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Submitted by Joy Pieper and Andrea Dinaro

Using iPad Adaptations to Promote Active Participation in Story-Based Lessons for Learners with Multiple Disabilities

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Abstract
Literacy and technology are critical to 21st century learner outcomes. College and career readiness, as well as communication should be accessible to all learners and levels of supports. Providing access to iDevices can be especially challenging for learners with multiple disabilities. Five classroom teachers implemented new hardware (i.e., wireless switch, mount, or stylus) and software (i.e., scanning or sequencing apps) adaptations to their classroom iPads in order to measure participation in the research-based literacy framework known as Story-Based Lessons (Browder, Mims, Spooner, Ahlgrim-Delzell, & Lee, 2008; Browder, Trela, & Jimenez, 2007). Systematic Instruction using a prompting hierarchy (most-to-least intrusive prompts) was used over a 4-week period. Five students participated in the project ranging in age from preschool to high school. A Single Subject A-B Research Design and descriptive statistics (i.e., mean) was conducted to measure teachers’ and students’ quantitative pre/post results. The results showed that (a) all students maintained or improved their participation, and (b) teacher efficacy increased (frequency of implementation, knowledge, confidence, and relevance). The results of this project are useful to provide information, guidelines, and future trainings to assist teachers in using their iPads to differentiate their lessons. The implications for practice relate to identifying meaningful apps for use during academic instruction, providing targeted training on selected apps, prioritizing training on up to two adaptations at a time, and consistent implementation in access opportunities.

Purpose
Differentiated instruction is essential in any classroom. In order to ensure that all students are able to participate in and acquire skills from the lessons, students require access. Even with advances in technology, it can be challenging for teachers to differentiate for all students. Particularly when the physical and cognitive needs of the students require intensive supports, and can vary widely within one classroom. Currently, our Cooperative implements a research-based accessible literacy framework known as Story-Based Lessons (SBL) (Browder, Mims, Spooner, Ahlgrim-Delzell, & Lee, 2008; Browder, Trela, & Jimenez, 2007). Pre-intervention reflection identified that teachers were eager to learn how to provide access:

- “Currently, it is difficult to adapt the iPad to be functional for my students. I don’t know how to make the necessary adaptation, and also need hardware adaptations to allow my students to better access the iPad.”
- “I am very proficient on the iPad. I just need some training on how it can be used in our Programs.”
With the SBL curriculum framework, we continuously aimed to increase active participation, language use, literacy skills, and self-determination through systematic lessons by providing access to adapted grade level stories. Although the SBL framework is specifically designed to differentiate for children with varying abilities, many students with significant intellectual and physical disabilities are unable to fully participate in the lessons without access to assistive technology. To provide ongoing supports for learners with diverse abilities, our Cooperative had recently purchased an iPad for each classroom. The iPad is a useful instructional tool and it was our responsibility as educators to identify innovative ways to reach all students by providing UDL principles. Therefore, since many students with the most significant intellectual and physical disabilities were unable to access the iPad through the typical touch screen method, and because teachers also struggled to adapt and use the iPad to differentiate SBL to be accessible to all students, this project was essential to continue to expand differentiated instruction to all learners. This project allowed staff to determine successful adaptations and apps that were necessary for students who require the most extensive level of supports.

**METHODS**

Qualitative and quantitative methods were used to collect data. Event recording was used for level of participation, and accuracy in activities. Staff pre- and post-surveys provided specific data on characteristics, perceived knowledge of iPad adaptations, confidence level for SBL implementation, confidence level for programming and implementation of iPad accommodations, perceived relevance of SBL instruction, perceived relevance of programming and implementation of iPad accommodations, and open-ended comments. Additionally, a post-implementation semi-structured focus group was conducted with the teachers for additional reflections about the process and tools.

**Expenditures**

There was a slight variance in the proposed items and purchased items. The final total was the same but the apps were more expensive than we initially had anticipated, so we reduced the number of Cordless Super Switches from two to one. The funds provided by this grant were used to implement the Using iPad Adaptations to Promote Active Participation in Story-Based Lessons for Learners with Multiple Disabilities (initially submitted to IAASE as the ‘Using Technology to Promote Active Participation and Learning in Story-Based Lessons’ project) as follows:

<table>
<thead>
<tr>
<th>Product</th>
<th>Company</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>iPad Sound System w/ Mounting Arm</td>
<td>Enabling Devices</td>
<td>$289.95</td>
</tr>
<tr>
<td>iPad Cordless Super Switch Stylus</td>
<td>Enabling Devices</td>
<td>$199.95</td>
</tr>
<tr>
<td>Adjustable Touch Screen Stylus Replaceable Tips (set of 6)</td>
<td>Enabling Devices</td>
<td>$37.95</td>
</tr>
<tr>
<td>iPad Apps</td>
<td>Various via iTunes gift card</td>
<td>$500.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>$1,159.80</strong></td>
</tr>
</tbody>
</table>
Participants

Five teachers and five students participated in this project comprising five dyads (student and teacher pairs). The project implementation occurred in special education self-contained classrooms within a self-contained building. Participants ranged in age and grade level. Five students ranging in age from Preschool to 12\textsuperscript{th} grade participated in the project: Preschool (1), Intermediate (3), and High School (1). All participants received special education services. Student participation primarily included receptive choice-boards, gestures, emotions, facial and body language expression, and picture/symbol/icon selection for materials.

Selection of Adaptations

The iPad Sound System w/ Mounting Arm and iPad Cordless Super Switch were used for students with physical disabilities who are unable to access the iPad through the touch screen. The Adjustable Touch Screen Stylus and replaceable tips were used with students who can use the touch screen but struggled with fine motor actions and finger isolation. This equipment was necessary to ensure that all students are able to access the iPad. The various apps were determined through extensive research of the options, communicating with the makers of the apps, and collaboration with the Cooperative’s Assistive Technology Specialist. These apps were considered based on how well they allowed the students to participate in SBL by

- reading a repeated storyline
- directing the reader to turn the page
- answering questions about the book

Teachers were asked to implement two adaptations for the project, one hardware and one software. For example one teacher used a scanning app and a wireless switch. Additionally, they may have used a mount.

Data Collection

Teacher’s self-rated knowledge, confidence, and relevance were measured (i.e., not, somewhat, moderately, proficiently/mostly and very’) using a likert-type scale survey created using the online survey software SurveyMonkey. Student participation was measured based on the percentage of opportunities provided in the literacy lesson to: (a) make a selection to read the repeating storyline, (b) select vocabulary, (c) respond to a comprehension question, or (d) provide a comment about the story or activity. A minimum of 3 baseline data points were collected and a minimum of 4 probes after intervention were collected once per week.

RESULTS

Prior to the start of the study, all students had learned the areas of SBL and were able to participate using paper-based materials, single level VOCAs, or rocker switches. In baseline data collection, students were able to demonstrate their knowledge of SBL procedures. We were able to control for this potentially confounding variable by establishing that the students already knew the instructional procedures in 90\% of opportunities. Once the intervention phase began, the student’s participation was maintained or increased, or their independence in participation increased (by decreasing the intensity of the prompt level). During the project, 4 out 5 students were observed to use both the hardware and software iPad adaptations to maintain or increase their participation. One student showed a decrease in one of the two adaptations when using the stylus adaptation with the iPad.
When participants were asked to debrief on their experiences, common themes included (a) increased motivation to incorporate iDevices into instruction for learners with multiple disabilities, (b) interest in additional training to continue to expand skills in adaptations and apps, (c) apprehension with the quick and short implementation timeline, and (d) effects on student achievement. One participant commented on how their team had difficulty with implementing the skill of scanning into their literacy instruction: “I’m so glad you did this because I was struggling scanning for SBL. Now I can use the iPad app. It’s so easy!” This demonstrated the increased teacher efficacy of implementing the iPad and the ability to blend methodologies.

Two teachers discussed their experiences with the critical benefits of access and engagement. One teacher explained an unexpected increase in independence of participation with dramatic fading of prompts from ‘hand-over-hand’ to ‘visual’ in just 4 weeks: “Would I, as the teacher, had known she could do this [without the adaptations for the iPad]?” This exemplifies the importance of providing multiple means of engagement, expression, and representation. The other teacher pointed out the benefit of engagement: “I feel pretty confident in creating story-based lessons on the iPad. My students seem to enjoy it more when it is on the iPad rather than having multiple switches in front of them.” Lastly, one teacher reported direct outcomes of providing adaptations to the iPad: “The iPad with switch and scanning apps have allowed the student I was working with for this grant to participate in all of the components of SBL, instead of the 2 or 3 she was able to do before [using single VOCAs]. Without the adaptations, she would only be able to select from a field of one, and wouldn't be able to make choices or comments.”

<table>
<thead>
<tr>
<th>Aggregate Average Teacher Pre-/Post-Survey Results</th>
<th>Pre</th>
<th>Post</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of use of iPad for academic instruction</td>
<td>40% multiple x/day</td>
<td>60% multiple x/day</td>
<td>+</td>
</tr>
<tr>
<td>Knowledge of iPad adaptations</td>
<td>1.78/5.0 mean</td>
<td>2.88/5.0 mean</td>
<td>+</td>
</tr>
<tr>
<td>Confidence in SBL methods</td>
<td>2.2/5.0 mean</td>
<td>3.32/5.0 mean</td>
<td>+</td>
</tr>
<tr>
<td>Confidence in creating adaptations for iPad</td>
<td>2.76/5.0 mean</td>
<td>3.32/5.0 mean</td>
<td>+</td>
</tr>
<tr>
<td>Relevance of SBL to learners</td>
<td>3.72/5.0 mean</td>
<td>4.6/5.0 mean</td>
<td>+</td>
</tr>
<tr>
<td>Relevance of iPad adaptations to learners</td>
<td>4.8/5.0 mean</td>
<td>4.8/5.0 mean</td>
<td>=</td>
</tr>
</tbody>
</table>

Finally, the 4 out of the 5 students demonstrated the ability to focus and utilize an iPad (that as its design is a dynamic display technology tool) only by teacher-implemented hardware and software adaptations. Because this project focused on teaching the staff how to utilize adaptations for the iPad to teach literacy skills using an existing framework, the accuracy and participation trials with the students occurred in a very short timeframe. Additionally, the teachers were directed to instruct for 4 days and assess on the 5th day. They were directed to decrease their prompting level if participation was 60% or more. If this project were replicated, it is recommended that the prompting measures be individualized to focus on typical participation and implementation for the individual learner.

Project Goals

Two main goals guided the project. Student participation and teacher perceptions were measured. The goals of the project were achieved:
Goal 1: Students will increase active participation or independence level when participating in Story-Based Lessons using the iPad.

Using a frequency count to track opportunities for participation and, four of the five students had shown an increase in participation in one of the areas using adaptations for the iPad (repeated storyline, vocabulary, comprehension question, or making a comment). One teacher participant best summarized the outcome:

“Without these adaptations, many of my students would not be able to access the iPad at all. The switch, mount, and scanning apps have allowed my students to use the iPad for learning, recreation, and communication. The iPad is now for them, not for me, as it was before the adaptations because they weren't able to access it. In fact, the student that I trialed the adaptations with for the grant is getting a switch, mounting system, and scanning apps for an iPad at home! What a great way to increase generalization over multiple settings!!!”

Goal 2: Teachers will maintain or increase their confidence level of implementing Story-based Lessons when moving from paper-based or single switch-based access, to using the iPad for student responses.

Using a pre- and post-test for self-reflection, one teacher maintained their confidence level and four out of five teachers rated an increased level of confidence when implementing SBL using the iPad. One teacher reflected on her increase in her comfort level to implement iPad accessibility: “I feel more comfortable than I did before the grant project. I have been able to make it more accessible to a variety of learners in my classroom. I'm eager to become more proficient with the adaptations.”

DISCUSSION

This project was essential to continue to expand differentiated instruction to all learners. It also allowed staff to determine successful adaptations and apps that are necessary for students who require the most extensive level of supports. Teachers were able to increase their ability to differentiate using an iDevice to create access to apps for participation in literacy lessons.

- Adaptive equipment for the iPad were identified and measured as effective for students with limited mobility as applied to the researched-based SBL framework.
- The lead researcher identified apps that enhanced differentiated instruction using the iPad during SBL with students with multiple disabilities.
- The lead researcher, assistive technology coordinator, speech and language pathologist, and occupational therapist provided specific examples and recommendations of how to use the adaptations to differentiate for a variety of students.
- The co-researchers developed guidelines for how to use the iPad for differentiation during literacy lessons.
- The short time frame did not allow for the ability to identify changes regarding accuracy, or expand on adaptations.
- Although teachers rated their ‘Knowledge of iPad Adaptations’ higher in the post-reflection by 1 point, each teacher implemented 2 adaptations of the 5 listed. This may have affected the anticipated increase.

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• The co-researchers created a data collection tool, procedures and method of analysis to measure if students were effectively using the iPad with adaptations to participate in SBL. Data was collected using this tool once a week for each student in the participating classroom to measure student participation.

• After implementation of the SBL framework using the iPad, the self-rated relevance of the literacy framework increased; this may help teachers’ efficacy regarding adaptations for access to literacy as it relates to technology.

• All teacher participants felt that being able to learn how to identify and implement adaptations for the iPad was and will continue to be essential for learners with multiple disabilities.

In closing, we want to express our gratitude for the IAASE Innovative Practices mini-grant program; it does make a difference. Our reflection echoes a teacher participant’s: “I look forward to seeing the possibilities and how its use in the classroom can directly impact our students.” The participants not only enjoyed the lessons and materials provided by the grant award but made measurable gains, meaningful reflections, and are already making plans to continue this exploration. Again, thank you for supporting our project.

REFERENCES


Appendix A

Final Implementation Timeline:

- Implementation date
  - December 2012
- Funds used
  - Equipment purchased (hardware)
  - iTunes gift cards purchased
  - Apps purchased (software)
- Planning
  - Grant co-leader meetings (Joy and Andrea)
    - Planned for purchases
    - Teacher recruitment for project
    - Timeline planning
    - Hardware and software review/explore
    - Research design
    - Fidelity, reliability, validity
    - Data collection tool (student and teacher)
    - Discussed informed consent for student participation (possible video)
    - Survey development
    - Collaboration and communication with administration
- Full Implementation:
  - Five classroom teacher participants
    - Selected one student per classroom
      - Demographics: grade/age, gender, range of supports
  - Single Subject Research A-B Design
    - Implementer training occurred April 9, 2013
  - Apps handbook distributed to participants
  - Baseline—Minimum of 3 baseline data points collected (pre-test) on participation
  - Teacher participant pre-assessment survey distributed March 28, 2013
  - Teacher participant post-reflection survey distributed May 22, 2013
  - Final meeting with co-leaders and participants occurred on May 22, 2013 (anecdotal data collected)
- Reflection
  - June 1, 2013: The teacher and Curriculum Coordinator will create the final report for IAASE. The teacher and Curriculum Coordinator will create a proposed plan for the administrators at the cooperative, describing how this program should be implemented with other classrooms. This plan will include details on trainings that should be offered and any additional costs for equipment. After the completion of this project, the teacher and Curriculum Coordinator will collaborate with AERO Cooperative administrators to create a plan to use the results of this program to assist with differentiation of Story-Based Lessons throughout the cooperative. Once this project is complete, the goal is to have guidelines, examples, and trainings for all teachers regarding how to use the iPad and adaptations to differentiate Story-Based Lessons.