a detailed exemplar see Thorkildsen, 2002, Chapter 2). Therefore, it follows that students who are observed to have poorer attention during literacy tasks might also be predicted to demonstrate slower growth in literacy skills. The purpose of this present study is to further examine that relationship in a kindergarten population.

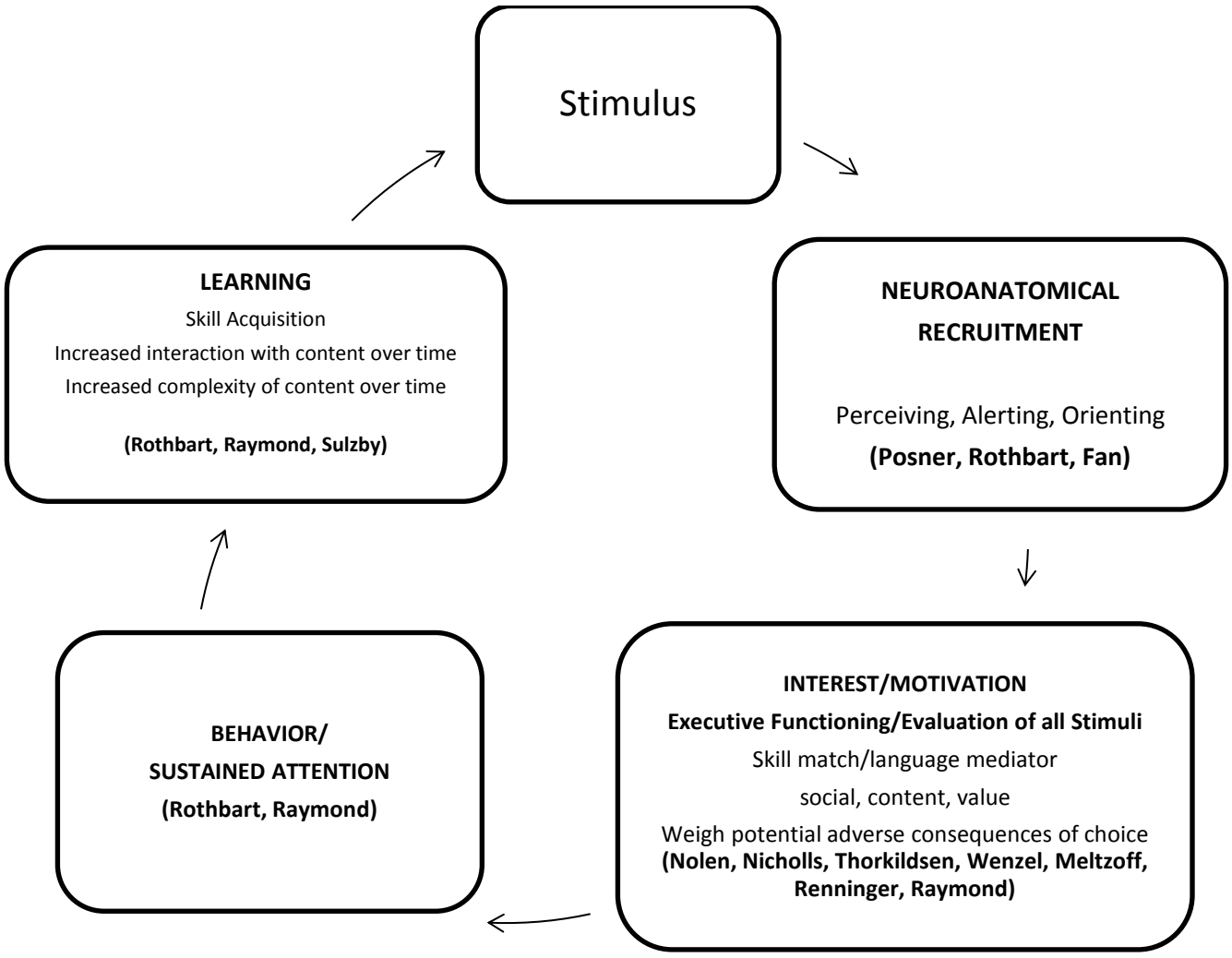

Figure 1 Theoretical Model of the Interest-Attention-Learning Sequence.

Research Objectives

The current research is an attempt to determine whether context-based literacy observations are useful in understanding the relationship between visual attention and literacy skill acquisition and, if so, develop a new observational measure of attention and interest in kindergarten students. Within the context of the present study the following three questions are addressed:

1. Is there a relationship between observed behavioral measures of visual attention to literacy instruction or activities and improvement in early literacy skills over the kindergarten year?
2. Can students' rate of improvement in early literacy skills in kindergarten be predicted by an observational measure of attention during literacy-related tasks at school?
3. Do kindergarten students in three early reading skill levels, low, average, and above average, demonstrate different behavioral characteristics during literacy-related activities at school?

Method

Participants

A district of approximately 1,700 students located in a rural area of Washington was recruited to participate in this study. District demographics are as follows: White 86.1%, Hispanic 6.3%, Mexican Multiple identities 4.2%, American Indian 1.6%. Special education enrollment was 10.5% and 41% of students receive free or reduced-cost lunch.

Within the participating district, kindergarten screenings have been used for the past several years to screen for disabilities in partial fulfillment of the district's federal ChildFind obligation to actively seek out students with disabilities or suspected disabilities and provide them with a free and appropriate public education. A student who does poorly on a screening may be referred for a comprehensive psycho-educational evaluation. Kindergarten screening data within that district are also used for instructional planning. Although some school districts use kindergarten screening to predict school readiness and may recommend delayed entry for students who don't meet a readiness criterion, within the participating district all students who meet the age requirement are invited to attend kindergarten—regardless of screening outcomes.

All students in the participating district who enter kindergarten in the Fall of 2011 and have participated in the kindergarten readiness screenings either before school began or shortly thereafter, and who also participate in the benchmark literacy screening in September, 2011, and who also pass routine vision and hearing screens were included. Approximately 100 – 120 students enter kindergarten each fall in the participating district. Typically all students participate in the kindergarten readiness screening as well as the early literacy, vision and hearing screenings unless a significant disability precludes participation. All students who participated in the screening were observed.

A total of 114 students were initially enrolled in kindergarten in September, 2011. Nineteen students were excluded from the study for the following reasons: Twelve students moved away during the study. Four students failed the hearing or vision initial screening as well as a recheck screening. Two students did not participate in developmental screenings (likely unavailable to the screening teams during the screening windows) and one student was too severely disabled to participate. The remaining 95 students, 83% of the original student group, were included in the study.

All students were distributed between 3 schools, 5 teachers, 7 classrooms. There were two full-time tuition-based kindergarten programs and five part-time kindergarten programs. The two full day programs offered 180 full days of instruction. There were three options for part time kindergarten. One school offered full day kindergarten three days per week Tuesday through Thursday with no school on Fridays and Mondays, with a shortened school year for a total of 90 days of instruction. A second school offered every other day kindergarten with alternating Fridays for a total of 90 days of instruction. A third school offered either morning or afternoon kindergarten sessions Monday through Thursday with alternating full day Fridays to make the equivalency of 90 instructional days. Although most students remain at their neighborhood schools, parents were allowed to transfer schools if they had a schedule preference.

The district-approved literacy curriculum used by all kindergarten teachers in the participating district over the 2011-2012 school year was *Read Well*. According to the Florida Center for Reading Research, *Read Well's* strengths include "…systematic and explicit instruction in phonemic awareness, phonics, fluency, vocabulary, and comprehension." The single weakness of *Read Well* pointed to verbiage in the implementation manuals which seems to imply that whole class instruction is "encouraged." There was concern by the reviewer that this may lead someone to believe whole class instruction is not required in order to be effective. No additional weakness were noted (2007).

Due to the participating district's recent increased focus on early literacy, an independent reading consultant was contracted to provide updated training in the *Read Well* curriculum and developing a pacing schedule to match the district's calendar. Whole group instruction was required. Frequent drop-ins by numerous administrators overseeing literacy instruction ensured close adherence to the pacing schedule and instructional content.

Instruments

Instruments used in the study can be described as grouped by purpose into kindergarten screening, early literacy screening (preschool level literacy) and Aimsweb tests of early literacy (Kindergarten and first grade level literacy). The instruments and what each measures along the course of the study are shown in Table 1. Kindergarten screening was performed in order to ensure students had achieved sufficient functional skills to learn and engage with classroom activities. Aimsweb tests of early literacy examine four domains of early reading fluency and the prompts use a written form. The participating school district uses these tests over the school year to determine whether students are making sufficient progress and plan instruction. The goal at the district level is to have students proficient on these measures by spring of the kindergarten year. However, because some students start school with poor skills in these domains and in order to understand students' basal skills, three early literacy screening measures (Picture Naming, Rhyming, Alliteration) which rely on pictures and auditory information only (no print) were also given during the first two benchmark periods.

Table 1. Instruments and schedule

Instruments & Purpose	Fall	Winter	Spring
K-Screen (DIAL-4, CELF-4)*	X		
Early Literacy Screening (Picture Naming, Alliteration, Rhyming)	X	X	
Aimsweb Tests of Early Literacy (Letter Naming, Letter Sounds, Phoneme Segmentation, Nonsense Word)	X	X	X

* May have occurred in Fall or before kindergarten started
Kindergarten Readiness Screening

Instruments included in the kindergarten readiness screening include the Developmental Indicators for the Assessment of Learning, Fourth Edition (DIAL-4) and the Clinical Essentials of Language Fundamentals, 4th Edition, Screener (CELF-4).

The DIAL-4 was used for screening concepts and motor skills. Additionally, the Clinical Essentials of Language Fundamentals, 4th Edition, Screener (CELF-4) was used as an oral language screener. Students were followed at benchmarking periods with two instruments: The Aimsweb Tests of Early Literacy which has from one to four screening items administered three times over the kindergarten year and the Individual Growth and Developmental Indicators administered twice at approximately the same times as the Tests of Early Literacy. The individual instruments are described in more detail below.

The DIAL-4 is used to assess student's developmental domains which are thought to be foundational for academic learning. It is based on Janet Lerner's analysis of the relationship between tasks and skill acquisition (Mardell-Czudnowski & Goldenberg, 1998). The DIAL line of screeners (DIAL, DIAL-R, DIAL-3, DIAL-4) has been one of the most widely used commercially available developmental screeners for screening children from 3 years up to 7 years of age. The domains of Cognitive and Motor skills were assessed by evaluators who have been trained in DIAL-4 administration

using the DIAL-4 video training protocol. All evaluators also had previous experience administering the DIAL-3 in a kindergarten population. The domains of Social/Emotional and Adaptive/Self-Help skills are assessed by a parent's responses to a questionnaire. The screening domains align with the National Educational Goals Panel, National Association for the Education of Young children and Head Start Domains and Standards (Pearson, 2011). Students who achieve a pre-determined age-referenced score are considered ready for a typical kindergarten experience.

In the process of standardization for the DIAL-4, norm samples included a performance areas norm sample (N = 1,400), a Parent Questionnaire norm sample and a Teacher Questionnaire norm sample, N=700 for each questionnaire type. All samples consisted of English-and Spanish-speaking children and were within 2% of U.S. Census targets. A total of 13% of examinees were Spanish-speakers. This is consistent with the U.S. population. The sample size was divided equally between males and females. Major ethnicity categories were represented in the standardization sample.

Socio-economic status as predicted by mother's education level as well as geographic region were considered as was children's educational settings (e.g. daycare, school setting, or "no program"). Children with clinical diagnoses were also considered within the standardization sample. Diagnoses included speech and language impairment (roughly 2% to 3%), developmental delay (2% to 3%) and other impairment (<1%). The standardization sample was spread across all major regions of the U.S.

A test's scores are considered reliable if scores are consistently accurate across situations. The DIAL4 Total score has the highest internal consistency reliability (Cronbach's *alpha*) of all domains at .95 for the English version and .96 for the Spanish version. The technical manual provides the reliability coefficients for each area broken down by age in six month intervals. In Table 2 below, the average

internal-consistency reliability coefficients across all age groups are given followed by the groups of 5-year-olds.

Table 2: Internal-Consistency Reliabilities: Split-Half by Age (English Version)

Performance Domains	Average	Age 5:0 – 5:5	Age 5:6 – 5:11
Language	.93	.94	.90
Motor	.84	.81	.74
Concepts	.92	.94	.82
Total	.95	.95	.90

Source: DIAL-4 Technical Manual

Test-retest reliability studies are reported in the DIAL-4 manual (Mardell, C., Goldenberg, D.S., 2011). The DIAL-4 was administered twice to 93 participants in the English version sample. Scores are converted to standard scores (Mean=100, SD=15) in order to make the comparison. Results as reproduced from the DIAL-4 Manual are shown on Table 3 (p.57).

Table 3: Test-Retest Reliabilities Age 4:0 – 5:11 English

Performance Area	R	Mean #1	SD #1	Mean #2	SD #2	Standard Difference	t-value	Mean Change #1-#2
Motor	.64	101.7	11.6	105.1	13.3	0.27	-2.11**	-3.4
Concepts	.73	104.9	13.4	108.6	13.1	0.28	-2.50*	-3.7
Language	.84	101.8	11.3	105.6	11.5	0.33	-3.99***	-3.8
DIAL-4 Total	.81	103.4	11.3	108.3	12.4	0.41	-4.25***	-4.9

*p<.05, **p<.01, ***p<.001.

Construct & Content Validity

A test is said to be valid when it actually measures what it claims to measure. One way to understand the validity of a test is by examining how closely it measures a domain that another test also measures.

DIAL-3 and DIAL-4

The domains assessed on the DIAL-3 and DIAL-4 (e.g. Language, Motor, etc.) are the same therefore strong correlations were anticipated. As expected, correlations are moderate to high with the DIAL-3 and DIAL-4 Total scores correlated at .85, Concepts at .84, and Language at .75. Motor .58 (Mardell, C., Goldenberg, D.S., 2011, p. 61).

Differential Ability Scales, Second Edition (DAS-II)

The DAS-II is an individually administered cognitive ability test designed to assess cognitive skills in children from 2 years 6 months to 18 years old (Pearson, 2011). A strong relationship between the DIAL-4 and the Differential Ability Scales would be important since students who do poorly on a developmental screener are often referred for a more comprehensive evaluation. The DIAL-4 Total score correlated highly with the DAS-II General Conceptual Ability at .73 indicating the DIAL-4 is an adequate screener for detection of possible cognitive delays.

Because the DIAL-4 aggregates Language skills and Phonology/Articulation skills in the scoring scheme, increasing the possibility of masking a positive finding, kindergarten students' communication skills were screened using the Clinical Essentials of Language Fundamentals, 4th Edition, Screener (CELF-4) in place of the DIAL-4 Language subtest.

The CELF-4 Screener estimates a student's language skills through screening Word Structure, Concepts and Following Directions, Recalling Sentences, Sentence Assembly, Semantic Relationships and Word Classes 1 and 2. The standardization, reliability and validity studies involved more than 1,200 students ages 5:0 to 21:11 with 50 in each 6-month age group up to age 16. The standardization sample accounted also for Sex, Race/Ethnicity, Geographic Region and years of education.

Validity studies and results for the CELF-4 screener are reported in the manual (Semel, S., Wiig, E.H., & Secord, W.A., 2004). In order to test the validity of the CELF-4 Screening Test, scores were standardized and compared to CELF-4 Core Language standard scores. Within the age group that included the kindergarten age sample, the two tests were correlated at r = .75. A second study of 450 clinical versus 450 nonclinical students were screened with the CELF-4 Screening Test. The CELF-4 Screening Test found that approximately 8% of students failed the screener in the standardization sample and of that 8%, 39% actually had a language disorder when given a comprehensive language evaluation. Of the students who passed the CELF-4 Screening Test, 99% did not have a language disorder and 1% were misidentified indicating the CELF-4 is more likely to over-identify students as needing a thorough language evaluation.

Reliability: The CELF-4 Screening Test was administered to a group of students on two separate occasions. For the age group which includes kindergarten-age students, the test-retest reliability coefficient was .89. Split-half reliability for students in the same age range was .70.

Overall, the CELF-4 Screening Test has demonstrated validity and reliability as well as very good positive and negative predictive power in determining whether a student may be at risk of a language disorder (Semel, E., Wiig, E. H., Secord, W. A., 2004).

Early Literacy Screening

Individual Growth & Development Indicators (IGDIs) is a brief screener of language and pre-literacy development in three to five year old children (Missall, K. N, & McConnell, S. R., 2004; University of Minnesota, 2010.). The IGDI's measure's a child's alliteration fluency, rhyming fluency and picture naming fluency--foundational skills to more advanced literacy learning. Testing of each

domain utilized picture flash cards. For Picture Vocabulary, the child is asked to name the cards. The score is reported as the number of correct names provided in 1 minute.

For Rhyming, the child is shown a flashcard with one picture on the top and three on the bottom. The examiner states the name of the top picture followed by stating the name of the three pictures at the bottom of the card then tells the child which picture on the bottom rhymes with the picture on top. This occurs for two trials. For trials 3-4 the examiner states the names of all the pictures as before then asks the child to point to which picture sounds the same as [the top picture]. Corrections are offered, if needed. For trials 5-6 the examiner reads off the names as before, and requests the child to point to which picture sounds the same as [the top picture] and provides no instructional or corrective feedback. If the student has responded correctly to at least two items in trials 3-6 the examiner proceeds with testing following the same routine as for trials 5-6 for two minutes. The score is the number of cards the student answered correctly in two minutes. Errors are monitored so that accuracy can be determined for progress monitoring.

For Alliteration, the protocol follows that of Rhyming with adjustments to student directions (e.g. "Point to the word that starts with the same sound as [the word on top]"). The score is calculated similarly to Rhyming.

Reliability and validity for the IGDIs has been provided by numerous sources as reported in the IGDI Technical Report and is summarized in Tables 4 and 5 (Missall, K.N., & McConnell, S.R., 2004).

Table 4 *Reliability of Individual Growth and Developmental Indicators*

Measure	Evidence of Reliability: One-month alternate forms	Evidence of Reliability: Test-retest across 3 weeks	Sample size
Picture Naming	r = .44 - .78	r = .67, p < .01	29
Rhyming	--	r = .83 to .89, p < .01	42
Alliteration	--	r = .46 to .80, p < .01	42

Table 5 *Validity of Individual Growth and Developmental Indicators*

Measure	Standardized measures of language	Correlation
Picture Naming	Peabody Picture Vocabulary Test —Third Edition	r = .56 to .75, p < .001
	Preschool Language Scale—3	r = .63 to .79, p < .001
	Dynamic Indicators of Basic Early Literacy Skills Letter Naming Fluency	r = .32 to .37, p not reported
Rhyming	Peabody Picture Vocabulary Test —Third Edition	r = .56 to .62, p < .05
	Concepts About Print	r = .54 to .64, p < .01
	Test of Phonological Awareness	r = .44 to .62, p not reported
	Picture Naming IGDI	r = .46 to .63, p < .01
	Alliteration IGDI	r = .43, p not reported
	Dynamic Indicators of Basic Early Literacy Skills Letter Naming Fluency	r = .48 to .59, p not reported
Alliteration	Peabody Picture Vocabulary Test —Third Edition	r = .40 to .57, p < .01
	Test of Phonological Awareness	r = .75 to .79, p < .01
	Concepts About Print	r = .34 to .55, p < .05
	Dynamic Indicators of Basic Early Literacy Skills Letter Naming Fluency	r = .39 to .71, p < .05

Note: The IGDI's were administered at the September and January benchmarking periods only.

Tests of Early Literacy

The AIMSweb Tests of Early Literacy (TEL) is a series of measures of early literacy including Letter Naming Fluency, Letter Sound Fluency, Phoneme Segmentation Fluency and Nonsense Word Fluency. These pre-literacy skills have been well vetted as foundational skills for oral reading fluency which, in turn, are critical for later reading comprehension (National Reading Panel, 2000; Pearson, 2011). Each measure is a brief one-minute sampling of a student's early literacy skills. Three tasks Letter Naming Fluency, Letter Sound Fluency and Nonsense Word Fluency measure phonics given visually presented letters or, in the case of Nonsense Word Fluency, non-real words. One task, Phonemic Segmentation Fluency assesses phonemic awareness wherein the child must identify the phonemes in orally presented words (no reading required).

Reliability of the TEL scores has been assessed by Elliott, Lee, and Tollefson (2001) as reported by Pearson (2012) through systematic reliability testing of 75 kindergarten children in three testing sessions each two weeks apart. An additional 50 cases of each measure were independently scored by two scorers from audio recording. Results are reported in Table 6:

Table 6

Reliability of TEL Scores (Elliott et al., as reported in Pearson, 2012)

Reliability	Letter Naming Fluency	Letter Sound Fluency	Phonemic Segmentation Fluency
Retest	.90	.83	.85
Alternate-form	.80	.82	.84
Interscorer agreement	.94	.82	.87

Note: Nonsense Word Fluency was not reported. It may have been administered to students beginning at first grade at the time the research was performed.

In addition to the above reliability, Pearson (2012) has provided the retest and alternate-form score stability for each of the TEL measures over the more realistic 4-month interval based on Aimsweb user data from 2007-2008. Kindergarten scores only are reported here in Table 8.

Table 7 Retest and Alternate-Form Reliability from 2007-2008 user data—kindergarten only

Interval	Type	N	Reliability	Standard Error of Measurement
		Letter Naming Fluency		
Fall—winter	Retest	1,463	.81	5.4
Fall—winter	Alternate form	665	.73	7.4
Winter—spring	Alternate form	674	.82	6.9
		Letter Sound Fluency		
Winter—spring	Retest	1,222	.82	4.0
		Phonemic Segmentation Fluency		
Winter—spring	Alternate form	674	.59	10.9
		Nonsense Word Fluency		
Winter—spring	Alternate form	674	.71	10.2

Validity of the TEL measures were also assessed by Elliott et al. (2001) and is reported by Pearson as Table 42 in the Aimsweb Technical Manual (2012). It is reproduced here as Table 9 for reference.

Table 8 Criterion Validity of TEL Scores (Elliott et al., 2001 as reported in Pearson, 2012).

Reliability	Letter Naming Fluency	Letter Sound Fluency	Phonemic Segmentation Fluency
Woodcock-Johnson Revised, Broad Reading	.63	.58	.44
Woodcock-Johnson Revised, Reading Skills	.75	.72	.60
Test of Phonological Awareness	.50	.68	.52

Statistic reported is correlation coefficient (*r*). Statistical significance was not provided in the technical manual.

Letter Naming Fluency is the only TEL measure given in September. All four measures are given at the January and May benchmarking periods.

Instruments: Summary and Rationale

Multiple instruments were used in an attempt to understand literacy knowledge (basal) at kindergarten entry and capture literacy growth over the kindergarten year. Assessments were selected based upon backward analysis of predictability. The Woodcock-Johnson Revised (WJ-R) Reading Skills test is a norm referenced standardized assessment of basic reading skills and has been used nationally as an instrument acceptable for use in establishing a student has a reading disability (it has since been replaced by the Woodcock-Johnson, Third Edition). The WJ-R uses both grade-based and age-based norms and is appropriate for use with students from elementary through high school. However, this level of test is expensive, time consuming and controlled as to who may administer, score and interpret results. Therefore, the Woodcock-Johnson Revised (and its successor) has distinct disadvantages as use for benchmark screening. However, the Dynamic Indicators of Basic Early Literacy Skills—Letter Naming Fluency (DIBELS-LNF) are correlated r =.75 (Table 8). The Aimsweb Test of Letter Naming Fluency is nearly identical in prompt and length to the DIBELS- LNF and could be assumed to have a similar relationship as the DIBELS-LNF to the WJ-R Reading Skills Test. Additionally, the National Reading Panel has established Letter Naming, Letter Sound, Phoneme Segmentation and Nonsense Word fluencies as critical for later reading comprehension (National Reading Panel, 2000; Pearson, 2011). The Letter Naming Fluency is the only reading-based literacy measure which is given at each benchmark period through kindergarten. Additional reading-based literacy measures are added at winter and spring, such as Phoneme Segmentation fluency and Nonsense Word fluency. However, since many students come to kindergarten without these more advanced skills, they are not assessed on these domain at the fall

benchmark period and Letter Naming Fluency is the only benchmark test in the AIMSweb system appropriate for use during Fall of the kindergarten year.

It is also possible that students will begin kindergarten with no letter knowledge. In those cases—where a basal is unable to be established on the written form—a less cognitively demanding pre-kindergarten literacy task could help determine whether children have the requisite oral language, memory, oral-motor skills and endurance for fluency tasks. Thus the Individual Growth and Developmental Indicators (IGDI) were added to establish a basal with the most basic/easiest of the three IGDI tests being the Picture Naming Fluency. Picture Naming Fluency is correlated with DIBELS Letter Naming Fluency r = .32 to .37; Rhyming Fluency is correlated with DIBELS Letter Naming Fluency r = .48 to .59 and Alliteration Fluency is correlated with DIBELS Letter Naming Fluency r = .39 - .71(Table 5). All students included in the present study were able to establish an age-appropriate basal on Picture Naming Fluency. (One student in the incoming class did not. This student was not included in the present study because she also did not pass her hearing/vision screening. She was referred for a more comprehensive evaluation and was found to have significant global delays.)

Procedures

Developmental Screening

Kindergarten readiness screenings took place in late spring before kindergarten or within the first two weeks of kindergarten as students were available to the screening team. In both time periods, the students were screened in an arena style where multiple testing stations are set up in a single room and students visit each of three testing stations (speech/language, concepts, motor) in any order. A licensed Speech/Language Pathologist or licensed Speech/Language Pathologist Assistant performed the Language screening, a School Psychologist and an assistant performed the Concepts screenings, and an

Occupational Therapist and a Certified Occupational Therapy Assistant performed the Motor screenings. (Note: The DIAL-4 does not require special expertise in specific domains in order to provide an adequate screening experience. However, because the participating district uses this screening information for the purposes of determining whether to refer students' for a comprehensive psycho-educational evaluation, this district has elected to use an itinerant/specialist team to perform the screenings.)

Students were assessed in their kindergarten readiness skills using the DIAL-4 (Concepts & Motor, Social/Emotional/Adaptive) and CELF-4 Screener either before the 2011 school year started or, for those unable to participate in the earlier screening, within the first month of the beginning of school to collect baseline developmental data. Although screening of all five developmental domains are offered by the district as part of the routine kindergarten screening process, the Social/Emotional and Adaptive portions of the screening require the parents to fill out a 4-page form. These portions were not included in this study because, historically, many parents choose not to return the completed questionnaire.

Literacy Screening

All students from Kindergarten through 9th grade in the participating district participate in tri-annual literacy screening benchmarks. Although the type and quality of the benchmark screening assessments changes to meet the needs of teachers and students across grades, kindergarten students have multiple measures to screen for oral language fluency skills as well as written literacy skills with emphasis on the oral language in the first (Fall) benchmarking period, a mix of oral and reading skills in the middle (Winter) benchmarking period and transition to the full written form by the third (Spring) benchmarking period. The screeners given by benchmark period are shown in Table 9.

Table 9

Kindergarten Literacy Screening Schedule by Benchmark Period 2011-2012 School Year

Measure	Fall	Winter	Spring
Individual Growth & Developmental Indicators			
Picture Naming Fluency	X	X	
Rhyming Fluency	X	X	
Alliteration Fluency	X	X	
Aimsweb Tests of Early Literacy			
Letter Naming Fluency	X	X	X
Letter Sound Fluency		X	X
Phoneme Segmentation Fluency		X	X
Nonsense Word Fluency		X	X

Post observation literacy screenings were performed in late January, 2012 (winter benchmark period) and again in May, 2012 (spring benchmark period) consistent with the schedule in Table 9. The author performed all the IGDI assessments and the Aimsweb Tests of Early Literacy tests were performed by the school district's testing team.

Observation Instrument

The idea for an observational tool that assesses student attention during literacy is drawn from Meltzoff's work with infant social and language development. Meltzoff used a similar observation format to study oral language acquisition in infants where interviews are inappropriate or inadequate to understand the concept. Meltzoff has found: "The genuine organ of attention is the eyes." Additionally, the neurobiological literature shows that motivation contributes to or enhances visual selection and selective attention (Meltzoff, 2002; Raymond, 2009). Since kindergarteners have a difficult time communicating deeply about their own literacy motivation, an indirect measure of interest via behavioral manifestation of attention may be accomplished through observations of students while they participate in literacy-related tasks (Reynolds, 2010).

An ecobehavioral analysis tool has been drafted and piloted to observe the functional relationships or interactions between the student's behavior within context. The observation tool--Time Sampling of Behavior during Literacy Activities--considers the student's behavior, the teacher's behavior, the physical environment/activity, and that activity of others with whom the target student may interact. Behaviors under observation are functional behaviors found in the literature: Looking at teacher and/or materials during instruction; Looking at what teacher is doing or pointing toward; Looking at materials during instruction; using appropriate materials for task; speaking with teacher (topic relevant); Speaking with peers (topic relevant); Drawing teacher's attention to work; Showing work to another student (Ysseldyke & Elliott, in Reynolds & Gutkin, 1999, Nolen, 2007). An additional item of "functional transition" was added to account for appropriate transitions within the school setting where a student is following the teacher's direction in movement during a literacy activity but does not clearly fit one of the other on-task categories. For example a direction of: "Choose a library book and line up at the librarian's desk" may more appropriately be observed as a functional on-task transition than any of the other more stationary on-task items. Off-topic behaviors were recorded but were not differentiated since off-topic behaviors, other than their existence, are not salient to the present research. Frequency and nature (positive/neutral/negative) of teacher feedback was also counted.

The preliminary instrument is two pages--a full page grid with space for check marks to indicate the behavior was observed during the observation interval. There is also space within the grid to mark a numeric code which can be linked to the numbered brief observation/field notes on the second page. The first row of the grid is a space for the observer to write what type of class activity is being observed and this can be updated during any observation interval in which a transition occurs.

The instrument is designed to include a 5 second observation period after 30 second intervals for a total of 30 observations per observation session. Multiple timing scenarios were rehearsed as part of a

pilot study with a group of kindergarten students the previous school year. Following the pilot study, momentary time interval sampling of 5 seconds each 30 seconds was used because the 30-second interval has been found to be especially suitable for controlled observations as it focuses the observer's attention on the subject and is efficient in a group setting such as a classroom as multiple observations can occur during one observation setting (Sattler, 2006). The observation tool is attached as Appendix A.

Thirty intervals was thought to be powerful enough to tease apart students who may have increased attention difficulty following a brief classroom disruption (e.g. a restroom visit, getting a drink of water, a school announcement over the loudspeaker) from those who have dysfunctional maintenance of attention to tasks. Additionally, extending the observation period to beyond more than an approximate 20-30 minute observation increases the chances the observation will be interrupted by a more intrusive kindergarten transition (e.g. transition to/from recess, to/from specialists, change in instructional content or mode, etc.) since this age range tends to spend less time on a single activity in a single place than older children. Such transitions could increase the chance of measurement error.

Observations

Three 30-time period observation blocks were recorded for each kindergarten student who met eligibility criteria for the study. Each student was observed during three literacy-related activities including one session each as follows: whole class reading instruction, small group ability-differentiated reading instruction, and library activities. There was no pre-notification to principals or teachers as to which classrooms would be visited on any particular day. Teachers were not informed which student(s) were under surveillance during a particular observation period. The observations were designed to be as ecological as possible and without modification as to attributes of the school setting and were unobtrusive. The observer typically sat to the side of the classroom in order to gain the best view of the

student's eye gaze while still remaining unobtrusive. Interval time samplings were performed and recorded on the Time Sampling of Behavior during Literacy Instruction form for each observation. Interval timing was monitored with a quiet stopwatch. All observations for this study were performed by a single observer.

The coding of behavior for this research was based on the observer's perception of what the student was looking at and/or engaging with during each observation interval. Some kindergarteners were noted to look at several different things in the 5-second observation interval—especially if there was an interruption such as someone entering the room. In the case of a multi-attentional observation interval, the interval was coded as the category which seemed to represent where the students' eye gaze was predominantly directed.

Observations were not performed immediately after major disruptions (e.g. fire drills, assemblies) since such an event is likely to increase norepinephrine levels which can have a lingering effect on a student's ability to maintain attention. Observations which were interrupted by unexpected events were stopped and additional observations were performed at a later time. All observations occurred between October, 2011 and January, 2012.

Results

Specific Research Objectives

As noted in previous sections, the current research is an attempt to determine whether a new observational measure of attention and interest in kindergarten students to determine whether such observations are useful in understanding the relationship between visual attention and literacy skill acquisition. Within the context of the present study the following three questions are addressed:

1. Is there a relationship between observed behavioral measures of visual attention to literacy-related activities and improvement in early literacy skills?

2. Can students' rate of improvement in early literacy skills be predicted by an observational measure of attention during literacy-related tasks at school?

3. Do kindergarten students in three early reading skill levels, low, average, and above average, demonstrate different behavioral characteristics during literacy-related activities at school?

Descriptives

Table 10 exhibits the descriptive data for items by time period obtained in this study. Table 11 exhibits the descriptive data for the 50th percentile indicators as provided by Pearson on the AIMSweb National Norms Tables for each domain assessed across the 2011-2012 school year (downloaded from www.Aimsweb.com, 2012). For ease of visibility, net change scores from the present study as shown in Table 10 have been duplicated and rounded and situated next to the net change scores from the national sample as shown in Table 11.

Table 10 Descriptives

Item		N	Mean	SD	Range
Fall					
	Picture Naming Fluency	95	27.07	5.49	15 to 41
	Rhyming Fluency	95	11.23	5.60	0 to 25
	Alliteration Fluency	95	4.89	5.17	0 to 18
	Letter Naming Fluency	95	16.02	12.07	0 to 57
Winter					
	Picture Naming Fluency	94	28.28	5.23	10 to 42
	Rhyming Fluency	94	12.91	5.32	0 to 21
	Alliteration Fluency	94	7.95	5.78	0 to 21
	Letter Naming Fluency	95	33.96	15.88	5 to 75
	Letter Sound Fluency	95	22.59	14.45	0 to 61
	Phonemic Segmentation Fluency	95	26.34	16.13	0 to 61
	Nonsense Word Fluency	95	22.86	17.64	0 to 124
Spring					
	Letter Naming Fluency	95	50.37	20.35	8 to 99
	Letter Sound Fluency	95	37.04	15.00	3 to 90
	Phonemic Segmentation Fluency	95	52.54	16.45	0 to 80
	Nonsense Word Fluency	95	39.81	21.81	0 to 117
Observations (Percent of observations where student was on task during the observation interval)					
	Whole Group Reading	95	93.61	7.68	67 to 100
	Small Group Reading	95	95.58	6.27	67 to 100
	Library Activities	95	93.51	8.78	56 to 100
	Total (Whole Gp., Small Gp. & Library)	95	94.49	4.84	80 to 100
Change/Growth (Change is obtained by subtracting earlier measure from later measure)					
	Picture Naming Fluency (Fall to Winter)	94	1.33	4.93	-11 to 15
	Rhyming (Fall to Winter)	94	1.64	4.16	-10 to 15
	Alliteration (Fall to Winter)	94	3.04	4.97	-9 to 16
	Letter Naming Fluency (Fall to Spring)	95	34.35	17.89	-1 to 82
	Letter Sound Fluency (Winter to Spring)	95	14.45	11.41	-11 to 49
	Phonemic Seg. Fluency (Winter to Spring)	95	26.20	16.65	-23 to 72
	Nonsense Word Fluency (Winter to Spring)	95	16.95	17.30	-29 to 63

Note: One student was withdrawn from school temporarily during the early portion of the winter screening period. This student was reenrolled within the time frame to participate in the tests of early literacy.

Table 11 Aimsweb National Norms Tables—Kindergarten 50th percentile benchmark

Item	**Fall** N	Mean	**Winter** N	Mean	**Spring** N	Mean	**Net Change** National Sample	**Net Change** present study (From Table 10 --rounded)
Picture Naming Fluency	6516	22	4243	22	--	--	0	+1
Rhyming Fluency	2775	9	1722	14	--	--	+5	+2
Alliteration Fluency	2187	6	1409	12	--	--	+6	+3
Letter Naming Fluency	32,597	21	32,597	44	32,597	52	+31	+34
Letter Sound Fluency	--	--	50,586	27	50,586	39	+12	+14
Phonemic Segmentation Fluency	--	--	48,100	30	48,100	48	+18	+26
Nonsense Word Fluency	--	--	42,104	25	42,104	40	+15	+17

Particularly noteworthy, from this national sample reflected in Table 11, under the Letter Naming Fluency item, 50% of the students made a net growth over the school year of 31 words per minute on Letter Naming Fluency. This is the only measure which extends across all time periods. Within the sample in this study, the mean change as shown in Table 10 over the same time period is greater than 34 words per minute which indicates that this sample of students made similar or slightly better growth when compared to the national sample. Although the students from the present study started out below the national average in Letter Naming Fluency with an average score of 16 (national average was 21), by the end of kindergarten the students had made up the deficit and had surpassed the 50th percentile with a net change of +34 letters per minute compared to the average of +31 words per minute.

Overall, the sample of students in the present study scored similarly to students in the national sample across individual literacy domains.

Exploratory Factor Analysis

Because several different screening tests were used over the nine-month time frame it was useful to determine whether pre and post observation screening scales could be established. This was performed through exploratory factor analyses.

Data reduction for each benchmark assessment period consisted of Principle Components Analysis with Kaiser normalization through Statistical Program for the Social Sciences (SPSS) version 19. Factors were extracted with an eigenvalue greater than one. The criteria for scale development was based on at least two items, each having a coefficient absolute value greater than .3 with an alpha level for the scale greater than 0.70. Three separate factor analyses were conducted—one for each benchmark period Fall, Winter, and Spring with all benchmark assessment results from Table 8 (Kindergarten Literacy Screening Schedule by Benchmark Period 2011-2012 School Year) entered as individual items into the analyses. Because only one factor was identified for each factor analysis, the solutions were not rotated in the analyses.

The first factor analysis included all kindergarten fall literacy screening tests as items. The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis, KMO = .50 and Bartlett's test of sphericity $X^2(1) = 36.80$, $p < .000$ indicated that correlations between items were large enough for PCA. One factor was extracted (Scale 1--Fall) with two items "Alliteration--Fall" and "Rhyming--Fall" (alpha = .76, percent of variance = 78.65%). The two items were correlated $r = .573$.

The second factor analysis included all winter literacy screening tests. The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis, KMO = .778 and Bartlett's test of sphericity $X^2(15) = 253.13$, $p < .000$. indicated that correlations between items were large enough for PCA. One factor was extracted (Scale 2--Winter) with six items "Alliteration--Winter," "Rhyming--Winter," "Letter

Naming Fluency--Winter," "Letter Sound Fluency—Winter," "Phoneme Segmentation Fluency—Winter," "Nonsense Word Fluency—Winter" (alpha = .81, percent of variance = 55.37%). Correlations of the items are shown in Table 12 below.

Table 12

Scale 2—Winter Inter-Item Correlation Matrix

		Alliteration	Rhyming	LNF	LSF	PSF	NWF
Alliteration	Pearson Correlation	1	.359**	.561**	.606**	.343**	.424**
	Sig. (2-tailed)		.000	.000	.000	.001	.000
	N	94	94	94	94	94	94
Rhyming	Pearson Correlation	.359**	1	.227*	.250*	.302**	.217*
	Sig. (2-tailed)	.000		.028	.015	.003	.036
	N	94	94	94	94	94	94
LNF	Pearson Correlation	.561**	.227*	1	.758**	.343**	.540**
	Sig. (2-tailed)	.000	.028		.000	.001	.000
	N	94	94	95	95	95	95
LSF	Pearson Correlation	.606**	.250*	.758**	1	.499**	.779**
	Sig. (2-tailed)	.000	.015	.000		.000	.000
	N	94	94	95	95	95	95
PSF	Pearson Correlation	.343**	.302**	.343**	.499**	1	.472**
	Sig. (2-tailed)	.001	.003	.001	.000		.000
	N	94	94	95	95	95	95
NWF	Pearson Correlation	.424**	.217*	.540**	.779**	.472**	1
	Sig. (2-tailed)	.000	.036	.000	.000	.000	
	N	94	94	95	95	95	95

** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

The third factor analysis included all the items administered in the spring. The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis, KMO = .784 and Bartlett's test of sphericity $X^2(6) = 200.80$, $p < .000$ indicated that correlations between items were large enough for PCA. One factor was extracted (Scale 3--Spring) with four items "Letter Naming Fluency—Spring," "Letter Sound Fluency—Spring," "Phoneme Segmentation Fluency—Spring," and "Nonsense Word Fluency—Spring" (alpha .86, percent of variance = 71.55%). Correlations are shown on Table 13.

Table 13

Scale 3—Spring Inter-Item Correlation Matrix

		LNF	LSF	PSF	NWF
LNF	Pearson Correlation	1	.809**	.480**	.701**
	Sig. (2-tailed)		.000	.000	.000
	N	95	95	95	95
LSF	Pearson Correlation	.809**	1	.502**	.666**
	Sig. (2-tailed)	.000		.000	.000
	N	95	95	95	95
PSF	Pearson Correlation	.480**	.502**	1	.532**
	Sig. (2-tailed)	.000	.000		.000
	N	95	95	95	95
NWF	Pearson Correlation	.701**	.666**	.532**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	95	95	95	95

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

Following the initial factor analyses, correlations were calculated to answer the first research objective: to determine whether there is a relationship between observed behavioral measured of visual attention to literacy activities and improvement in early literacy skills. The correlation matrix is shown as Table 14.

Table 14

Correlation Matrix between literacy scales and percent of time on task during observations.

Correlations

		1	2	3	4	5	6	7
1. Library Activities (% of episodes on task)	Pearson Correlation	1						
	Sig. (2-tailed)							
	N	95						
2. Whole Group (% of episodes on task)	Pearson Correlation	.094	1					
	Sig. (2-tailed)	.366						
	N	95	95					
3. Small Group (% of episodes on task)	Pearson Correlation	.102	.306**	1				
	Sig. (2-tailed)	.324	.003					
	N	95	95	95				
4. Total (% of episodes on task)	Pearson Correlation	.664**	.603**	.593**	1			
	Sig. (2-tailed)	.000	.000	.000				
	N	95	95	95	95			
5. Scale 1--Fall	Pearson Correlation	**.060**	**.087**	**.012**	**.057**	1		
	Sig. (2-tailed)	**.564**	**.402**	**.909**	**.584**			
	N	**95**	**95**	**95**	**95**	95		
6. Scale 2--Winter	Pearson Correlation	**-.069**	**-.009**	**.098**	**.010**	.741**	1	
	Sig. (2-tailed)	**.509**	**.930**	**.346**	**.923**	.000		
	N	**94**	**94**	**94**	**94**	94	94	
7. Scale 3--Spring	Pearson Correlation	**-.177**	**-.032**	**.030**	**-.061**	.555**	.788**	1
	Sig. (2-tailed)	**.086**	**.760**	**.772**	**.557**	.000	.000	
	N	**95**	**95**	**95**	**95**	95	94	95

**. Correlation is significant at the 0.01 level (2-tailed).

Relationships of interest are highlighted in bold. Of note, literacy factors, although made up of somewhat different measures each time, were moderately to strongly correlated over time, suggesting the factors were measuring similar features. As Table 14 shows, there are no statistically significant correlations between Scale 1 (fall), Scale 2 (winter), and Scale 3 (spring) literacy-related scales and the observed measures of attention.

Regressions

In order to answer the second research objective, a series of regressions were performed. Because analysis of the observation data revealed non-normality of the data with a skew to the left, the raw data (percent on task) were standardized then transformed into categorical predictors and dummy variables with dummy coding to analyze the data. Dummy variables represented the students with the

lowest time on task (below 25th percentile; $z < -.66$), medium time on task (25th to 75th percentile; $z = -.66$ to .66) and highest time on task (above 74th percentile; $z > .66$) and were created for each type of observation. The medium time on task group was used as the baseline in the analysis. All three variables for each observation were then entered as independent variables and multiple regressions were performed using the improvement/change of the literacy items as the dependent variables. A total of 16 analyses were performed as shown in Table 15.

Table 15

Regressions: observations as predictor variables, literacy improvement as criterion variables

	LNF Δ Fall to Spring	PSF Δ Winter to Spring	PSF Δ Winter to Spring	NWF Δ Winter to Spring
Whole Group Reading On Task	ns	ns	ns	ns
Small Group Reading On Task	ns	ns	ns	ns
Library Activities On Task	**	ns	ns	ns
Total On Task	ns	ns	ns	ns

**Statistically significant

Library Activities On Task behavior predicted the change in Letter Naming Fluency from Fall to Spring. Constant $B = 28.67$, 95% CI 21.7 to 35.6; $p = .000$. Medium vs. High Attention $B = .07$; 95% CI -6.33 to 11.54; $p = .564$, and Medium versus Low Attention $B = .35$ 95% CI 3.95 to 22.13; $p = .005$. $R^2 = .099$, F (2, 92) = 5.037, $p = .008$. However correlation analysis showed this was a negative relationship, $r = -.34$, $p = .00$.

As noted previously, other than for a single analysis, the present research found that students' rate of improvement in early literacy skills is not adequately predicted by the observational measure of attention developed for this research during literacy tasks.

The third research objective was analyzed through serial regression analyses. Students were recoded as to their early literacy skills upon kindergarten entry from Scale 1—Fall which, as noted above, included two items, Alliteration Fluency and Rhyming Fluency. Students were assigned into one of three groups based on their standardized score on Scale 1—Fall. The low skills group were the students in the lowest 25th percentile, n = 25; the medium skills group were those students that fell between the 25th to 75th percentile, n = 46; and the high skills group were those students at the 75th percentile and above, n = 24. Regressions were again performed using the dummy coded observation data as the predictor and change/improvement in the four literacy scores (Letter Naming Fluency, Letter Sound Fluency, Phonemic Segmentation Fluency, and Nonsense Word Fluency) as criterion variables. Table 16 shows the analyses and items of significance.

Table 16

Regressions with observations as predictor and change in literacy scores as criterion segregated by early literacy skills upon kindergarten entry (Scale 1—Fall).

	Lowest Skills $z < -.66$				Average Skills $z = -.66$ to $.66$				Highest Skills $z > .66$			
	LNF	LSF	PSF	NWF	LNF	LSF	PSF	NWF	LNF	LSF	PSF	NWF
Whole Group Reading	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Small Group Reading	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	**
Library Activities	ns	ns	ns	ns	**	ns	ns	ns	ns	ns	ns	ns
Total On Task	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
N	25	25	25	25	46	46	46	46	24	24	24	24

LNF = Letter Naming Fluency; LSF = Letter Sound Fluency; PSF = Phonemic Segmentation Fluency; NWF = Nonsense Word Fluency. ** indicates a statistically significant relationship was found and is described below. Non significance is indicated by ns.

Two cells in Table 16 above showed a significant relationship. Among students with relatively Average literacy skills, a significant relationship was noted with observations perceived as on-task in the library being predictive of a student's improvement in Letter Naming Fluency. Constant $B = 27.38$, 95% CI 13.97 to 40.77; $p = .000$. Medium time on task vs. highest time on task $B = 6.213$; 95% CI -10.03 to 22.46; $p = .445$, and medium time on task versus low time on task $B = 18.05$; 95% CI 2.31 to 33.80; $p = .026$. $R^2 = .136$, F (2, 43) = 3.39, $p = .043$. However correlation analysis showed this was a negative relationship, $r = -.381$, p = .009.

In the higher skills group, a significant relationship was noted between the observations in the small reading group and improvement in Nonsense Word Fluency. Constant $B = 20.58$, 95% CI 10.83 to 30.33; $p = .000$. Medium time on task vs. highest time on task $B = -10.28$; 95% CI -24.75 to 4.18; $p = .154$, and medium time on task versus lowest time on task $B = 28.417$; 95% CI 2.62 to 54.21; $p = .032$. R^2

= .318, F (2, 21) = 4.899, p = .018. However this correlation analysis again revealed a negative relationship, r = -.619, p = .001.

In response to the third research objective, in general, students in various early literacy ability groups do not demonstrate different behavioral characteristics during literacy-related activities with two exceptions. Within the Average literacy skills group, their off task behaviors are predictive of their improvement in Letter Naming fluency and in the Above Average literacy skills group, their off task behaviors are predictive of improvement in Nonsense Word fluency.

Additional analyses

In addition to the analyses described above, three regression analyses were performed between the three literacy scales derived from factor analyses as described above, to determine if 1) Scale 1--Fall predicts Scale 2--Winter; 2) if Scale 1--Fall predicts Scale 3--Spring; and, 3) if Scale 2--Winter predicts Scale 3--Spring. Correlations between the scales have been previously provided on Table 14.

The Fall Early Literacy Scale is composed of Alliteration and Rhyming and these assessments were performed soon after kindergarten entry in the fall. The Winter Early Literacy Scale is composed of six measures; Alliteration, Rhyming, Letter Naming Fluency, Letter Sound Fluency, Phonemic Segmentation Fluency and Nonsense Word Fluency and these scores were obtained in January. The Spring Early Literacy Scale is composed of four measures: Letter Naming Fluency, Letter Sound Fluency, Phonemic Segmentation Fluency and Nonsense Word Fluency. These scores were obtained at the end of May and after students had completed through Unit 13 *Read Well* curriculum per the pacing schedule. (Subsequent chapters in the kindergarten *Read Well* program are review of previously learned material.)

In the first analysis, Scale 1--Fall was entered as the predictor variable with Scale—2 Winter as the criterion. In this analysis, R^2 = .55, F (1, 92) = 112.27, p = .000; (β = .74, p = .000)

In the second analysis, Scale 1--Fall was again entered as the predictor variable with Scale 3--Spring as the criterion. In this analysis $R^2 = .31$, F (1, 93) = 41.35, $p = .000$; ($\beta = .79$, $p = .000$).

In the third analysis, Scale 2—Winter was entered as the predictor variable Scale 3—Spring as the criterion. In this analysis $R^2 = .62$, F (1, 93) = 151.07, $p = .000$; ($\beta = .56$, $p = 000$).

The relationships that emerged from analyzing all students together in this study are shown in Figure 2.

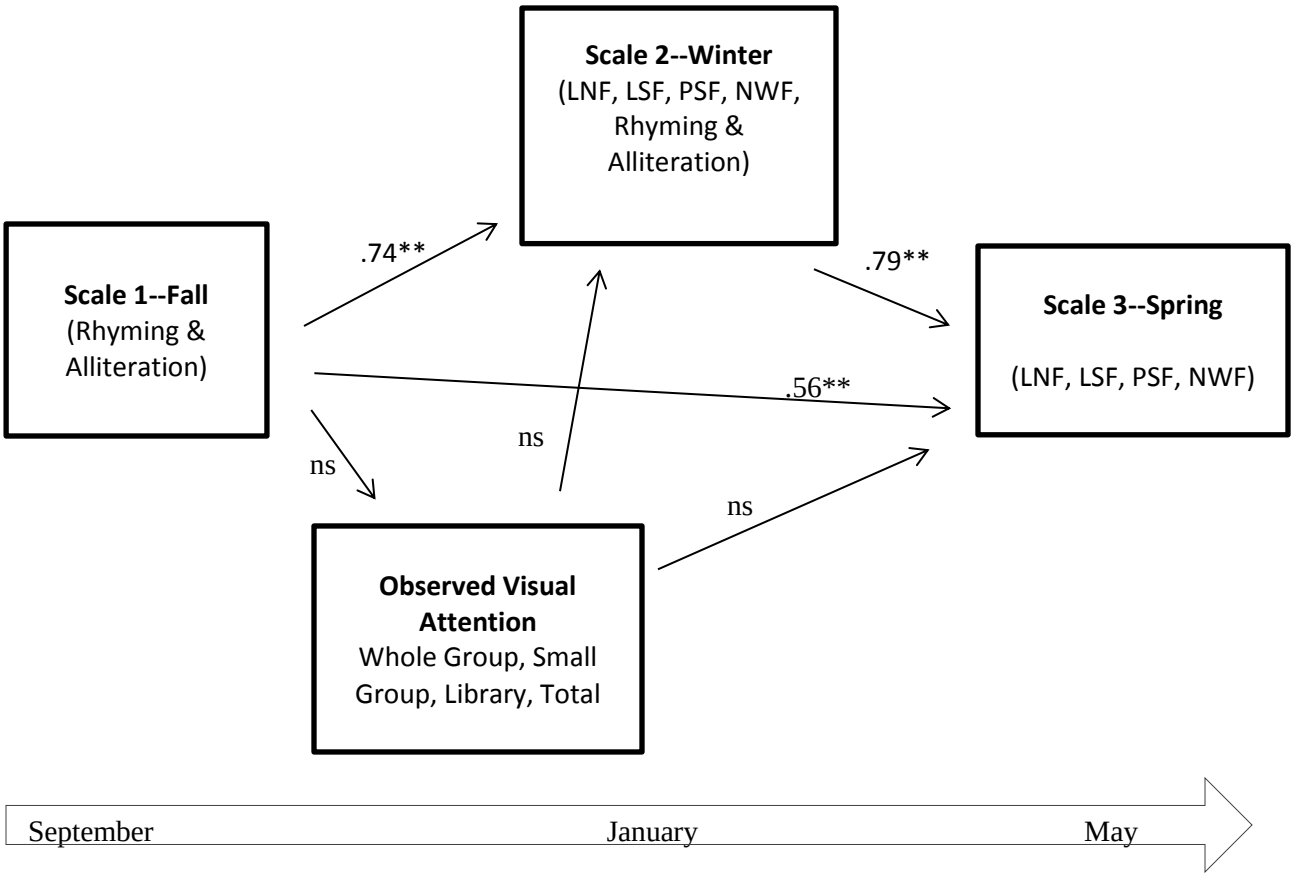

Figure 2. Associations among literacy measures and observations (standardized path coefficients β). ** $p \leq .001$.

Discussion

A prominent concern for classroom teachers occurs when they believe their students aren't attending to them, their instruction, or the instructional materials. Lack of visual attention in the classroom may result in referral to special education programs encouraging parents to have their child evaluated for potential attention-related disorder such as attention deficit hyperactivity disorder (ADHD) due to the concern that lack of attention in the classroom causes poor learning outcomes, or reduced potential for learning. Review of literature related to attention and learning support the hypothesis, however the present research did not find support for the hypothesis in the domains of attention to literacy activities in a kindergarten population. Discussion regarding some strengths and potential limitations of the present study as well as speculation as to the findings are presented below.

Curriculum/Instruction

When students as a whole make poor gains, it's natural to look to the curriculum and instruction for reasons. The curriculum used by the district is the *ReadWell* curriculum by Cambium and a review by the Florida Center for Reading Research shows the *ReadWell* curriculum to be a good match for the district's population. All teachers followed the *ReadWell* pacing schedule developed by the school district's reading consultant to ensure the curriculum and materials were covered over the kindergarten school year. The final data for the present study was collected after students had been exposed to all primary units of the curriculum and were engaged in the review materials at the end of the year.

The direct instruction environment required for *ReadWell* presentation may pose challenges for observations because student behavior may be considered more controlled through effective pacing and student monitoring. If that were the case, we would expect to see attention differences in the library observation setting. However, there was no significant difference in attention between the unstructured

library setting and the structured direct-instruction classroom setting which suggests the present findings were not influenced by curriculum or instruction.

Student Factors

Several factors related to the students themselves should be considered including their skills, interest/motivation and development. First, students come to kindergarten with a wide variety of literacy and academic experiences; from little knowledge to knowing some letters, sounds, and some students are already reading words. It is conceivable that some students may not show gains over the kindergarten year because they started kindergarten with strong literacy content knowledge and skills. However, in this population overall, they were noted to come in with relatively poor skills—lower than the 50th percentile compared to a national sample. None of the students came in with literacy skills which showed the growth potential in the kindergarten curriculum didn't exist (e.g. were already at the end of kindergarten skill level). The initial early literacy screening on the IGDI showed overall, Picture Naming fluency was adequate (a pre-literacy basal); rhyming and alliteration skills were poor and nearly 20% failed the oral language screening assessment which has been found in the past to predict literacy growth over the kindergarten year. In addition, for those students that knew some of the curriculum content (e.g. alphabet) and the instruction was reteaching what they already knew, the high quality/colorful and multi-mode instruction that is integral to the *ReadWell* curriculum with its songs, chants, turn-taking, whole-body involvement, colorful cue cards, etc., seemed to have been entertaining enough during observations to hold even a highly capable student's visual attention. Therefore, poor potential for growth in the curriculum and an unstimulating curriculum may be ruled out as major limiting factors in the present study.

A third consideration is whether attention based on observed foveal direction is the best measure of interest and attention in kindergarten-age students. As mentioned in the introduction section of this paper, foveal attention has been thoroughly researched and is a highly regarded and sensitive measure of attention and interest in younger children as young as approximately an hour after birth and beyond. School psychologists, school counselors, administrators and others who engage in classroom observations, measure a student's engagement with instruction by observing what the student is observing. Evidence by Ruffman, Garnham, Import & Connolly (2001) suggests that in an implicit knowledge of false belief task, that 3 to 5 year-olds first glanced at a correct answer before providing an explicit answer which may not be correct and the children themselves were not aware of the knowledge conveyed through their eyes. This further supports the use of observed eye gaze as a possible measure of a child's internal state while also suggests significant care and caution is needed in interpreting the results.

The sample size as a whole was adequate to answer the original research questions, however, additional analyses by subgroups was limited by lack of statistical power. This should be considered in follow-up studies. The present study is also limited by the lack of inter-rater reliabilities in the observation protocol and the observer's interpretation of the student's gaze. Although this was usually straightforward and the process was refined through pilot testing the observational tool, it's not impossible to rule out some measurement error. However, due to the observer's history of performing thousands of classroom and school-based observations over the last decade, such error is likely to be minimal. Suggested next steps for future research could include an inter-rater reliability study for the observation form to verify the present findings. Additionally, as the eye-gaze research matures, with improved technology for unobtrusive data collection, it may be more telling to measure eye gaze (including gaze patterns) more precisely through use of emerging technologies.

Implications

Classroom observation is considered an integral part of an evaluation when a student has been referred for an evaluation due to a learning difficulty. It is required by WA state law in any evaluation where a student is found to have a Specific Learning Disability in any core subject area. However, law does not define what the evaluation teams should consider in such an observation. Nor does it specify the duration or content.

Observations can be problematic in that they are snapshots subject to interpretation by the observer, through the observer's filters, and is not a direct assessment of totality of engagement or attention such as might include auditory attention, internal processing of complex thoughts or language, etc. Some students may visually disengage while processing complex material because the visual input is distracting to their memory encoding and deep processing. This doesn't mean the student is not paying attention to the subject at hand—although it may appear that way to an observer. Correction by a teacher for "not paying attention" when the student is actually deeply engaged with the material may result in a transition from deep to superficial processing over time and/or decreased performance motivation in the classroom.

A practice for consideration, as suggested by the present study, may be to rely more on periodic standardized testing and screening data points in the form of topical screeners (e.g. language, pre-literacy, oral language in younger students) and brief interval formative assessments as a measure of actual learning while minimizing judgments about a student's attention, interest or even respect for the teacher in those students who may appear disengaged. In those students with poor skills coupled with poor attention, a deeper investigation may be warranted into such possibilities as perceptual difficulties (seeing/hearing); language difficulty or difference; or a health/medical concern.

The federal Race to the Top education improvement initiative (Obama, B., 2009), and the WA State implementation of that initiative (Washington State Legislature, 2010) mandates school districts to select a framework model for instructional reform out of a set of three possible options. By school year 2013-2014, teachers will be evaluated on their districts' chosen model. All three models include an evaluation domain of student engagement. Although it's presently up to districts to determine how to design and implement the teacher evaluation, the present study suggests that care should be taken if attempting to interpret student engagement through observations of students' visual attention in the classroom.

References

Arias-Carrion, O. Poppel, E, (2007). Dopamine, learning, and reward-seeking behavior. ACTA Neurobiologiae Experimentalis 67: 481-488.

Center for Disease Control (2012). Downloaded from: http://www.cdc.gov/nchs/fastats/adhd.htm 10/13/12.

Connell, J.P., & Wellborn, J.G. (1990). Competence, Autonomy and Relatedness: A motivational analysis of self-system processes. Minnesota Symposia on Child Psychology.

Dynamic Measurement Group. (2008). DIBELS Research References. Retrieved 10/26/09 from www.dibels.org.

Dynamic Measurement Group. (2009). General Questions about DIBELS. Retrieved 10/26/09 from www.dibels.org/faqs.html.

Fan, J., McCandliss, B. D., Sommer, T., Raz, A., & Posner, M.E., (2002). Testing the efficiency and independence of attentional networks. Journal of Cognitive Neuroscience, 14:3, 340-347.

Florida Center for Reading Research Read Well. (2007). Tallahassee, Florida: Florida Center for Reading Research. Retrieved from http://www.fcrr.org/fcrrreports/PDF/read_well/report.pdf.

Fogel, A. (2009). What is a transaction? In Sameroff, A (Ed.), The Transactional Model of Development: How Child and Contexts Shape Each Other. (pp. 271-280) American Psychological Assn., Washington D.C.

Gopnik, A. & Meltzoff, A. N. (1986). Relations between semantic and cognitive development in the won-word stage: The specificity hypothesis. Child Development, v. 57.

Hong, G., & Raudenbush, S. W. (2005). Effects of Kindergarten Retention Policy on Children's Cognitive Growth in Reading and Mathematics. Educational Evaluation and Policy Analysis, 27, 205-224. doi:10.3102/01623737027003205

Jimerson, S. R. (2001). Meta-analysis of Grade Retention Research: Implications for Practice in the 21st Century. School Psychology Review, 30, 420-437.

Mardell-Czudnowski, C., Goldenberg, D. S., (1998). Development Indicators for the Assessment of Learning, (3rd Ed.) Circle Pines, Minnesota: American Guidance Service, Inc.

Mardell, C., Goldenberg, D.S., (2011). Development Indicators for the Assessment of Learning, (4th Ed.) Bloomington, MN: NCS Pearson, Inc.

McCombs, B.L. (1997). Commentary: Reflections on motivations for reading—through the looking glass of theory, practice, and reader experiences. Educational Psychologist, 32:2.

Meltzoff, A. N. (2002).Imitation as a Mechanism of Social Cognition: Origins of Empathy, Theory of Mind and the Representation of Action. In Goswami, U. (Ed) Blackwell Handbook of Childhood Cognitive Development. (pp. 6-25) Blackwell Publishers.

Meltzoff, A. N. (2005). Imitation and other minds: The Like Me Hypothesis. In Hurley S. & Chater, N. (Eds.) Perspectives on Imitation: From Neuroscience to Social Science, Vol 2, pp 55-77. Cambridge, MA: MIT Press.

Missall, K. N. & McConnell, S. R. (2004). Technical Report: Psychometric Characteristics of Individual Growth & Development Indicators: Picture Naming, Rhyming, and Alliteration. University of Minnesota. Downloaded 5/22/11 from http://igdis.umn.edu/about-igdis/what-are-igdis/.

National Reading Panel (2000). Teaching Children to Read: An Evidence-Based Assessment of the Scientific Research Literature. Retrieved October 25, 2009. http://www.nichd.nih.gov/publications/nrp/upload/smallbook_pdf.pdf.

Nicholls, J. G., (1989). The competitive ethos and democratic education. Cambridge, MA: Harvard University Press.

Nolen, S. B. (2001). Constructing literacy in the kindergarten: Task structure, collaboration and motivation. Cognition and Instruction. Vol. 19. No.1.

Nolen, S. B. (2007). Young children's motivation to read and write: Development in social contexts. Cognition and Instruction. V. 25, No. 2.

Nolen, S. B. & Ward, C. J. (2008). Sociocultural and situative approaches to studying motivation. In Maehr, M.L., Karabenick, S.A. & Urdan, T. C. (Eds.) Advances in Motivation and Achievement, Volume 15. (pp. 425-460) Emerald Group Publishing Ltd.

Obama, B. (2009). Fact Sheet: The Race to the Top. Retrieved 7/18/2012 from: http://www.whitehouse.gov/the-press-office/fact-sheet-race-top.

Office of the Superintendent of Public Instruction, State of Washington (2007). Rules for the Provision of Special Education to Special Education Students, Chapter 392-172A WAC. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=392-172A

Pearson Assessments (2011). Developmental Indicators for the Assessment of Learning, Fourth Edition (DIAL-4); located at http://www.pearsonassessments.com/HAIWEB/Cultures/en-us/Productdetail.htm?Pid=14753&Mode=summary; downloaded 11/19/2011.

Pearson (2012). Aimsweb Technical Manual. Pearson Inc., Bloomington, MN. Downloaded 7/10/12 from: http://aimsweb.com/index.php?page=resources/research/.

Pearson/PsychCorp. Test of Early Literacy—CBM. Retrieved May 22, 2011. http://www.aimsweb.com/measures-2/test-of-early-literacy-cbm/.

Posner, M.I. & Fan, J. (2004). Attention as an Organ System. James R. Pomerantz and Michael C. Crair, Eds. Topics in Integrative Neuroscience: From Cells to Cognition. Cambridge UK: Cambridge University Press.

Posner, M.I. (2008). Evolution and Development of Self Regulation. American Museum of Natural History. New York.

Posner, M.I. & Rothbart, M.K. (2009). Toward a physical basis of attention and self regulation. Phys Life Rev. June 1;6(2): 103-120.

Raymond, J., (2009). Interactions of attention, emotion and motivation. Progress in Brain Research, Vol. 176.

Renninger, K.Ann (2009). Interest and identity development in instruction: An inductive model. Educational Psychologist, 44:2.

Reynolds, C.R., Vannest, K.J., Harrison, J.R. (2012). The Energetic Brain. John Wiley & Sons, Inc. San Francisco.

Reynolds, C. (2010). Personal correspondence.

Rothbart, M.K. & Posner, M.I. (2005). Genes and experience in the development of executive attention and effortful control. New Directions for child and Adolescent Development. No. 109.

Ruffman, T, Garnham, W, Import, A., Connolly, D. (2001). Does eye gaze indicate implicit knowledge of false belief? Charting transitions in knowledge. Journal of Experimental Child Psychology 80, 201-224.

Sattler, J.M. & Hoge, R. D. (2006). Assessment of Children: Behavioral, Social and Clinical Foundations, Fifth Edition. Jerome M. Sattler Publisher, Inc., San Diego.

Semel, E., Wiig, E. ,H., Secord, W. A. (2004). Clinical Evaluation of Language Fundamentals Fourth Edition, Screening Test Examiner's Manual. Harcourt Assessment, Inc. San Antonio, TX.

Siegler, R. S., (2005). Children's Learning. American Psychologist.

Stipek, D., Newton, S., Chudgar, A (2010). Learning-related behaviors and literacy achievement in elementary school-aged children. Early Childhood Research Quarterly. Vol 25.

Storch, S. A, Whitehurst, G. J. (2002). Oral language and code-related precursors to reading: Evidence of a longitudinal structural model. Developmental Psychology. Vol 38, No. 6.

Sulzby, E. (1985). Children's emergent reading of favorite storybooks: A developmental study. Reading Research Quarterly, Vol. 20, N. 4.

Thorkildsen, T. A. & Nicholls, J. G. (2002). Motivation and the Struggle to Learn: Responding to Fractured Experience. Allyn and Bacon, Boston.

Tripp, G., Wickens, J.R. (2008). Research Review: Dopamine transfer deficit: a neurobiological theory of altered reinforcement mechanisms in ADHD. The Journal of Child Psychology and Psychiatry. 49:7, pp 691-704.

Turner, J.S., Patrick. H. (2010). How does motivation develop and why does it change? Reframing motivation research. Educational Psychologist, 43:3, 119-131.

Washington Administrative Code (2009). *Chapter 392-172A WAC.* Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=392-172A

Washington State Legislature (2010). E2SSB 6696. Downloaded from: http://tpep-wa.org/about-tpep/legislation/6696-2/. Downloaded 7/19/2012.

Wenzel, K. R. (1999). Social-Motivational processes and interpersonal relationships: Implications for understanding motivation at school. Journal of Educational Psychology. Vol. 91, No. 1.

Wigfield, A. (1997). Reading motivation: A domain-specific approach to motivation. Educational Psychologist, 32:2.

Ysseldyke, J., Elliott, J. (1999). Effective Instructional Practices: Implications for Assessing Educational Environments. In Reynolds, C.R. & Gutkin, T. B. (Eds.) The Handbook of School Psychology, 3rd Ed. (pp. 497-518).

Appendix

Student:_____Date:_____Time:_____Teacher:_____Location/Task:_____ Page 1

Time Sampling of Behavior during Literacy Activities: Directions: At the end of each 30-second interval, observe the child's behavior for 5 seconds and place check marks in the time columns next to the category of behavior observed during the 5 second observation period and whether teacher feedback was primarily positive (encouragement, thumbs up, etc.), corrective (direction to stop a behavior or pay attention) or unclear indicating there was interaction with the teacher but intent was unclear. If teacher feedback toward the student was not observed, leave blank. Descriptive details may be added by matching numerical coding to the notes page.

Functional Behaviors	30	1	30	2	30	3	30	4	30	5	30	6	30	7	30	8	30	9	30	10	30	11	30	12	30	13	30	14	30	15	Sum
Class Activity																															
Functional Transition																															
Looking at teacher and/or materials during instruction																															
Looking at what teacher is doing or pointing toward																															
Looking at materials during instruction																															
Using appropriate materials for task																															
Speaking with teacher (topic relevant)																															
Speaking with peers (topic relevant)																															
Drawing teacher's attention to work																															
Showing work to another student																															
Off Task: Physically interacting with or looking at object or person																															
Teacher Feedback, if any (+/-/neut.)																															

#	Observations Notes
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

Curriculum Vitae

Kelly Ann Coughlan

Education

Ph.D.	University of Washington, 2012: Educational Psychology, Human Development & Cognition
M.Ed.	University of Washington, 2001: Educational Psychology, Human Development & Cognition
B.S.	Pacific Lutheran University, 1997: Psychology

Honors

Pacific Lutheran University Psychology Faculty Research Award (05/1997). Awarded for research: Achievement Motivation in Adolescents

Jane Russell Grassroots Leadership 2-year Fellowship, Class I 2004 – 2006. Funded fellowship to support grassroots leaders and their work in Pierce County, WA.

Research

Toward the Development of an Observation Measure of Interest and Attention for Literacy Tasks in Kindergarten Students (12/2012). University of Washington, Dissertation.

Correlations between Developmental Kindergarten Screenings and Early Reading Indicators One Year Later (02/2010). University of Washington Research and Inquiry presentation, also presented at AERA, Vancouver, BC; April, 2012.

Discussions with Homeschooling Parents and Students (2003).
University of Washington: A qualitative research study examining the achievement motivation goals of a matched parent/student pair.

Educational Advocacy for Court Appointed Special Advocates/Guardians ad Litem (2002) Commissioned by a large state-wide nonprofit organization. This was an 18-month study of to assess needs related to advocating educationally for a dependent child in court. Project also involved training others and curriculum development from the research findings.

Danforth Leadership/Principal Program Cohort Survey (2001). Department of Educational Leadership and Policy Studies; University of Washington (Class project).

Decomposing Task and Ego Orientation: A Cross-sectional Study of Motivation to Read in Early Adolescents (04/2001). Nolen, S. B., Coughlan-Mainard, K., Juelis, J., & Whitney, S.D. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.

Why Go to School? Why do Homework: Motivational correlates in Adolescents. (2002). Poster presented at the annual meeting of the American Educational Research Association, New Orleans, LA.

Truancy Study (2002). Tacoma School District—commissioned study. Involved reviewing police and school records and interviewing 30 chronically truant students and 30 parents of chronically truant students to inform interventions.

Achievement Motivation in Adolescents (1998). Poster presentation at Western Psychological Association meeting in Albuquerque, NM.

Presentations & Trainings

Specially Designed Instruction, Related Service & Supplementary Aids & Services: What's the Difference? (02/2012). Orting School District. Commissioned Presentation/Professional Development for all Special Education teachers and itinerant staff members,

Using the AIMSweb Data System to Understand Your Students' Formative Assessment Data (10/2010). Eatonville School District: Multiple sites.

RTI & Special Education Eligibility: Putting the Pieces Together (03/2009).
Eatonville School District.

Brief Introduction to the Child Study Team and Special Education Process (10/2008).
Eatonville School District.

Boundless Diversity (10/2006).
The Russell Family Foundation. Presentation to Class II Jane's Fellows and TRFF Staff—personality strengths and weaknesses— diversity in personal strengths in grassroots leadership.

Understanding IEPs (05/2006).
Parents of Autistic and other disabled Children in Eatonville (PACE), Eatonville, WA.

Emotionally/Behaviorally Disabled Students & Special Education (05/2006).
Eatonville School District. Considerations in educating students with suspected emotional or behavioral disability.

Educational Advocacy for the Court Appointed Special Advocate/Guard ad Litem (08/2004).
Pierce County Juvenile Court. 2-hour training using original material for CASA/GAL's.

Special Education: The Process of the Service (02/2004). Eatonville School District. Explained eligibility law and process for high-incidence disabilities.

Educational Advocacy for the Court Appointed Special Advocate/Guard ad Litem (08/2002). Pierce County Juvenile Court. 6-hour training using original material for CASA/GAL's.

Education Advocacy for Foster Children: Information for the Court Appointed Special Advocate/Guardian ad Litem (10/2002). Washington State CASA. CASA Conference, Yakima, WA.

Methamphetamine Labs in the Neighborhoods: Report from the Front Line (05/2002). Pierce County Methamphetamine Summit, Tacoma Sheraton Convention Center.

Safety in the Rural Neighborhoods of Pierce County—Mounting Concern (05/2002). Pierce County Council Safety Committee, Tacoma, WA.

Education Advocacy for Foster Children: Information for the Court Appointed Special Advocate/Guardian ad Litem (10/2001). Washington CASA Conference, Yakima, WA.

Why Go to School? Why do Homework: Motivational Correlates in Adolescents (04/2001). University of Washington. Poster Presentation, AERA, New Orleans, LA.

Achievement Motivation in Adolescents (04/1998). Pacific Lutheran University. Poster Presentation, Western Psychological Association, Albuquerque, NM.

Teaching Experience

Teacher/Facilitator (Summer, 2006): Eatonville School District. Taught summer enrichment for a cohort of nine, 70% special education/mixed (dis)ability, mixed age students.

Co-Instructor (1989 – 1991): Clover Park Technical College & City University: Options for Parent Teachers. Homeschooling qualifying course for parents who are considering homeschooling their children.

Homeschooled 1985 – 2008.

Related Experience

Researcher/Consultant (June – September, 2006). The Russell Family Foundation. Research and consulting regarding Jane's Grassroots Leadership Fellowship Program.

Work Group Member (09/2001 to 02/2002). OSPI/DSHS/WA CASA: Foster Children in the Educational System in Washington.

Research Assistant (01/2002 to 06/2002). University of Washington, Literacy Project, Deborah McCutcheon, PI.

Additional Relevant Training

Cognitive Behavioral Interventions/Risk Assessment for Psychoses (05/25/2012). Washington State School Psychologists Association Spring Lecture Series. Presenter: Sam Song, PhD., Seattle University.

Cognitive Behavioral Interventions for Executive Functioning ADHD/Autism (04/27/2012). Washington State School Psychologists Association Spring Lecture Series. Presenter: Sam Song, PhD., Seattle University.

Cognitive Behavioral Interventions for Depressive Moods (03/16/2012). Washington State School Psychologists Association Spring Lecture Series. Presenter: Sam Song, PhD., Seattle University.

Cognitive Behavioral Interventions for Anxiety (02/17/2012). Washington State School Psychologists Association Spring Lecture Series. Presenter: Sam Song, PhD., Seattle University.

Introduction to Cognitive Behavioral Interventions and Anger/Aggression (01/27/2012). Washington State School Psychologists Association Spring Lecture Series. Presenter: Sam Song, PhD., Seattle University.

Using Data to Develop District/School Improvement Plans (08/29/2011). Eatonville School District.

School-Police Partnership: A Legal Roadmap for Solutions (08/24/2011). Presenter: John L. More, J.D., Response Law, Inc. The Rights of School and Police Personnel: Managing Your School Environment.

National Incident Management System (NIMS) an Introduction (06/29/2011). FEMA/Department of Homeland Security Course for Educational Administrators.

Incident Command System for Single Resources and Initial Action Incident, ICS-200 (06/28/2011). FEMA/Department of Homeland Security Course for Educational Administrators.

Introduction to Incident Command System ICS-100 for School (06/28/2011). FEMA/Department of Homeland Security Course for Educational Administrators.

SRA McGraw Hill: Language for Learning Curriculum (06/30/2011). Bonney Lake, WA.

SRA McGraw Hill: Reading Mastery Signature Edition 2-5 (06/24/2011). McGraw Hill & ESD 105; Yakima, WA.

SRA McGraw Hill: Reading Mastery Signature Edition K-1 (06/23/2011). McGraw Hill & ESD 104; Yakima, WA.

Bullet Proof Mind: Mental Preparation for Combat (06/20/2011). Federal Way City Hall, Federal Way, WA. Presenter Lt. Col. Dave Grossman. Prevention of catastrophic school violence and how to react should violence occur.

Drug Impairment Training for Education Professionals (05/26/2011). Washington State Criminal Justice Training Center. Two-day training—detecting DUI drugs/alcohol at school. Instructor MPO Mike Graddon, DRE.

Prepare Workshop 1: Crisis Prevention & Preparedness: The Comprehensive School Crisis Team (05/13/2011). Washington State Assn. of School Psychologists, Spring Conference Series. Presenter: Tom Delaney, PhD.

Early Onset Bipolar Disorder (04/22/2011). Washington School Psychology Assn. Presenter: Richard M. Marshall, Ph.D.

Violent Youth. (03/17/2011). Risk and Threat Assessment for educators. 14 hours.

Diagnosis of Autism within the School Setting (02/11/2011). Washington State Assn. of School Psychologists, Spring Conference Series. Presenter: Liz Pechous.

Workshop on WIAT-III (02/04/2011). PsychCorp/Pearson. Review of changes to the WIAT-III from prior versions. Presenter: Patrick J. Moran, Ph.D.

Alternatives to Exclusionary Discipline (1/19/2011). Washington State Assn. of School Psychologists, Spring Conference Series. Presenter: Richard Van Acker, Ed. D.

Response to Intervention: Using Data from Reading Assessments for Professional Decision-Making (03/24/2010). Jan Hansbrouck, Ph.D.

Aiming High to Close the Gap (03/25/2010). Washington Education Research Association, Spring Conference. Multiple presenters.

Group Facilitation Skills: Putting Participatory Values into Practice and Supporting Groups to do their Best Thinking (1/26/10 – 1/28/10). Facilitative listening, chart writing, brainstorming, prioritizing, group dynamics, facilitating open discussion, process management, goal setting, agenda design and reaching closure. Community at Work. Instructor: Sam Kaner, PhD.

Moving Forward with RTI: First Steps…Next Steps (08/17/09 to 08/18/09). 2009 Summer Institute in School Psychology; Seattle University.

Response to Intervention/Cohort E (09/24/08, 09/25/08, 10/21/08, 11/20/08, 1/13/09). Educational Service District 113. Instructors: Wayne Callendar & Nichol Lindsay.

Special Education and the Law (October, 2009). University of Washington Special Education Law Conference.

Functional Behavior Assessment (03/20/2009). ESD 113. Performing functional behavior assessments and developing behavior intervention plans.

Best Practices in Linking Cognitive Assessment of Students with Learning Disabilities to Interventions (2/20/2009). Washington School Psychology Spring Seminar. Presenter: Jack Naglieri, Ph.D., George Mason University.

Best Practices in Data-Analysis Teaming (01/09/2009). Washington School Psychology Spring Seminar. Presenter: Joseph Kovaleski, Indiana University of Penn.

Section 504 in Washington: A Closer Look (December, 2008). Presented by: Joni R. Kerr, J.D.

Alert! Math Screener (11/2008). Presented by: Steve Hirsch, PhD

Emotional Disability or Social Maladjustment? (04/24/2008). Presented by: Michael Tansy, PhD, NCSP, ABPP, FAASP.

Nonverbal Learning Disabilities (11/8/2006). Sponsored by Maple Leaf Center, Wallingford, VT. Presented by Dean J. M. Mooney, Ph.D.

Service Alternatives Ethical Crisis Understanding and Response Education (SECURE) Initial and recertification (11/1/2006; 12/05/2005; 11/01/2004). Presented by Greg Burd.

Now You See It, Now You Don't: Changing the Way we Look at Challenging Behavior (3/11/2006). Sponsored by Franklin Pierce School District. Presented by Carol Ann Davis, Ed.D.

Severe Disabilities and Challenging Behavior (12/03/2005). Seattle Pacific University. Instructor: Valerie Lynch, Ph.D.

Innovative Interventions in Autism/Non-Verbal Learning Disabilities: Practical Outcomes in Home & School (12/03/04 – 12/04/04). Presenters: Margaret Bauman, M.D., Martha S. Burns, Ph.D., Jerry Newport, Rosemary White, OTR/L. Seattle, WA.

Disruptive Behavior Disorders in Children and Adolescents (06/11/2004). Sponsored by Cross Country University. Presented by Daniel R. Fecht, Ph.D.

KTEA-II, KABC-II, BASC-II Workshop (09/17/2004). AGS Publishing. Provided advanced training in use, interpretation and components of these instruments. Sponsored by Clover Park School District. Presented by: David Crump, Ph.D., AGS Publishing.

An Overview of Autism Spectrum Disorders: Characteristics, Assessment, Diagnosis, Etiology and Intervention Strategies for Children and Adolescents (08/02/2004 through 08/06/2004). University of Washington Autism Center, Seattle, WA. Presented by: Milani Smith, Ph.D.

Wechsler Intelligence Scale for Children, Fourth Edition Workshop (09/2003).
Provided in-depth training in use, scoring and interpretation of the WISC-IV. Presenter: PsychCorp representative. Sponsored by Clover Park School District.

Volunteer Service

Cybermentor for School Psychology students (2008 – 2012). University of Oswego School Psychology; Instructor: John Garruto, Ph.D.

Cybermentor for School Psychology Students (2010 – 2012). University of Wisconsin at La Crosse School Psychology; Instructor: Russell Vaden, Ph.D.

Proposal Reviewer (2001-2003). American Education Research Association (AERA).

President (2008-2010). Frederickson Clover Creek Community Council; Frederickson, WA.

Commissioner (2007-2009). Frederickson Land Use Advisory Commission, Frederickson, WA.

Founding Board Member (2001-2008). Community Action Team—a non-profit educational and community advocacy organization.

Court Appointed Special Advocate/Guardian ad Litem (1998 – 2008). Pierce County Juvenile Court.

Planning Team member (2001-2002). Pierce County Methamphetamine Summit.

Community Accountability Board Member (1998 – 2000). Thurston County Juvenile Court, Juvenile Diversion Program.

Invited Participant (1989 – 1990). Tacoma Public Schools--work group convened to determine how to grant high school credit for homeschool work.

Invited Observer to the Board (1986 – 1990). Washington Federation of Independent Schools.

Founding Board Member (1986 – 1990). Washington Homeschool Organization.

Founding Board Member (1987 – 1990). Washington Homeschool Convention.

Relevant Memberships/Awards

American Education Research Association
National Council for Measurement in Education
American Psychological Association
Western Psychological Association
Washington Education Research Association
Washington State School Psychologists Association
Pi Lambda Theta (Honor Society in Education)
Psi Chi (Honor Society in Psychology)