



LetsGoLearn Final Report #3, Period 1/1/02 to 2/28/02

Small Business Innovation Research (SBIR)  
U.S. Department of Education

**Accelerating the Literacy Achievement of Students through Technology:  
The Design and Development of an Individualized,  
Assessment-Driven, Internet-Based Literacy Intervention**

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**Topic 11. Development or Adaptation of Emerging and Cutting-Edge Technologies for Improving Teaching and Learning in Pre-Kindergarten to Postsecondary Education, or for Supporting School/Classroom Management and Comprehensive School Reform**

**ABSTRACT (FROM GRANT PROPOSAL)**

*Technical Abstract*

Schools around the nation have the challenge of raising the literacy achievement of many struggling readers. It has been shown that targeted, consistent, individualized instruction is the ideal way to accelerate the literacy development of struggling students. However, current models of individualized instruction are traditionally limited to serving only a fraction of the students in need while the pool of trained professionals necessary to implement these programs is scarce. *LetsGoLearn, Inc.* proposes a way to extend individualized literacy instruction to all students and a way for teachers to manage each student's reading progress and apply individualized computer-based activities to authentic classroom practices. It is our intention to 1) complete the design and development of a computer-based diagnostic assessment which would drive individualized instructional activities delivered over the Internet, 2) pilot this initial version of the program at one school, 3) plan the development of an expandable instructional platform, and 4) analyze all data collected to inform future development plans.

*Summary of Anticipated Results and Implications*

Through the proposed research and development plan for Phase I, we anticipate creating a viable model of a dynamic assessment and instruction engine that would deliver, via the internet, targeted, individualized literacy instruction to all students. By Phase II, we anticipate generating more instructional activities to be added to the instruction engine and the development of more features associated with the system. These will include 1) multimedia demonstrations of instructional techniques that teachers could implement to extend individualized instruction into classroom practices, 2) features which would easily allow parents to participate in their child's instruction at home, and 3) the development of features that would allow the product to be implemented in other settings outside of school (e.g., afterschool centers, correctional facilities, etc.). We anticipate that the development of this product could greatly increase the capacity to serve more people nationwide. While literacy problems arise in many institutions and many contexts across the nation, it is our contention that struggling learners everywhere can achieve success through individualized instruction. It is our goal to help the country become "a nation of readers" through the development of this product.

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**FINAL REPORT**

*Note:*

The content in this third and final report will cover progress made since our last report submitted two months ago in addition to a summary of the results of our pilot study.

*Recent Progress: Overview of the Final Stage of Pilot (Jan & Feb. 2002)*

Over the past two months, we have concentrated our efforts on three areas: 1) administering our reading assessment product to students in the Tahoe/Truckee Unified School District (TTUSD) and measuring the results of these assessments against similar pen and paper assessments 2) developing the framework for the instructional component to our product and 3) tapping into the home-school market as a source of revenue. In the process of implementing the assessment engine in schools we have collaborated with the Tahoe/Truckee Unified school district which has a diverse population of students in need. As we work on the implementation of the assessment engine, we started to develop a process (both technically and pedagogically) for integrating an instructional component to our product. The activities we have conducted the past two months have led to many lessons learned.

The process of implementing our assessment product to schools in TTUSD has involved making several trips to 2 primary sites in Lake Tahoe and Truckee, CA. We initially delivered an overview of our assessment to the teachers and principals and then followed up with training sessions on how it works. Once the on-line assessment was implemented, we encountered several glitches that negatively affected the implementation of the on-line assessment in the schools. One problem involved a bug in Macromedia's Flash plug-in for MacIntosh versions of Internet Explorer. The bug in the Flash plug-in made our assessments terminate prematurely on MacIntosh computers. This problem incapacitated the use of our system by Tahoe and Truckee teachers for one and a half weeks as we developed a solution. Eventually, we were able to edit the assessment engine in a way which took into account the bug present in the Flash plug-in.

In addition to modifying our system to work with Flash, we learned, through first-hand experience, a lesson on Internet security. Mid-February, hackers penetrated our server and forced us to lose one week of use as we rebuilt our system. While our data was protected, the nature of their attack made us discover faults in our first layer of defenses. In this situation we learned that we need to allocate more of our resources now and in the future towards security to keep similar breeches and shut-downs from occurring. This means maintaining our security patches more diligently, upgrading our servers, and hiring an information technology company to regularly maintain our server's security. This additional cost is necessary and will become a key point in our financial planning.

In February, we integrated into our assessment product, our initial instructional activity module tied to the first subtest of High Frequency Words. We determined the starting point of the students in the instructional activity based on where they last demonstrated mastery in our leveled high frequency words test list. Our instructional activity then pulled from a larger complete list of high frequency words to drill and test the student. The students only moved forward with instruction as they demonstrated mastery of the current high frequency words. This insured that the pace of instruction was in line with the pace of the student's ability to learn. We currently will

use this initial module as a basis to learn and shape the development of the remaining instructional activities for the balance of our assessments.

As we completed the assessment engine in December 2001, we began to market our product to home-school parents. In the home-school market, we discovered that we will need many more home-schooling web site partners to get significant use by home-schooling parents. This was apparent when our lead partner site, HomeSchool.Com exhibited fewer website hits than expected. Naturally, our web-site also received fewer than expected hits. However, the parents that did purchase assessments for their children have given us an overwhelming amount of positive remarks about our assessment. In general, these parents found the product to be useful because without it, they lacked the technical understanding of the complexity of learning to read and they generally had children with very unique reading profiles. Many of these children exhibited extreme peaks (or areas of high achievement) and valleys (areas of weakness). While our current resources and time preclude us from performing further formal statistical analyses of these home-school children, we will certainly consider this for future planning.

### *Overall Summary of Results of Pilot Study*

#### *1. Development of Assessment and Instruction Engine*

As mentioned in our second progress report, we completed our assessment engine development in December. Since the launch of the assessment engine we have applied many preventative modifications and enhancements. Because our product is a web server application we have been able to update it as needed on a daily basis, making the current version of the assessment tool immediately available to users. For instance, a teacher at TTUSD informed us one day that a student's test suddenly terminated. Upon examining that particular child's profile of use on the server, we discovered that we had a bug that halted that particular student's test because our system had moved that student down a grade on a particular subtest and assumed the test was over. That afternoon we corrected the problem and the next morning the student resumed taking the assessment.

Piloting the assessment engine in TTUSD has helped us in many ways. We have received many useful tips suggestions from teachers concerning our assessment. Some of these suggestions which were already considered in the development process helped us reinforce the need for these features. For instance, teachers have instinctively asked for a feature that would tie the assessment to some sort of instructional activity. To compensate for this developing feature of our assessment, we have included instructional suggestions with each individual profile that is generated for the teachers. Some teachers suggested changing the script of the mascot who guides the student through the assessment. Others have asked us to build in a function that would help the teachers group their students into various profiles to help with their grouping decisions for small group instruction. Some suggestions have been adopted while others are on waiting lists to be reviewed and possibly implemented.

In late December 2001, we finalized the instructional paradigm that the instructional engine would follow. This paradigm moves a student's learning through three domains. These domains are: 1) discrete knowledge: Memory Activities (i.e., letter-sound patterns, sight words, word analysis items, vocabulary words, affixes, etc.) 2) application of knowledge on a word level (i.e., decoding strategies in word recognition, encoding strategies or spelling, vocabulary usage) and 3) application of knowledge on a sentence or passage level (i.e., comprehension, fluency, writing/composition). The computer program would start the instructional engine at the appropriate place given the results of the assessment engine. This instructional paradigm

provides the initial logic which we will use to build the interaction of the assessment engine to instruction and different instructional components with each other.

As we summarized above in the 'Recent Progress' section, we have completed the development of one instructional activity related to the first domain of the paradigm. This instructional activity involves practicing the student's recognition of sight words. We have plans of creating more activities that interact with each other which speak to the individual profiles of each student

## *2. Pilot Beta Version of Assessment and Instruction Engines*

As mentioned earlier Tahoe Truckee Unified School District is extensively testing many of their students using our assessment. The teachers are excited to gain detailed information on how their students are performing in the subskills necessary for fluent reading.

In our pilot testing, we compared our online automated assessment system to the best diagnostic assessment methodology currently available for early readers, which has been developed by the CalReads program in the UC Berkeley Graduate School of Education. But whereas the CalReads assessments are administered to children one-on-one by highly trained specialists with advanced degrees in education, the LetsGoLearn system is an automated tool that requires no staff to administer.

For this test, 20 kindergarten through grade 5 boys and girls were identified by the principal at Glenshire Elementary School, in the Truckee Unified School District, near Lake Tahoe in California. These 20 children were chosen because they all were manifesting difficulties in mastering reading skills appropriate for their grade level. All 20 kids were thoroughly assessed by the LGL system and by the CalReads experts. Both systems assess children of 5 diagnostic outcome variables: 1. Sight-word familiarity 2. Word recognition 3. Word meaning 4. Spelling and 5. Silent reading. The diagnostic outcome variables for both systems were placed on a common scale and correlation coefficients were computed. The correlations between the assessments made by the two systems for the same kids are as follows:

- Sight-word familiarity       $r=.89$     (n=17)
- Word recognition             $r=.81$     (n=20)
- Word meaning                 $r=.60$     (n=20)
- Spelling                         $r=.78$     (n=20)
- Silent reading                 $r=.89$     (n=19)

All correlations are statistically significant beyond the  $\alpha=.01$  level. Note that some of the correlations above are based on fewer than the full sample of 20 children. Observers noted that three sight-word subjects and one silent reading subject did not actually participate in the assessment activity.

Although these correlations are quite good, we are currently evaluating the detailed qualitative observations of our system, provided as part of the pilot study by the CalReads professionals, to improve the accuracy of LGL's assessment algorithms and performance criteria. The LGL system will be continuously refined with more testing, across a broader range of kids and classroom contexts.

Some examples of the kind of refinements we will examine include adjusting our scoring to improve alignment with CalReads. For example, we did not put in a time limit for a correct response for Word Recognition. We will try applying this limit to see if it will help compensate for our reduced correlations. In Word Meaning, the sub test with the lowest correlation, we may

try to compensate by adjusting the word difficulty. The Let's Go Learn Word Meaning sub test has 4 images for students to choose from which provides additional contextual clues.

Qualitatively, we found that the majority of students piloting our on-line assessment enjoyed using it. They usually saw it as a game and not an assessment. As the children moved up in age from the elementary to the middle school level, they did find our graphics less interesting. The entire pilot was performed using our animal theme that was designed for younger children. Due to financial constraints we were not able to build parallel graphic "skins" for older children and adults yet. We do, however, have the hooks in our system to grab different graphics files based on the age of the learner and hope to put these in sometime in April 2002.

Additionally we noticed that younger children generally had more problems initially getting started. Teachers had to explain more thoroughly how the "game" worked and what they were supposed to do. In one of our first versions of the High Frequency Words subtest, our instructions said, "Click on the fly that says the word correctly..." However, when the mouse rolled over the fly, the fly would rise up a centimeter and flap its wings. Younger kids would then try to move their mouse up before clicking. As they moved up, they moved out of the click zone and thus many became confused. We fixed this problem by increasing the click zone. This illustrates the challenge of designing on-line interfaces with younger children in mind. Moving forward we are working on fixing some similar sources of confusions for younger children and have already begun to reword some of our audio instructions that sometimes are too confusing for young children. When younger children are confused we concluded that less words are better than trying to explain more. We will also have a practice area where teachers can have students try the "games" without actually starting a real assessment.

While we have designed the first of many instructional activities we have not been able to pilot this feature of our product in time for this final report. As mentioned above this instructional activity practices the recognition of sight words. The instructional component functions in the following way: Once an assessment is completed our system automatically starts the student with instruction. Instruction begins at the exact level where the student was tested in our assessment. The instructional activity is based on the same Flash module which the assessment module was built. We added some additional user interfaces into the existing module. One module instructs the student by presenting them with a series of words and matching tasks. When they get an answer wrong another module, a correction interface signals the system to continue to instruct the child. The idea is that the student only advances when they have mastered the current set of high frequency words that they are learning.

We do not directly teach the 300 high frequency words present in our assessment engine. We created a separate list of 1000 high frequency words commonly accepted and used by reading specialists. While some of the three hundred words are part of this list, the premise involved is move away from teaching to the test and moving towards accelerating the literacy of the children interacting with our product.

### *3. Prepare Product and Establish Partnerships for Future Developments Beyond Phase I*

We have been very successful at creating effective and innovative partnerships with other companies. We have signed an agreement with a company called Inventive Communication. Inventive Communication is an educational portal that has a URL library that it has currently sold to 3450 schools nationwide. Let's Go Learn, Inc. has had several meetings with Inventive Communication's founder. Currently Inventive Communication is planning on selling Let's Go Learn's assessment along side its product. Our estimates is that come September 2002, the Let's Go Learn assessment can possibly be in use by 175 to 225 schools. This achievement is

extremely important given the costly nature of our development and the need to become operationally profitable as soon as possible.

A public educational company called Scientific Learning has also signed some initial agreements with us to allow them to use our assessment in up to 10 pilots. They have 180,000 students using their computer based reading instruction system but have no assessment component. They are in some extremely large school districts like Los Angeles Unified in Southern California. This will potentially turn into a great opportunity for revenue. Given their long track record in computerized learning, they have already offered us much feedback that we expect to implement this summer.

#### *4. Human Subjects Protection*

Federal Wide Assurances completed and being followed.

#### *5. Financial Update*

Currently, operating the company has been costly and funding has been difficult. Let's Go Learn is in the process of raising a new series B funding round. We hope to raise \$100K in April that will allow us to continue to improve our assessment engine and to continue where our SBIR pilot study has left off. Expanding the supplemental instructional activities to be complete enough for school teachers to use by fall 2002 is our goal. However, if we do not acquire funding we will have to slow down development and wait for revenues to grow. Otherwise will wait and hope for a phase II SBIR grant to be awarded before being able to resume development. Fortunately, the signing of the Inventive Communications partnership will help convince potential investors that revenue is in the pipeline.

#### *6. Future Outlook*

Our future outlook remains strong. Our partnership deals will insure that we can start generating significant revenues in 2002. This is absolutely essential for our survival and growth. Free flowing VC funding is virtually non-existent in the education sector. This means that we need to become financially independent. We have already begun to plan well beyond 2002 and into 2003 and 2004. Our hopes are to provide an effective total solution for schools in the area of reading. This means providing reading assessment, reading instruction tied to assessment that adapts to the learner's pace of development and finally professional development for teachers.

Dr. McCallum has become more and more focused on K-4 teachers. His belief is that good tools and teacher training is necessary for any system-wide literacy program to succeed. We are working towards this goal as well. And our initial foray into this market is the posting of "e-seminars" on teaching reading. We have already posted one 30-minute interactive e-seminar that is free to all teachers and parents that explains a basic introduction to reading theory. Our goal is to create full online courses that teachers can take for credit. The professional development director at Tahoe is extremely excited about this option given their remote location and the difficulty teachers experience when trying to attend courses at university or colleges.

In conclusion, everyone at Let's Go Learn, Inc. is extremely excited about our success to date. Teachers and parents using our site have been extremely happy. Our "new features" list is becoming extremely long as our users get excited about our system and eagerly submit new ideas to us. Our plan is to remain focused but ambitious. By focusing on what is absolutely necessary we can expand our system and add great new tools that will benefit schools, teachers and students. This focus will also allow us to be realistic and make our deadlines. While we do not want to create ideas too grandiose to be implemented, we do need to be ambitious and do what no one else has done.

Thank you for your support in the phase I SBIR grant. In addition to the direct financial support it provided, the prestige and validation that it has brought to us has been invaluable. We look forward to applying to the phase II competition and hope to be given a phase II award to help us accomplish our goal of helping every child become successful readers. Once again thank you for your support and we hope to be working with the U.S. Department of Education in the future.

**Appendix A: "Work Plan Activities" as submitted in original grant proposal**

<b>WORK PLAN ACTIVITIES</b>	Sept. 2001	Oct. 2001	Nov. 2001	Dec. 2001	Jan. 2002	Feb. 2002
<b>Development of Assessment and Instruction Engine</b>						
Adapt assessments for delivery on web						
Development of database to analyze patterns of error						
Development of instruction engine framework: align to assessment database						
Development of instructional objectives						
Development of instructional activities						
Development of embedded instruction engine matrix to analyze and adjust instruction assessment according to student progress						
<b>Pilot Beta Version of Assessment and Instruction Engines</b>						
Obtain consent from teachers to pilot beta version of program						
Orient teachers to the program: conduct needs assessment						
Administer assessment measures to students						
Administer beta version of instructional activities						
Collect qualitative data and quantitative data						
Analyze qualitative and quantitative data						
<b>Prepare Product and Establish Partnerships for Future Developments Beyond Phase I</b>						
Develop platform logic to easily add other features for post Phase I						
Commence planning for future developments and features						
Develop current partnerships						
Seek new partnerships						
Disseminate results of study						