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Monitoring Reading Fluency Progress with the Use of Graphs

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Running head: MONITORING READING FLUENCY

Monitoring Reading Fluency with the Use of Graphs

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Abstract

Curriculum-Based Measurement (CBM) is a scientifically based approach used to collect progress monitoring data, and is often used to monitor reading development. Graphing a student's reading data over time allows educators to view the student's rate of progress, goal, and interventions. This leads to timely changes to ineffective instructional programs, often resulting in more academic success for students. Graphs can be a communication tool for educators to share progress data with students, parents, and other staff. The current need for educators to monitor student progress has resulted in an increasing need of programs that can be used in the educational setting to graph and store a large amount of educational data in an inexpensive way. The project designed is a program that stores student CBM results, specifically reading fluency data. Data collected includes screening information from all students during the Fall, Winter, and Spring, as well as frequent progress data, which includes individual students' rate of progress and their goal. This information is stored in tables and can be presented in graph form allowing teachers to view student progress. The program described is user-friendly and allows teachers to monitor student reading progress in an inexpensive, convenient way.

CHAPTER I

Statement of Problem

Effectively teaching children to read is one of the most urgent jobs facing educators. Unlike language acquisition, a child's literacy development is a learned behavior that needs to be taught. Reading is an essential part of academic success, and is one of the largest contributing factors for prediction of a student's overall academic success (Shaywitz, 2003). Reading is highly involved in all academic areas, and proficient readers may easily gain knowledge from many subject areas.

A child's reading failure will not only affect his or her academics, but may also negatively affect his or her self-confidence and motivation to learn in school. A change such as this in a student's self-esteem may cause negative long-term effects on the student's school performance (National Reading Panel, 2003). Within our ever-evolving technologically advanced society, increasing demands are placed on literacy; therefore the consequences of a student falling behind his or her peers or his or her school standards are more devastating than it has been in the past (Snow, Burns, & Griffin, 1998). Yet an enormous part of our student population continues to fall behind. The National Center for Education Statistics (NCES) examined the number of children that were unable to reach a proficient level of reading in the fourth, eighth, and twelfth grades. The proficient level of reading is identified as the standard that all students should reach, and represents "solid academic performance" for each grade assessed (Donahue, Voelki, Campbell, & Mazzeo, 1998). NCES found that only 31% of fourth graders, 33% of eighth graders, and 36% of twelfth grade students were at or above the proficient reading level for their grade in 2002. Students reaching this level have demonstrated reading competency, which includes knowledge and application (Grigg, Daane, Jin, & Campbell, 2003). The NCES also found that only 64% of fourth graders, 75% of eighth graders, and 74% of twelfth grade students performed at or above the basic reading level for their grade in 2002. The basic reading level denotes at least a partial mastery of the knowledge that is necessary for the student to perform at that particular grade level (Grigg, Daane, Jin, & Campbell, 2003).

Government Programs for Improvement

The devastating statistics revealing how many US students are struggling to read at their grade level has resulted in a governmental focus on teaching children literacy skills. Current government policy has called for more attention to be placed on literacy in elementary schools. No Child Left Behind (NCLB), and its associated Reading First Initiative have prompted discussions on the instructional methods most effective in increasing student early reading acquisition. A focus of NCLB is creating schools that are accountable for their student's academic progress and successes in grade level academics (NCLB, 2002). NCLB requires that all students become proficient in reading and math by the year 2014. Before that time, schools must monitor for Adequate Yearly Progress (AYP) towards their proficiency goal. Requiring schools to monitor for AYP indicates the importance of assessing students not only on their performance at a specific point in time, but also assessing students on the progress they are making. Monitoring progress allows educators to determine if the curriculum is appropriate, or if there is a need for an alternative curriculum.

NCLB contains the Reading First initiative, which focuses on putting research-supported methods of early reading instruction into Kindergarten through 3rd grade classrooms. The initiative provides districts with grants in order to raise student achievement through the implementation of reading instruction in the classroom. Reading First focuses on using scientifically based reading research to determine appropriate instructional and assessment tools. The program's goal is to ensure that all children learn to read well by the end of 3rd grade. Reading First also requires the use of screening assessments that a measure students' reading skills, as well as tools that monitor their progress as they acquire these skills (U.S. Department of Education, 2002).

Government policy has also focused on improving outcomes for students receiving special education. The 1997 Reauthorization of the Individuals with Disabilities Education Act (IDEA) has called for methods to be put into place that allow all students access to the general education curriculum to the maximum extent possible. The 2004 Reauthorization of IDEA has impelled an increase in the discussion on the use of a Response To Intervention (RTI) model to identify students with learning disabilities. The RTI model has taken precedence over previous methods used in the schools to identify students with learning needs (e.g. Gresham, Reschly, Tilly, Fletcher, et al., 2005; Schrank, Teglasi, Wolf, Miller, et al., 2005). IDEA's suggested use of a RTI model for the identification of learning difficulties encourages educators to change their focal point from labeling students with disabilities, to increasing the achievement of those students. This model will take the spotlight away from the students' weaknesses, and shift educators' concentration to finding what interventions will allow students the greatest success in order to bring out their strengths. The RTI model not only focuses on the students already identified as learning disabled, but allows for the early discovery of students who are at-risk of being later classified as learning disabled (Fletcher, Coulter, Reschly, & Vaughn, 2004). Identifying at-risk students before they fall behind their peers will allow educators to provide support aimed at preventing failure (Fletcher et al., 2004). Specifically in the area of reading, RTI emphasizes the importance of identifying students who may be at-risk of having reading difficulties before they arise, rather than after the students' have already fallen far behind their peers. This encourages teachers to consider practices that focus on prevention and the use of a problem-solving model. When this model is followed, assessment for special education eligibility is reduced (Shinn, 1995).

Many children with reading difficulties primarily do not have a biologically based deficit; rather they are experiencing an instructional deficit. The identification of at-risk students can be an effective way to discover which children struggle with reading due to an instructional deficit by providing them with additional interventions or changes in instruction (Vellutino, Scanlon, Small, & Fanuele, 2006). Students who are at-risk for reading failure often have characteristics that do not match well with the type of reading instruction that they are receiving in the classroom (Foorman & Torgesen, 2001). Therefore, a change in reading instruction could move them from being at-risk of reading failure to performing in the average range. By the time a student is identified as having a reading disability it may be too late to easily catch up to their peers. So, the earlier a student's struggle is noticed, the earlier interventions can be put in place, which will then alleviate academic struggling before it cannot easily be changed. Even at the kindergarten level, interventions put into place have been found to be an effective strategy for teachers to prevent long-term reading difficulties in at-risk readers (Vellutino, Scanlon, Small, & Fanuele, 2006).

Curriculum Based Measurement (CBM)

Deciding whether or not a student is progressing academically in the classroom is a vital job for teachers. Due to inaccuracies in teachers' judgment of student progress, the utilization of standardized measurement tools is important when assessing progress (Madeline & Wheldall, 1998). Curriculum Based Measurement (CBM) is an assessment procedure used to measure a student's academic growth. A CBM assessment procedure consists of administering a set of short achievement tests to assess a student's reading, math, spelling, or writing (Scott & Weishaar, 2003). It can be used to screen groups of students to determine who needs additional support to be successful, and it can also be used to assess individual achievement over time to monitor progress.

CBM is a standardized scientifically based set of assessment procedures that has been supported by evidence to produce both reliable and valid data on student performance (Fuchs & Fuchs, 1991). In 1985 Deno introduced CBM as an alternative to commercial tests and informal observation procedures. The CBM process combines the advantages of both of these procedures, while generating reliable valid data (Deno, 1985). CBM can be used to monitor how well students have learned what they have been taught. It also provides an individualized assessment of the needs of each student. This has been shown to be more effective than basing curriculum decisions upon group-administered classroom assessments (Stecker & Fuchs, 2000). The efficiency of the assessment process allows teachers to evaluate their students in a timely manner and make instruction or intervention decisions based upon the results.

Although CBM can be used in several subject areas, its usefulness has been seen in research focused on reading in the public school classroom (Shaywitz, 2003). Using

CBM procedures to monitor reading is also referred to as R-CBM, which is the assessment of a students' ability to read automatically, or fluently. Fluency is one of the principal building blocks on which reading development is built (Marston, 1989). Students who can read fluently are able to focus on the content of the material and learn from what they are reading. Non-fluent readers are forced to focus a majority of their attention to the decoding process; therefore, less attention is paid to the content of what is being read and less will be learned. Readers who lack reading automatacity are unable to gain insight into what the material is teaching them, and are therefore likely to struggle in all academic areas (Shaywitz, 2003).

Administering R-CBM involves asking a student to read a passage or probe aloud for 1 minute. The probes are stories (or passages) organized according to grade-level appropriateness. While the student is reading, the examiner tracks the number of words read correctly (WRC), and the errors made within 1 minute (Scott & Weishaar, 2003). WRC does not include omitted words, word substitutions, and hesitations for more than three seconds, all of which are considered errors. Words that are self-corrected by the student within the three second time limit are included as WRC. The final score obtained by the student consists of their WRC over the number of errors made (Good, Kaminski, Simmons, & Kame'enui, 2001).

Screening

The importance of schools identifying students when they first begin to struggle, rather than after they fail or fall far behind and can no longer profit from their regular classroom instruction was previously noted. Teachers are then faced with the challenge of assessing a student's standing within their class as a whole in order to identify the students who are not making as much progress as the rest of the class. This task proves to be more complex because identification cannot wait until a student has fallen behind, but needs to take place when he or she is at-risk for reading difficulties (Pinnell, 2000). Although there are many known risk factors for reading difficulties, it is unclear how to predict accurately whether or not a student will have difficulty progressing at the same pace as their peers (Snow, Burns, & Griffin, 1998). Therefore, consistent screening allows educators to continue focusing on prevention efforts and will enable students to achieve efficient progress towards literacy acquisition. CBM can also be used to quickly and efficiently screen groups of students in order to identify those who are performing within the average range, but are not sufficiently progressing since the previous screening.

Originally, CBM was used primarily for instruction evaluation in special education classrooms; however, CBM is now used as a screening tool that identifies students at-risk for academic failure (Deno, 2003a). Screening takes place when CBM is administered to all students at specific points in time throughout the year, often taking place once during the fall, winter, and spring (Fuchs & Fuchs, 2007). This information can be compiled to create normative standards in order to identify students that are performing significantly lower than their peers, and therefore are in need of additional attention (Fuchs & Fuchs, 2007). Students performing below others in the normative sample can be considered at-risk, and their progress can be monitored until the correct instruction provides improvement. After gathering data from the sample, whether it is a large group, or just a classroom, the at-risk students can be identified by looking for scores that fall below the 25th percentile. This is done to determine which students need progress monitoring.

Progress Monitoring

At-risk students can then be administered probes on a consistent basis, which can range in frequency from twice a week to once a month (Safer & Fleischman, 2005). Probes are administered to track progress until the next screening takes place, or the individualized goal is obtained. Individually monitoring student progress frequently with short probes between screening times will allow teachers to make decisions on which intervention or instruction works best with each student. The term 'Progress Monitoring' is used to refer to the process of assessing the academic skills of students on a regular basis to determine if instruction is beneficial, and to provide more appropriate instruction for those who are not benefiting (Fuchs & Fuchs, 2007). This data is used to make decisions on the direction of future curriculum, determine the effectiveness of teaching, and to set appropriate student goals (Scott & Weisharr, 2003).

The process of repeatedly assessing a student's performance across time using similar measures allows one to evaluate growth. Growth in student performance on CBM across time is indicative of an increase in the student's proficiency in that academic area (Deno, 2003). Progress monitoring is typically accompanied by interventions to increase student progress. Information received from the progress monitoring data over time is evaluated to assess whether the intervention is effective in allowing students to grow academically (Shinn, 1995). The progress that students make is a result of the interventions or curriculum that they have encountered. Using progress monitoring procedures to determine how the instruction is affecting students allows teachers to provide instructional approaches or interventions that are effective for that student. The individualized process of progress monitoring therefore provides students with instruction that allows them to learn more from their academic environment (Fuchs & Fuchs, 2002).

Progress monitoring is an essential element in the process of encouraging literacy development in students. Students in special education, including students with a classification of a learning disability, can have reading growth rates comparable to their regular education counterparts when there is a selection of an effective intervention with ambitious goals (Deno, Fuchs, Marston, & Shin, 2001). Accurate data-driven progress monitoring, paired with effective research based interventions, allows students with learning disabilities to achieve growth rates equal to their regular education counterparts (Deno et al., 2001). These findings encourage the use of progress monitoring within general and special education, to allow students to reach challenging goals, and to enable teachers to provide effective interventions (Shaywitz, 2003).

Graphing Data

Progress monitoring tools can be used by teachers can ensure that students are on track for reaching the goals determined for them. The use of graphs to monitor progress makes decision making easier by providing data in a visual manner. A graphic representation of CBM data is the central way to visualize and communicate findings. Fuchs (1986) refers to graphing procedures as an essential element to monitoring student attainment of a goal. Graphing CBM data provides three references for interpretation (Deno, 1992). Graphing individual data allows for the understanding of student progress, both recent and long-term. It also reveals the goal in comparison to the students' current performance, therefore allowing for easy interpretation of where the student needs to be progressing in order to achieve the established goal. Also, the progress that a student makes, or does not make, can be visually linked to instruction or interventions that were taking place at different periods of time throughout the data collection process. Peer performance can also be graphed in order to identify the average area the student should be falling into to be considered within the average range (Deno, 1992).

Purpose of Project

This project will provide teachers with a convenient, easy, and inexpensive way to store all of their students' screening and progress monitoring R-CBM data. The screening portion of the program will store student R-CBM data, rank students from highest to lowest according to their reading scores, and chart each student's performance on a graph. Graphs will display student data as well as the average range for their grade level. The program can also store individual student data for progress monitoring purposes throughout the school year. It provides a way for the user to enter a student's individual goal, as well as intervention dates and descriptions. By monitoring reading progress as well as the interventions that are put into place, users can ensure that the interventions are effective in allowing the student to achieve his or her reading goal. Overall, this program provides teachers with a way to use RTI techniques to help students at-risk of reading difficulties improve their reading abilities.

CHAPTER II

Literature Review

The previous chapter described the need for educators to focus on literacy in schools. The importance of building student literacy as well as statistics revealing poor student reading performance has resulted in government programs calling for reading improvements. Policies focusing on both general and special education have prompted schools to use RTI methods, which emphasize identifying at-risk students, assessing progress, and ensuring that students are provided with appropriate interventions that enable them to achieve individual goals. CBM has been identified as a reliable and valid assessment technique that allows teachers to take advantage of RTI methods. R-CBM is a tool that can assist teachers as they focus on building their student's literacy skills while working within an RTI framework.

This chapter will review the scientific literature on the technical adequacy of R-CBM for screening and progress monitoring purposes. Specifically, it will review screening for the purpose of early identification of students' at-risk of reading difficulties and how progress monitoring affects students' learning environments. Finally, this chapter will cover the usefulness of graphing R-CBM data for the purpose of visualization and communication of student progress.

Reading-Curriculum Based Measurement (R-CBM)

CBM is a specific set of technically adequate standardized assessment procedures that sample student performance, have multiple equivalent forms, are time efficient, and are easy to teach and administer (Deno, 2003a). The measurements contain two basic features; they are short, and they emphasize fluency, which requires both speed and accuracy (Shinn, 1995).

In 1989 Marston conducted a literature review of studies addressing the reliability of R-CBM procedures. Specifically, Marston acknowledged 4 studies, which assessed the test-retest reliably of R-CBM measures in intervals from 1 to 10 weeks, with results ranging from .82 to .97. Four studies were also reviewed which assessed the parallel forms reliability of R-CBM with results ranging from .84 to .96. Marston (1989) concluded the reliability "findings provide compelling evidence of the reading measure reliability of CBM" (p. 42).

Using CBM to measure reading is an accurate way to assess a student's overall reading ability due to strong relations between R-CBM and a student's decoding, word reading, comprehension, and basic reading skills across first through fourth grades (Hosp & Fuchs, 2005). Deno, Mirkin, and Chiang (1982) conducted one of the first studies on the concurrent validity of CBM reading and standardized achievement measures of reading. Students receiving general and special education in 1^{st} through 6^{th} grades were randomly selected and administered five measures of CBM reading: words in isolation, words in context, reading fluency, cloze comprehension, and word meaning. They were also administered three subtests from two frequently used standardized assessment instruments. Correlations ranged from .73 to .91 between CBM of reading out loud (words in isolation, words in context, and reading fluency) and the standardized reading measures. Results indicated that reading out loud is a valid index of reading proficiency (Deno, Mirkin, & Chiang, 1982).

High correlations between reading fluency and standardized tests were also indicated when Deno conducted a literature review of CBM research in an attempt to examine the criterion validity of R-CBM (Deno, 1985). Deno (1985) found high correlations that ranged from .70 to .95 between reading fluency and comprehension subtests from standardized achievement tests.

Research since Deno's 1985 review continues to reveal the relationship between R-CBM and a student's reading proficiency. Hintze, Callahan, Matthews, Williams, and Tobin (2002) assessed the effectiveness of R-CBM in predicting reading skills of students. A hierarchical multiple regression analysis was used to assess whether R-CBM, socio-economic status, sex, ethnicity, and age were predictive of reading comprehension in 2^{nd} through 5^{th} grade students. It was discovered that ethnicity and socio-economic status did not bias R-CBM data. Also, R-CBM data did not over or under predict reading comprehension when age, sex, and socio-economic status were controlled; therefore indicating that R-CBM is an accurate reading assessment tool (Hintze, Callahan, Matthews, Williams, and Tobin, 2002).

Shinn, Good, Knutson, Tilly, and Collins (1992) used a confirmatory factor analysis to examine the relationship between R-CBM and students' reading proficiency in 3^{rd} and 5^{th} grades. First, the relationship between 3^{rd} graders' R-CBM data and their reading competence, which consisted of decoding and comprehension, was examined. R-CBM was found to correlate highly with overall reading competence, with coefficients of

.88 and .90. The 5th grade students' reading competence was examined using the two separate constructs of decoding and comprehension. It was found that R-CBM best fit with the decoding construct, and the decoding and comprehension constructs were highly correlated. R-CBM also correlated as highly with reading comprehension as it did with the decoding subtest of the Stanford Diagnostic Reading Test measures, with correlations of r = .76 and .74, and r = .76 and .73 respectively. This study concluded that R-CBM was a good indicator of overall reading proficiency. For 3rd grade students it was an indicator of a unitary model of overall reading ability, and for 5th grade students R-CBM was highly correlated with decoding and comprehension (Shinn, Good, Knutson, Tilly, & Collins, 1992).

Research has also indicated that R-CBM is a useful tool for identifying struggling readers who are in need of further assessment of specific reading skills, or more intensive interventions (Hosp & Fuchs, 2005). Students with higher reading fluency are found to have higher reading comprehension rates. A student who has a faster automaticity of word identification will spend less time on decoding, and is better able to focus his or her attention on comprehension (Stecker, 2007). Tenenbaum and Wolking (1989) conducted a study of reading fluency, and intraverbal responding, or comprehension. Their results indicated that high reading rates are consistently associated with better comprehension responses.

Findings from Marston, Mirkin, and Deno (1984) also supported CBM as a technically adequate tool. It was found that teacher referrals were more informed, and appropriately made when they were placed with the knowledge of the CBM results. Referrals were determined to be 'appropriately made' when widely used commercially made achievement assessments identified the referred students to be likely referral candidates. The study also found that the direct and repeated assessment of students using CBM resulted in a balanced distribution of male and female referrals. Also, female students referred using CBM procedures displayed less behavioral difficulties than the female students referred without the CBM data knowledge. These two facts suggest that the CBM referrals tended to negate teacher biases made based upon both gender and behavior. The last finding from Marston, Mirkin, and Deno (1984), suggested that repeated assessment procedure of CBM may result in a more accurate assessment approach. Approximately one-third of the Learning Disability (LD) referrals made based upon teacher judgment resulted in students meeting the criteria for an LD student. However, 80% of students referred for LD based upon CBM data actually met the criteria for LD, suggesting an increase in consistency when assessment is conducted utilizing CBM procedures.

Using R-CBM for Screening Purposes

Screening all students to identify those at-risk for reading difficulties is an approach that allows students to be identified early in order to provide early intervention. Hosp and Fuchs (2005) explored the usefulness of R-CBM as a screening instrument in grades 1 through 4, by confirming their association with scores on the Word Attack, Word Identification, and Passage comprehension subtests from the Woodcock Reading Mastery Test-Revised (WRMT-R; Woodcock, 1987). Three hundred and ten students participated, and findings demonstrated strong relations at each grade level between R-CBM and overall reading score, as well as the subtest scores, revealing the usefulness of R-CBM as a screening tool.

When screening, data can be obtained by administering either one R-CBM probe, or the median of three R-CBM probes. Ardoin et al. (2004) found that when 3rd grade students were assessed with 1 probe or the median of 3 probes, both were predictive of scores on the Woodcock-Johnson-III (WJ-III; Woodcock, McGrew, & Mather, 2001) Letter Word Identification, Reading Fluency, and Passage Comprehension subtests. R-CBM scores were also found to be predictive of the Iowa Test of Basic Skills (ITBS) Reading Comprehension and Vocabulary subtests. The use of a single R-CBM probe was found to be as predictive of assessment measure scores as the median of 3 R-CBM probes (Ardoin, et al., 2004).

Predicting how students may end up performing on high-stakes tests is of particular importance to educators with the increase in government pressure to hold schools accountable for student performance. Good, Simmons, and Kame'enui (2001) examined the relationship between R-CBM and high-stakes reading outcomes as assessed by the Oregon Statewide Assessment-Reading/Literature (OSA). Results of this study indicate that reading accuracy and fluency, as assessed by R-CBM, is an important foundation for reading competence as assessed by state assessments. Third grade readers who read at a rate of at least 110 words correct per minute of a grade level passage were likely to meet or exceed the expectations on the OSA. Those who read grade level passages at a rate of 70 words or less per minute were not likely to meet the standards on the OSA (Good, Simmons, & Kame'enui, 2001). R-CBM therefore provides a quick and easy screening procedure to identify students at risk of not meeting the standards as demonstrated by performance on state assessments.

Progress Monitoring with R-CBM

R-CBM is used as both a universal screening instrument to identify the students who are in need of additional support, as well as a progress monitoring tool to improve upon instructional programs (Fuchs & Fuchs, 2007). Therefore, R-CBM data can be used to determine a student's interindividual standing and growth rate within the classroom, as well as their intraindividual level and growth (Deno et al., 2001). Research has indicated high correlations between oral reading fluency and comprehension, and has also shown the reliability and validly using R-CBM to monitor growth in reading proficiency throughout a student's elementary school years (Deno, 1985).

Utilizing R-CBM as a progress monitoring procedure may be a functional tool to determine students' response to intervention. Educators can use progress monitoring to increase the likelihood that every student reaches the goals set for them. Monitoring progress allows teachers to assess how students are achieving compared to how they should be achieving to be on track to reaching their goals. When encountering a student whose rate of progress is below what it needs to be in order to reach their goal, instruction can be individually modified for that student. Using progress monitoring in this manner provides students with more effective instruction that focuses on the movement of students towards their goals.

Fuchs, Deno, and Mirkin (1984) studied the effects of progress monitoring on student achievement, teacher decision-making, and student knowledge. Volunteering special education teachers were assigned randomly to experimental and contrast groups. The experimental teachers designed goals, used R-CBM to evaluate student oral reading fluency at least twice a week, graphed performance, and introduced a program change if student improvement appeared to be inadequate across 7 to 10 data points. Students whose teachers performed ongoing R-CBM achieved better on decoding and comprehension tests than those in the control group. Students did not perform as well when their teachers continued to use their current monitoring methods which included teacher made tests, informal observations, and work samples. Student surveys revealed an increase in knowledge from the experimental students. It was found that a greater percentage of the students whose teachers conducted R-CBM stated that they knew their goals, could correctly state their goals, and could accurately determine if they would meet their goals. Data from this study also indicated that the experimental teachers were more realistic about progress, while the contrast teachers tended to be either uncertain or optimistic of student growth when the results did not indicate the same. The teachers became more structured in their instruction over time, and they adjusted student goals more frequently (Fuchs, Deno, & Mirkin, 1984).

When educators follow a problem solving model, they can examine student progress to identify the intervention that works best with each student, thus informing instructional decisions. King, Deno, Mirkin, and Wesson (1983) examined the relationship between teacher utilization of CBM procedures, changes in the structure of instruction, and student achievement, in order to assess whether the implementation of CBM leads to an increase in instructional structure. Results indicated that students in the experimental group, whose teachers utilized CBM procedures to monitor reading progress towards IEP goals, were provided with significantly more controlled practice of their lessons than the students in the control group. Therefore, teachers who used CBM improved upon the structure of the reading instruction provided to their students (King, Deno, Mirkin, Wesson, 1983).

Increasing the Accuracy of R-CBM Data Collection

Error in the collection of progress monitoring data is reduced when two factors in particular are taken into account, optimal testing situation and length of progress monitoring. Progress monitoring was found to have minimized errors when assessment is taken consistently in optimal situations. These situations include quiet testing conditions, standardization of directions, and a consistent examiner, location, and passage difficulty (Christ, 2006). The longer period of time that the progress monitoring data is collected also resulted in fewer errors. Christ (2006) recommends that data be collected twice a week for at least eight weeks in order to reduce error.

R-CBM progress monitoring probes are categorized according to grade level, and although different grade level passages can be chosen, consistency in passage difficulty should take place week to week. Hintze and Christ (2004) found that when purposely controlling the reading passage difficulty, rather than randomly selecting passages of different grade-levels, there was a reduction in the standard error of measurement. The level of measurement error would lead to enhanced data-based decision making, as would happen with increased reliability. Therefore probes will be more accurate in assessment and the slope of the progress will be more reliable (Hintze & Christ, 2004).

R-CBM Screening and Progress Monitoring for Special Education

Both R-CBM screening and progress monitoring data can be used to make special education decisions. Specifically, students' achievement increases when CBM data are used to write Individualized Education Plan (IEP) goals (Fuchs, 1999). Screening information can be documented on a student's IEP to represent the present levels of performance (Stecker, 2007). A measurable IEP goal may be set by determining the appropriate rate of increase in progress from the present levels of performance. Scott and Weishaar (2003) recommend an IEP goal statement that includes identification of the goal date, the type of CBM used, and the WRC goal. While working towards this goal, teachers will utilize progress monitoring data to interpret growth and determine if the student's growth is appropriate to reach the goal within the determined amount of time. Etscheidt (2006) suggests that when a progress monitoring goal is used in a student's IEP explicit plans should follow. The staff member collecting the data should be specified and exactly when and where the progress monitoring data will be collected. Teachers are next faced with the challenge of storing, interpreting, and communicating R-CBM results. This is a challenge that can be easily alleviated with the use of computer programs and graphic representations.

Graphic Displays of R-CBM Data

The use of graphic images facilitates the interpretation of student performance. Evaluating trend changes in progress is difficult without displaying the data graphically (Deno, 1992). The process of graphing R-CBM progress monitoring data was an essential element in Fuchs, Deno, and Mirkin's (1984) study of the education effects of repeated CBM, which resulted in higher achievement for students. In meta-analysis of research on formative evaluation, Fuchs and Fuchs (1986) found that higher effect sizes were observed when data was graphed.

Being able to display each week's progress monitoring data graphically also allows educators to show progress to others. Graphs may be used as a communication tool to show progress to parents, as well as students. Graphic images of progress monitoring data are valuable because the data can easily be understood, more so than conventional test scores. Graphs can provide direct information to parents communicating how their child is performing in school (Deno, 1992).

Not only should graphs display student progress data, but they should also display a student goal. A student goal can be visualized when an aimline connects the initial data point collected to the student goal on the goal date. An aimline will display the progress that a student needs to make from their starting point to their goal date in order to achieve their goal. The student's current rate of progress can be compared to the aimline in order to determine whether he or she is on track to achieving that goal. In order to make progress easier to compare to the aimline, a trend line can be used to estimate where the student's progress would be by the goal date if the current rate of progress continues (Scott & Weishaar, 2003). By graphing consistently collected R-CBM data, a student's trend line can be compared to his or her aimline to determine if progress is sufficient to achieve the goal (Safer & Fleischman, 2005). Being able to visualize student progress in graph form allows teachers to determine if instruction needs to be adjusted, or if the current instruction is enabling the students to eventually achieve their goal. If a student is not on track to obtaining his or her goal, different or more intensive interventions may be needed to increase the current rate of progress (Safer & Fleischman, 2005). The graphic depictions of a student's progress, including their trend line and their aimline, allow for quick visual analysis for decision-making purposes.

Student Self-Graphing

Students may also be involved in graphing progress. Allowing the student to view graphs on a consistent basis may encourage continued progress by allowing them to view their successes (Joseph, 1995). Also, increased progress often results when students are allowed to graph their own R-CBM performance (Sutherland & Snyder, 2007; Gunter, Miller, & Venn, 2003). According to Gunter et al. (2002), allowing students with mild disabilities to evaluate their progress through self-graphing enhances the effectiveness of progress monitoring. When user-friendly software is available, students are able to easily learn how to graph high quality representations of their performance. Over time, when students self-graph it has a positive effect on performance and also provides teachers with more time (Joseph, 1995). Gunter, Miller, and Venn (2003) conducted a case study of a student and self-graphing of reading rate, and concluded that the act of self-graphing reading data was associated with increases in WRC. Although this study had its limitations due to a single subject design, it was concluded that student graphing provided three main benefits: it increased student achievement, it provided teachers with more time, and it provided documentation of data and progress (Gunter, Miller, & Venn, 2003).

Current Graphing Programs Used

Currently there are some programs available for educators to use for progress monitoring purposes. Two commonly used programs that can be obtained on the internet are AimsWeb (Harcourt Assessment, 2008) and ChartDog (Intervention Central, 2008). AimsWeb is an internet based program that provides users with R-CBM passages, and will store and graph student screening and progress monitoring data. AimsWeb requires a subscription fee, which will be determined depending on the number of students being stored in the program. ChartDog is a free website application that allows users to enter data from a single subject to be displayed graphically. The website is able to graph R-CBM data, but is not specifically created for that purpose. Once the data is entered the graphs that are created may be saved on the computer or printed. However, the data entered cannot be saved in order to continually enter new progress monitoring information.

Summary

Graphs are both a useful communication tool and an accurate way to store and view student progress. This is especially useful to track R-CBM data, which is a research-based, effective method of monitoring students' overall reading achievement. Having graphing programs is essential for educators during a time when emphasis is being placed on RTI, scientifically based instruction, goal setting, and progress monitoring with the use of R-CBM. Graphing also ensures that instructional decisions are made in the best interest of the student, or that a student is truly benefiting from instruction. When graphs are utilized, more accurate judgments of progress towards a determined goal are made, and more students achieve academically. The benefits of graphing have resulted in an increasing need of programs that can be used in the educational setting. These programs are needed to store and graph the increasing amount of educational data in an inexpensive and convenient way. Two commonly used internet sites that are available to educators for graphing R-CBM data are AimsWeb and ChartDog. Although these programs allow the user to display their R-CBM data graphically, AimsWeb requires a paid subscription, and ChartDog does not store data for future uses. The program described in Chapter III will allow the user to store and graph R-CBM data. It will do so at no cost to the user, will allow the user to continually save and enter data, and does not require an internet connection.

CHAPTER III

Designing the Program

The program was developed using the National Instruments Corporation graphical programming language LabVIEW. An electrical engineer familiar with the language worked with the designer to create the program. LabVIEW was used because it provides algorithms that allow the programmer to easily develop graphical depictions of data. The process began by determining the basic design of the program, which would be utilized for two purposes: group reading screening and individual reading progress. This was accomplished by creating two interfaces for data collection, or two front panel screens; one for classroom screening, and one for individual student progress monitoring. The design process consisted of four steps; (a) setting up the front panels, (b) creating graphs, (c) developing storage files, and (d) wiring together information in order to run the program.

Determining Data Entry

The first step in the design process involved setting up a list of the critical data entry parameters needed for the program. Both the screening and progress monitoring front panels were created using many of the same parameters. Buttons created for both of the initial screens include the following: "screening" or "progress," "open existing file," "create new file," "graph or table," "norms," "save," "print," and "exit." The differences between the two front panels are in the data collection tables.

The design of the front panel tables began by identifying what information was necessary for collection. A screening table was needed to collect a list of student names with their WRC and errors made. There is room to enter WRC and errors three times because screening usually takes place three times during the school year (Fall, Winter, and Spring). In order to be more specific, the table contains a space for the date of each screening. The "WRC Sort" button was next created for the screening front panel in order to organize the list of entered students. By sorting the list of students the user can view the students in order from lowest to highest WRC. The student order of highest to lowest WRC may be different in each date of collection; therefore, the user has to choose to sort between Fall, Winter, and Spring by pressing the arrow selection next to the "WRC Sort" button.

The progress monitoring front panel was created with supplementary tables for the additional collection of information. It includes space for the user to enter a student goal and goal date, intervention descriptions and dates, and WRC and errors. The user determines information entered for the student goal. All of the tables on both the screening and progress monitoring front panels were created in order to hold information to be displayed graphically.

Graphical Interfaces

The next part in the design process consisted of developing the graphical screens to display information from the front panels. This is an essential feature of the program, providing the user with graphs depicting the information they entered. LabView provides graphical icons for data; therefore, the information collected in the front panels was easily converted to graphical form by wiring the information to the graph icons. Figure 1 contains the LabView block wiring diagram of the graphing functions for both the screening and progress monitoring graphs. This portion of the code takes the information from the front panels, and creates a graphic representation for the user to view when they click the “graph or table” button. The screening graphs were created with the intent of providing the user with data points from the screening, and horizontal displays of the average range. This allows the user to visualize whether or not the student is performing in the average range.

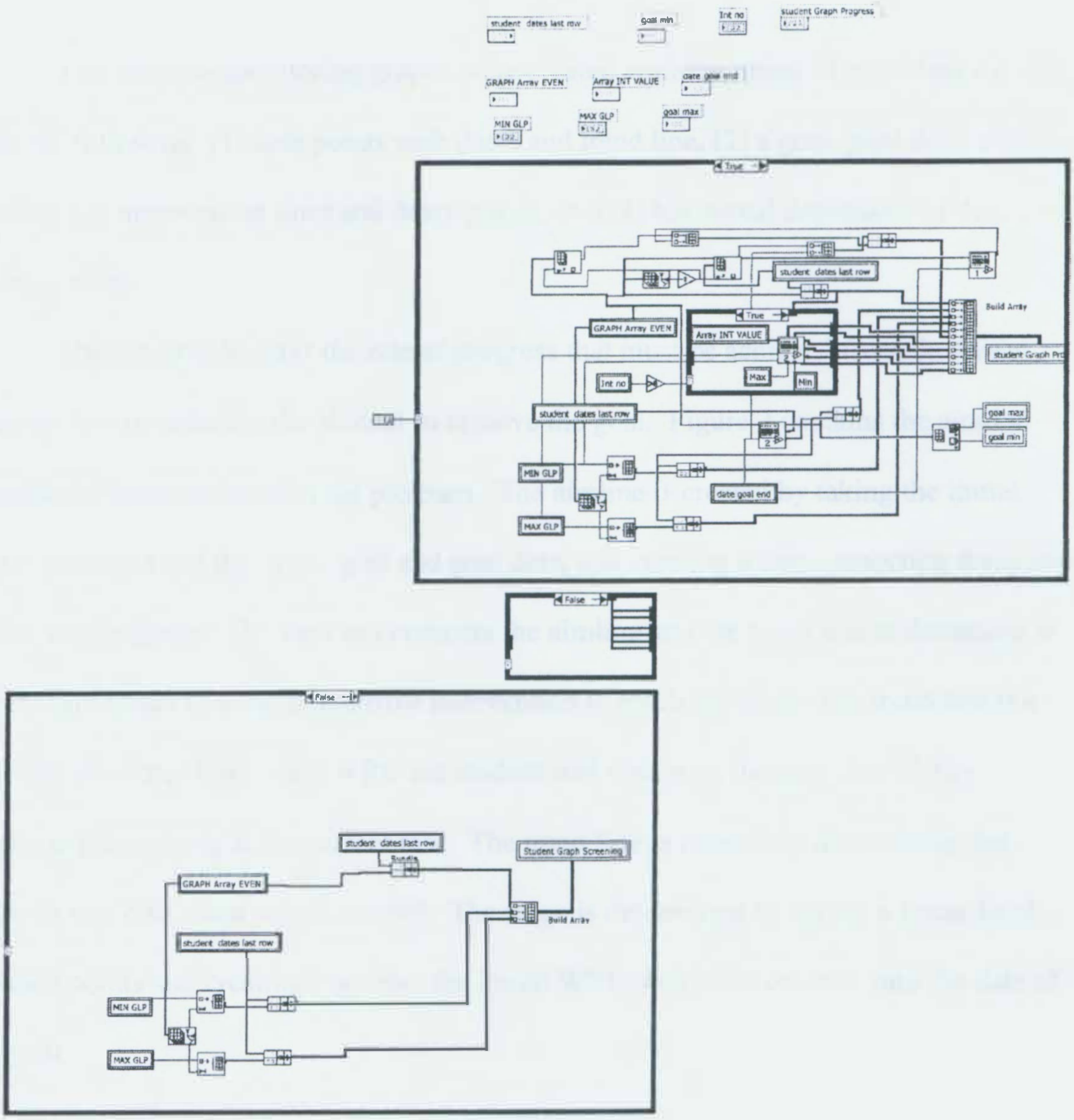


Figure Caption

Figure 1. Graphing function for the screening and progress monitoring portions of the program.

The progress monitoring graphs were created with the intent of providing the user with the following: (1) data points with dates and trend line, (2) a goal, goal date, and an aimline, (3) intervention lines and descriptions, and (4) horizontal depictions of the average range.

The aimline displays the rate of progress that must be achieved from the initial starting date in order for the student to achieve the goal. Figure 2 contains the aimline calculation sequence used in the program. The aimline is created by taking the initial WRC collected and the WRC goal and goal date, and creating a line connecting these two points on the graph. The user can compare the aimline and the trend line to determine if the student needs of a more intensive intervention to reach the goal. The trend line is a line that estimates how many WRC the student will obtain on the goal date if they continue progressing at the current rate. The trend line is created by determining the slope of the WRC data points entered. The slope is determined by taking a linear fit of the data points and creating line from the initial WRC data point entered until the date of the goal.

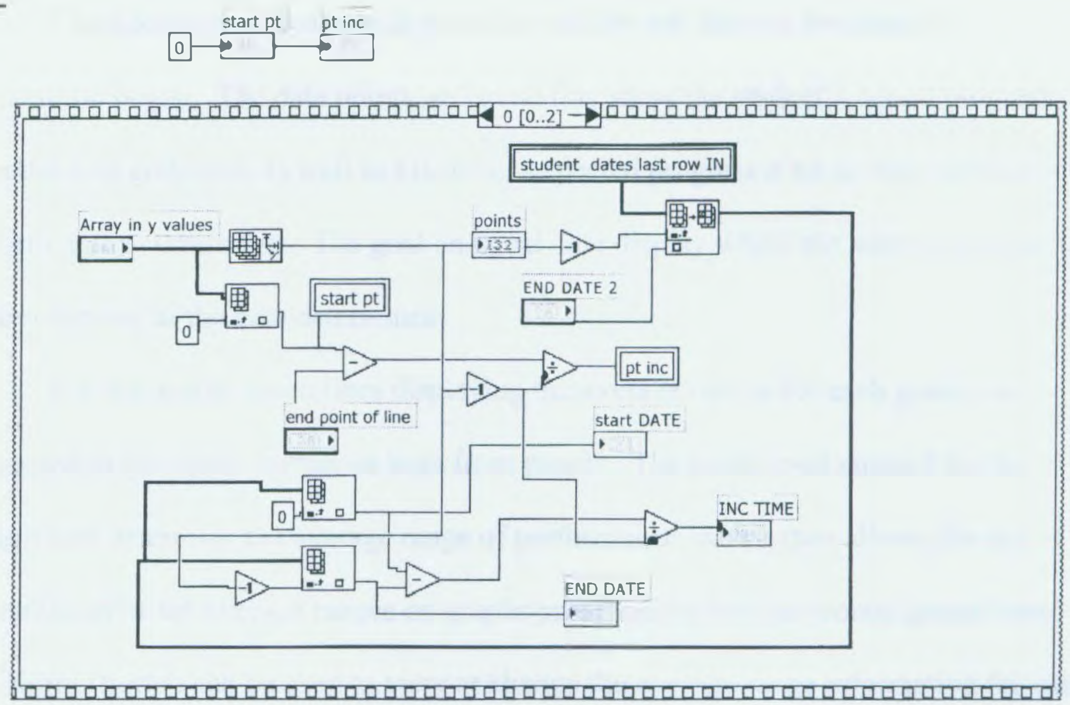


Figure Caption

Figure 2. Aimline calculation sequence.

The intervention lines are depicted as vertical red lines on the date the intervention began. The data points and trend line show the student's actual progress from the data collected, as well as his or her expected progress if he or she continues to perform at the current rate. The goal and goal date display where the student is expected to be achieving at the date determined.

The horizontal green lines displaying the average ranges for each grade are connected to the norms button on both front panels. The grade level entered for the student will determine the average range of performance, which then allows for the visualization of the average ranges on graphs presented by two horizontal green lines. The Norms button can be used to view or change the average range information for each grade level. The program begins with pre-entered data obtained from the AIMSweb (Harcourt Assessment, Inc., 2007) normative sample for oral reading fluency. The lower portion of the average range is determined by the 25%ile of performance for the indicated grade level, and the upper portion of the average range is determined by the 75%ile.

Saving Data

The third part of the design process was the development of a file storage system. Folders were created to store the screening information, individual progress monitoring data, and the grade level averages. The "CLASS" folder was used to store screening information, and the "STUDENT" folder was created to store progress monitoring data.

Both folders are stored on the C drive. The average performance data is stored in the GLPdata.txt in the "CLASS" folder. When the user chooses to save class screening data, they hit the save button, and can select one of two saving options: adding data to an already created class or store the information under a new class name which they choose.

When progress monitoring data is saved the user will click the save button and the information will automatically be saved under the student's name. When additional information is added and saved it will continue to save under the student's name.

Completing the Program

The final step in the design process was wiring together the control buttons, front panel screens, graphs, and data storage files. This is a necessary final step when using the LabVIEW programming language. It is done by connecting graphical icons in a form that looks like a block diagram, with individual blocks representing the different elements of the program. It allows the different elements, or portions of code, to interact with each other creating one program. Figure 3 contains the completed hierarchy of the LabVIEW modules when wired together.

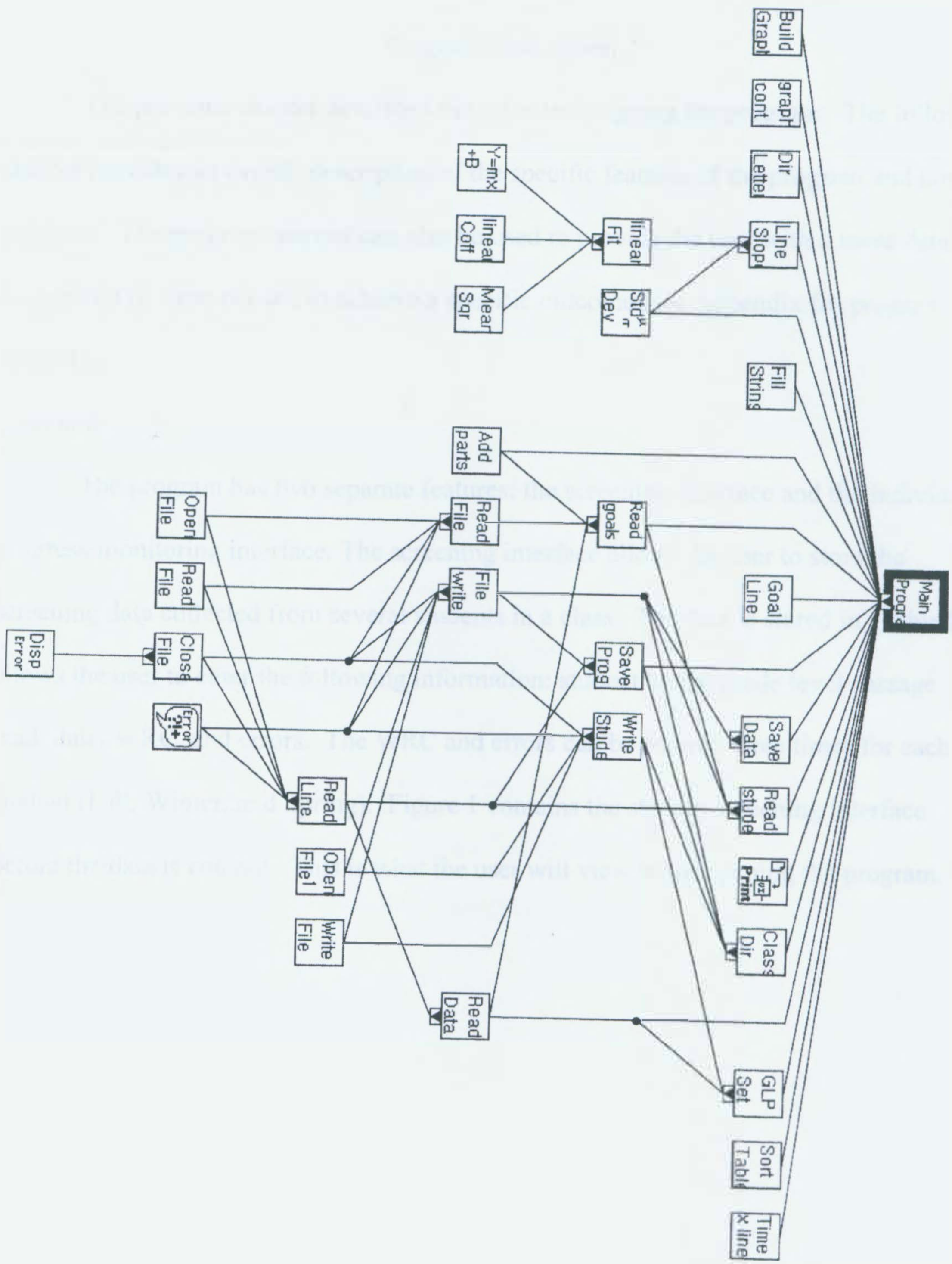


Figure Caption

Figure 3. Completed program hierarchy diagram.

CHAPTER IV

Program Description

The previous chapter described the steps in designing the program. The following chapter provides an overall description of the specific features of the program and how to use them. The program manual can also be used to provide the user with a more detailed description of steps needed to achieve a specific outcome (see Appendix for program manual).

Screening

The program has two separate features: the screening interface and the individual progress-monitoring interface. The screening interface allows the user to store the screening data collected from several students in a class. The data is stored in a table that allows the user to enter the following information: student name, grade level passage read, date, WRC, and errors. The WRC and errors can be entered three times for each student (Fall, Winter, and Spring). Figure 1 contains the student screening interface before the data is entered. This is what the user will view when opening the program.

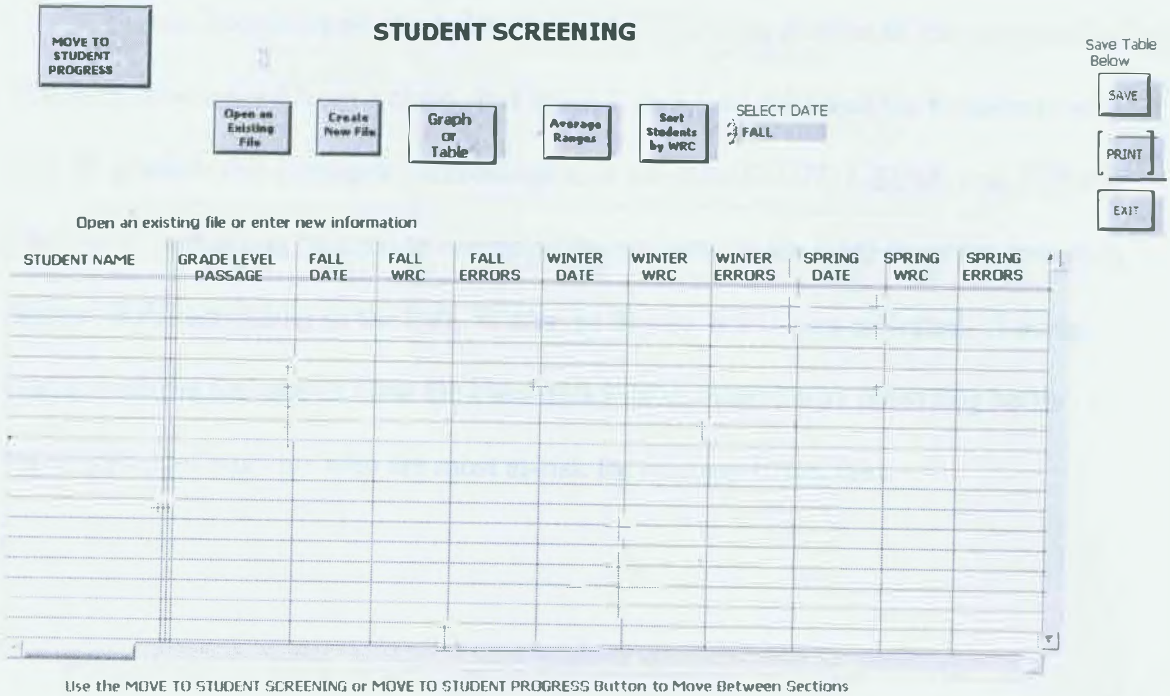
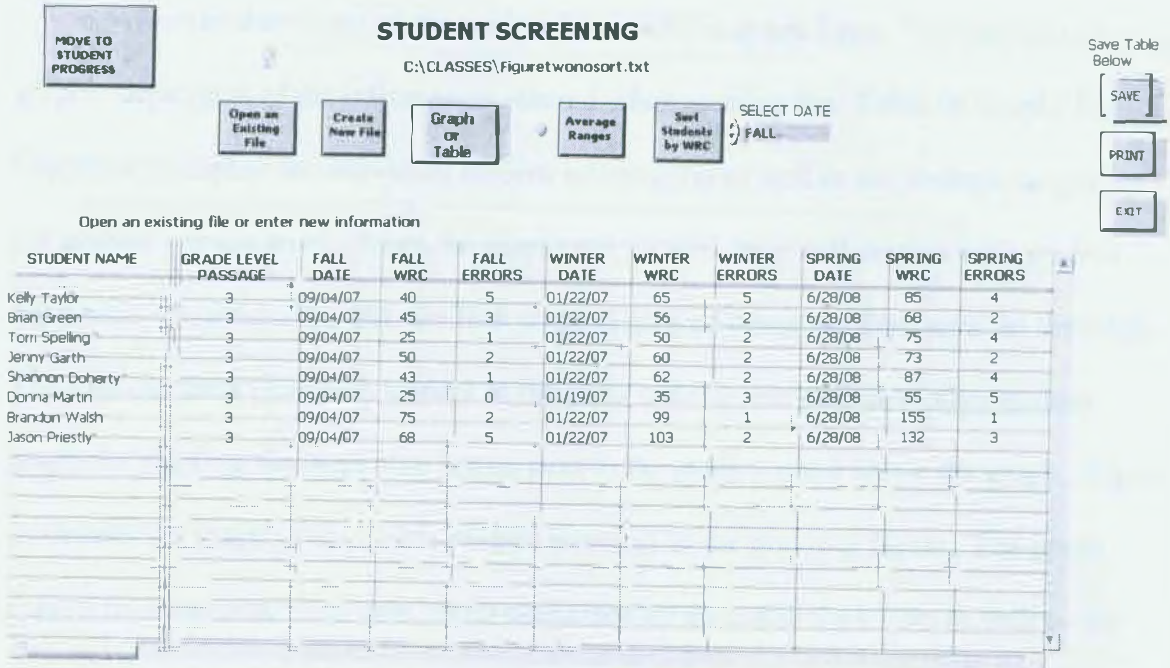


Figure Caption

Figure 1. Classroom Screening Interface before data entry.

Student Screening Example

Figure 2 contains an example of what the screening portion of the program looks like with data entered from a class. In Figure 2, data was collected for 8 students who all read 3rd grade levels passages. Screenings took place on 9/4/07, 1/22/08, and 6/28/08. The "Sort" button can be used to rearrange the students on the table from the lowest to highest WRC according to the Fall, Winter, or Spring WRC data collected. Sorting students allows the user to view the class data in a structured way providing better visualization of students who are most at-risk for reading difficulties.



STUDENT NAME	GRADE LEVEL PASSAGE	FALL DATE	FALL WRC	FALL ERRORS	WINTER DATE	WINTER WRC	WINTER ERRORS	SPRING DATE	SPRING WRC	SPRING ERRORS
Kelly Taylor	3	09/04/07	40	5	01/22/07	65	5	6/28/08	85	4
Brian Green	3	09/04/07	45	3	01/22/07	56	2	6/28/08	68	2
Torri Spelling	3	09/04/07	25	1	01/22/07	50	2	6/28/08	75	4
Jenny Garth	3	09/04/07	50	2	01/22/07	60	2	6/28/08	73	2
Shannon Doherty	3	09/04/07	43	1	01/22/07	62	2	6/28/08	87	4
Donna Martin	3	09/04/07	25	0	01/19/07	35	3	6/28/08	55	5
Brandon Walsh	3	09/04/07	75	2	01/22/07	99	1	6/28/08	155	1
Jason Priestly	3	09/04/07	68	5	01/22/07	103	2	6/28/08	132	3

Figure Caption

Figure 2. Classroom Screening Interface with data entered.

Student Screening Graph

After the data is saved, it can then be viewed in graph form. The user can view graphic depictions of the information entered when pushing the "Table or Graph" button. Graphs will display the individual student information as well as the average ranges for the student's grade level. When the graphs are viewed, they will display each student information individually, with the first graph displayed being the first name on the table. The user can then view each student in the class and the user can view other student graphs by clicking the large blue button next to the student name above the graph. Figure 3 contains the graph of the eighth student screened in the previous figure. The graph depicts the three screening data points connected by the solid black line, as well as the average ranges depicted by the horizontal green lines. This student was performing below the average range for the fall screening, in the average range for the winter, and above the average range for the spring.

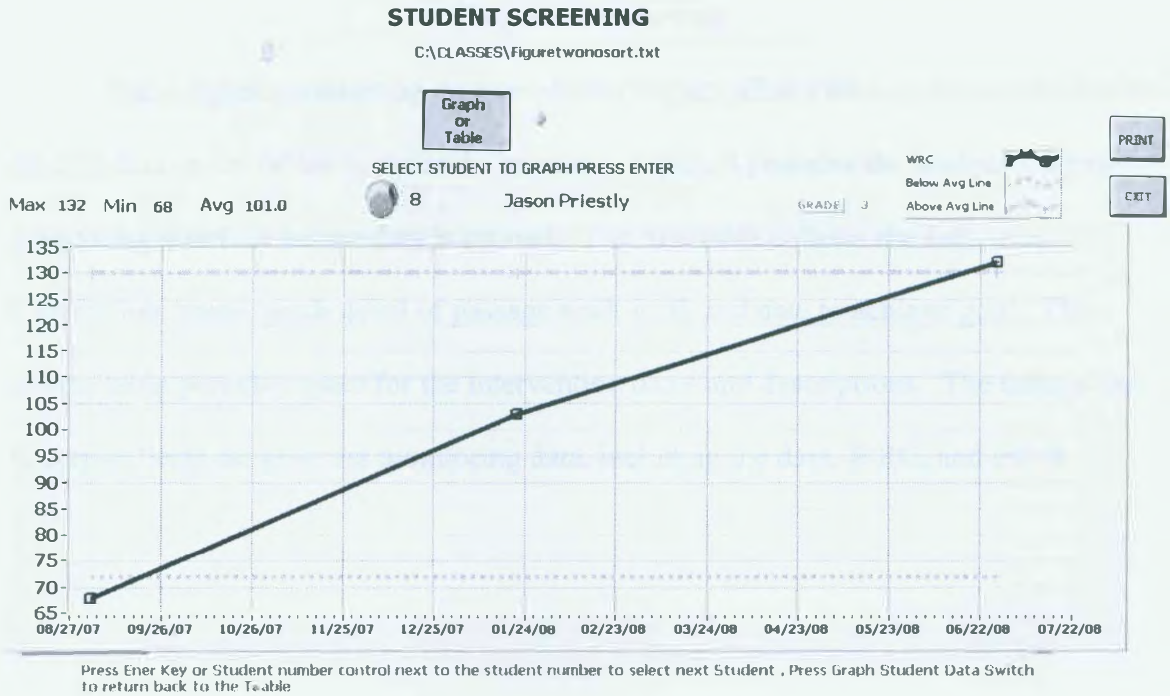


Figure Caption

Figure 3. Classroom Screening Graph: An individual student graph from data collected during screening.

Progress Monitoring

The progress monitoring portion of the program allows the user to store individual student data on the tables in the main interface. Figure 4 contains the student progress monitoring interface before data is entered. The first table collects the following information: name, grade-level of passage read, goal, and date to achieve goal. The middle table provides space for the intervention dates and descriptions. The table at the bottom collects the progress monitoring data, including the date, WRC, and errors.

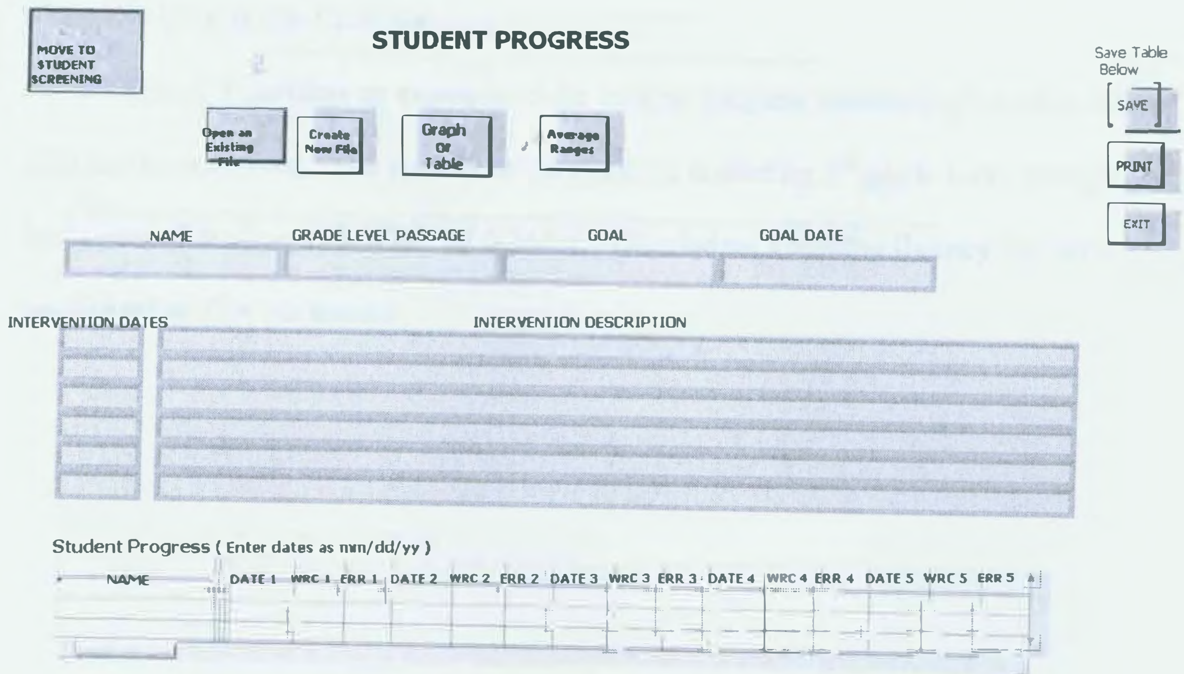


Figure Caption

Figure 4. Student progress monitoring interface before data entry.

Progress Monitoring Example

Figure 5 contains an example of the student progress monitoring interface when data has been entered. The student in the example is reading 3rd grade level passages, and has a goal of reading 125 WRC by 6/26/08. The student's reading fluency has been monitored on five occasions.

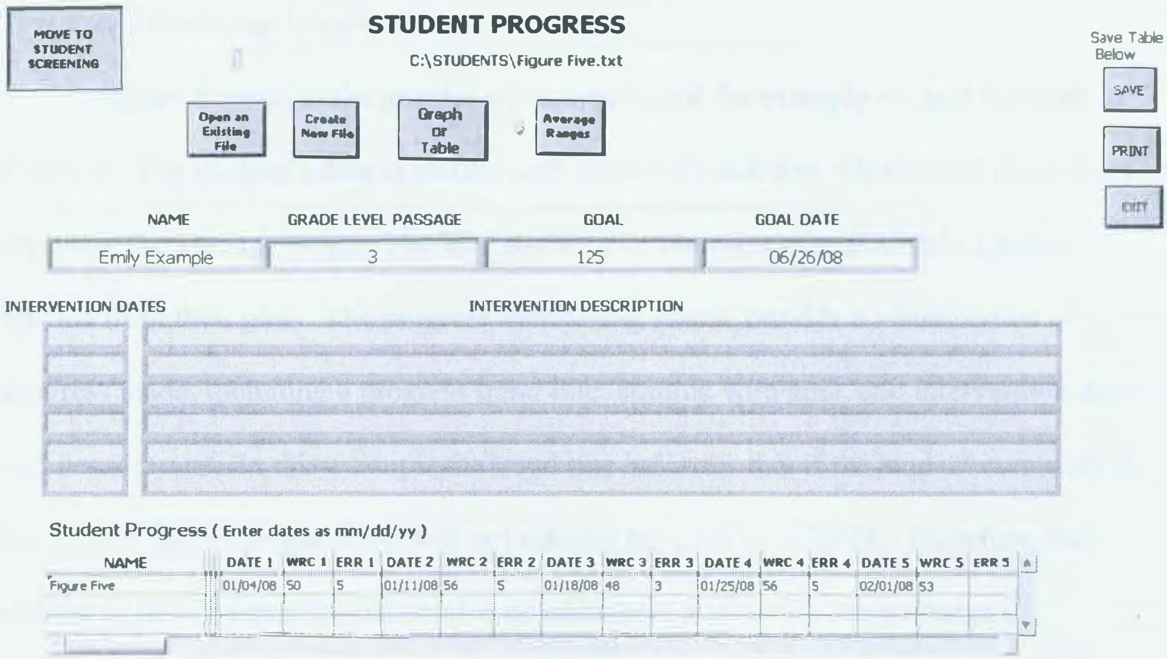


Figure Caption

Figure 5. Student progress monitoring interface with data entered.

Progress Monitoring Graph

Figure 6 contains the graphic representation of the example student depicted in Figure 5. The student's data is plotted with the solid black line. Horizontal green lines represent the average range. The blue dashed line represents the student's aimline created from their goal. The progress monitoring graphs provide a visualization of progress made, including a progress trend line, aimline with goal, and intervention dates and descriptions. In this example the trend line indicates that if the student continues at her current rate of progress she will not achieve her goal by 6/26/08. Therefore, the student in this example should receive an additional intervention or a change in instruction that will increase her rate of progress.

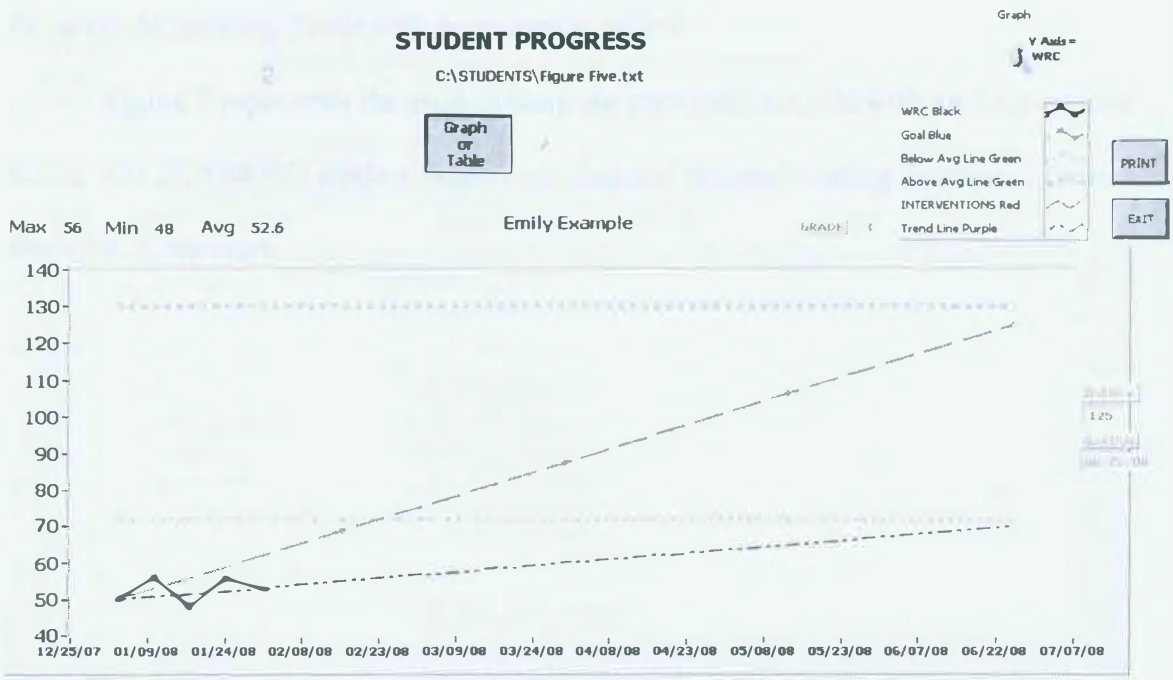
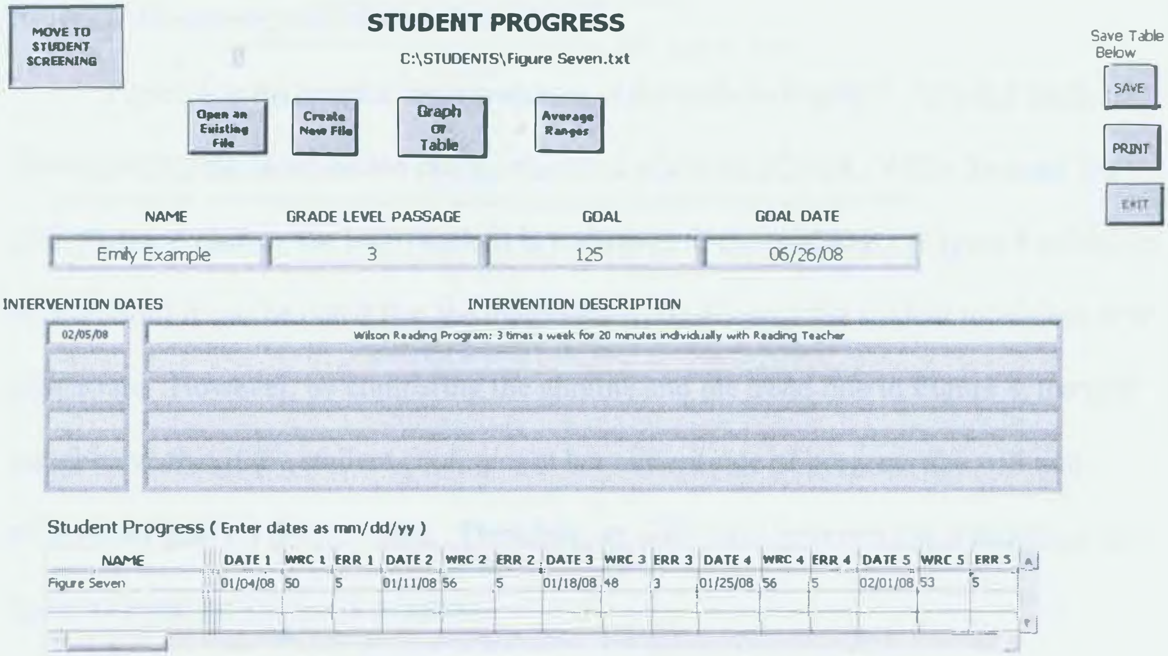


Figure Caption

Figure 6. Student progress monitoring graph: The individual progress of one student before interventions.

Progress Monitoring Table with Intervention added

Figure 7 represents the student from the previous example with an intervention added. On 2/25/08 this student began receiving the Wilson Reading Program 3 times a week for 20 minutes.



NAME	DATE 1	WRC 1	ERR 1	DATE 2	WRC 2	ERR 2	DATE 3	WRC 3	ERR 3	DATE 4	WRC 4	ERR 4	DATE 5	WRC 5	ERR 5
Figure Seven	01/04/08	50	5	01/11/08	56	5	01/18/08	48	3	01/25/08	56	5	02/01/08	53	5

Figure Caption

Figure 7: Student progress monitoring table: Student example with intervention added.

Progress Monitoring Graph with Intervention

Figure 8 is the graphic representation of the table in Figure 7. The red vertical line represents the intervention change that took place on 2/25/08. When the tend line from Figure 6 (before the intervention) is compared to the tend line in Figure 8 (with the intervention) it can be noted that the intervention has allowed the student to achieve at a higher rate. However, by comparing the aimline and the trend line in Figure 8, the user can observe that if the student continues at her current rate of progress she will not achieve her goal on the goal date. Therefore, an additional intervention is necessary to again increase the student's progress.

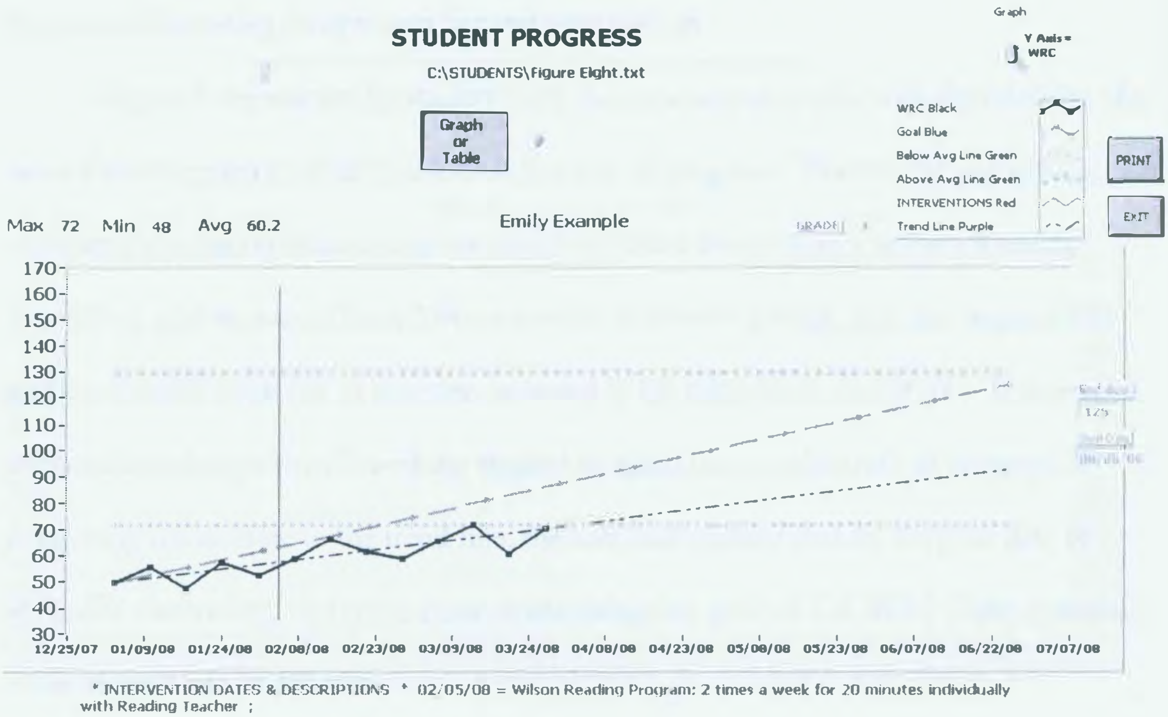


Figure Caption

Figure 8: Student progress monitoring graph: The individual progress of one student with an intervention added to their program.

Progress Monitoring Graph with Second Intervention

Figure 9 represents the student from the previous example, with the addition of a second intervention in order to increase her rate of progress. The second red vertical line represents the intervention change on 04/01/08 when the student's Wilson Reading instruction was increased from 2 times a week to 5 times a week, and she began silent reading twice a week for 15 minutes, as noted in the table under the graph. This second intervention change has allowed the student to again increase her rate of progress. By comparing the aimline to the trend line, the user can observe that on the goal date of 06/26/08, the student will come close to obtaining her goal of 125 WRC if she continues at the current rate of progress.

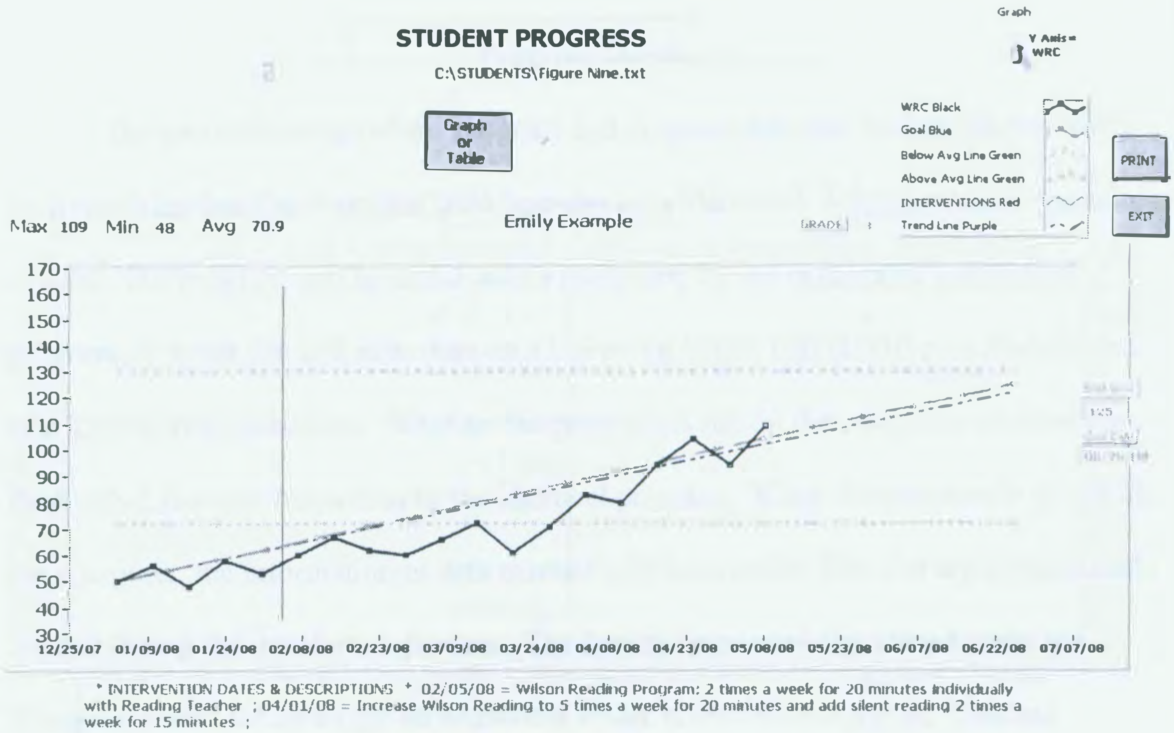


Figure Caption

Figure 9: Student progress monitoring graph: The individual progress of one student with a second intervention change.

Program Storage

The use and storage of the program and program data can be done in two ways; both requiring that the computer used operates on a Microsoft Windows based operating system. The program can be saved onto a computer, by the executable installation program, or it can run and store data on a Universal Series Bus (USB) port flash-drive, also known as a flash-drive. Whether the program is run on the computer, or from the flash-drive, the user has access to the identical program. When the program is stored on the computer, the information or data entered will be saved in files that are automatically created during the installation process. The files are automatically stored under the "Program Files" folder where an additional folder is created and named "Student Progress Monitoring." Additional saved data that is entered into the program is stored on the C drive. The "CLASSES" folder is used to store screening data, and the "STUDENTS" folder is used to store progress monitoring data. When the student information is saved, it will be saved automatically under the student name entered into the table. When the program is used from the flash-drive, folders of the same name are created and stored directly on the flash-drive. Using the flash-drive allows the user to add, save, and open previously saved data on different computers if they choose to do so. However, when using the flash drive, the user must make sure that the computer has an installed Labview Run-Time engine. This is also on the flash-drive must be first copied over to the computers C drive.

Conclusion: Program Use

The previous chapter outlined the basic features and uses of the screening and progress monitoring portions of the program with examples to illustrate how it can be used. Additional directions can be obtained from the Student Progress Monitoring Program Manual. The program user can read the manual to understand the basic features of the program, or reference it when a specific question arises.

The program is intended to provide teachers the advantage of quickly and easily storing, graphing, and interpreting student data for screening and progress monitoring purposes. Research indicates that R-CBM data is a technically adequate tool that can be used to determine which students need more intensive interventions as well as determine if the additional interventions allow them to progress. Due to the positive correlation between R-CBM data and overall reading abilities, collecting R-CBM data may be a convenient way for teachers to easily assess their students' reading skills. This program will allow teachers the convenience of quickly storing R-CBM data and easily communicating the results of the data collection with others. This program will be a valuable device in a school environment that is promoting early identification, monitoring student progress towards proficiency, as well as other RTI techniques that promote students to become successful readers.

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Appendix

Student Progress Monitoring Program Manual

Table of Contents

I. About this program

This program allows teachers to store and graph student's reading fluency data for classroom screening and individual progress monitoring purposes. The screening portion of the program allows a user to screen groups of students to identify those who are performing below the expected level. Screening data can be saved for the Fall, Winter, and Spring. The progress monitoring portion of the program allows a user to monitor students' reading fluency, their goal, and the interventions provided.

II. Loading Program on Your Computer

Compact Disc (CD) Installation

The program will load onto any PC with Microsoft Windows. Place the installation CD into the CD Rom drive and it will automatically load placing an icon on the computer's desktop. The program's installation procedures will occur automatically. If this does not occur, search for 'Student Progress Monitoring' by using the search command in the start menu.

Flash Drive Use

The program can also be used on the flash drive. When used this way, the program will not have to be saved on the computer being used to run the program, and all data will be stored in files on the flash drive. This version of the program is useful for those who will be using more than one computer.

III. Entering New Student Information

Choose Between Screening or Progress Monitoring

When opening the program you will automatically be in the screening portion of the program. To move from the screening portion to the progress monitoring portion the "Move to Student Progress" button can be used. When in the progress monitoring portion the "Move to Screening" button can be used to move to the screening portion.

Entering New Screening Information

When in the screening portion of the program, begin typing information into the table. Enter the student's name, the grade level passage they are reading, the date of the assessment (MM/DD/YY), and the WRC and errors. The WRC and errors can be entered for three assessment times (Fall, Winter, and Spring). Save the information by clicking the "Save" button.

Entering Progress Monitoring Information

After opening the program, click the 'Move to Student Progress' button to move to the Progress Monitoring portion from the student screening portion. The progress monitoring interface contains three tables to enter information. Begin by entering information for a new student in the top table. This includes the student's name, grade level passage, and their goal and goal date.

The table below is where the intervention information is entered. The date the intervention began should be entered on the left portion of the table, and the intervention description is entered on the right. The intervention should be specifically described, including what is being done, the frequency it will occur, the length of time, and who is providing it. An example of this would be the following: phonics flash cards from the Readers Program will be done twice a week on Tuesdays and Thursdays for 20 minutes with Ms. Smith.

The third table on the page is labeled 'Student Progress,' and is where a student's fluency is recorded. Their name, goal, and grade level passage (GLP) will automatically appear in this table. The date of the assessment, WRC, and errors should all be entered into the table each time reading fluency is assessed.

IV. Saving Data

Saving Screening Information

After entering screening information, click the "save" button and a prompt will require the choice between the "Save Class File under a New or Existing Name" and "Add to Existing Class File." The "Save Class File under a New or Existing Name" will save data for a new class, or save additions or changes made to an existing class. The "Add to Existing Class File" will add more students to an already created class. All screening data will be automatically saved in the "CLASSES" folder. Leaving classes in this folder is recommended.

Saving Progress Monitoring Information

The 'Save' button in the progress monitoring will automatically save information under that student's first and last name in the "Students" folder. Leaving files in this folder is recommended.

V. Opening Saved Class or Student Information

To open a saved class, click on the "Open Existing File" button in the Screening portion, and select the class name. To open previously saved student for progress monitoring, first enter the progress monitoring portion of the program by clicking "Move to Student Progress" and next click the "Open Existing File" button and choose the student name.

VI. Sorting Screening Information

Once class information has been entered into the table the 'Sort' button can be pressed to rearrange the students from lowest WRC to the highest WRC. This can be sorted according to the Fall, Winter, or Spring WRC. The organization of the student information in this way allows the user to easily visualize the students who are most at risk for reading difficulties.

VII. Norms

Norms are used to determine which students are performing in the above average range, average range, or at-risk range. The initial norms set in the program are the national norms from AIMSweb (Harcourt Assessment, Inc., 2007).

Average Range

After clicking the norms button a chart is displayed with the 'min' and the 'max' for each grade level. The 'min' is the minimum words read correctly to be considered in the average range, and depicts the 25th percentile. The 'max' is the maximum words read correctly that can be obtained to fall within the average range, and depicts the 75th percentile. Scores below the min are considered below average, scores above the max are considered above average. Graphs will show the average range by displaying min and max lines across the length of the graph.

Changing the norms

Norms may be changed to better fit the needs of a specific class. For example, a second grade class at School 'A' could be reading at a much higher rate than another second grade class at School 'B.' In order to ensure that the lowest readers at School 'A' are receiving extra support, the min and max for that school will be higher.

VIII. Viewing Graphs

Viewing Screening Graphs

The "Graph or Table" button can be used to display the graphs for the students in a particular class. Once viewing a graph from the class, the blue button next to the student's name can be used to view the next student's graph.

Viewing Progress Monitoring Graphs

The "Graph or Table" button can be used to view a progress monitoring graph for the student displayed in the table. When viewing graphs the legend will display the line information. The main graph line can be changed from 'words read correct' to 'errors made' by clicking the "Y axis" button in the top right corner.

Printing the Graphs

The "Print" button can be used to print the graph that is currently being displayed. This feature works for both the screening and progress monitoring graphs.