How Can we Improve Teacher Decision-Making in the Use of Open Education Resources?

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Abstract

The greatest barrier to the effective use of Open Education Resources (OERs) is the time required to locate, identify, evaluate, and integrate them into existing instruction. Researchers have found that locating credible OERs was time consuming, and in some cases, impractical due to the confusing multitude of repositories and distribution channels. When teachers do find the time to search, vet, and link relevant OERs, there is no systematic feedback loop to support communication between students and teachers about how OERs are influencing their learning. In short, the number of decisions that teachers are required to make to provide differentiated instruction undermines the potential benefits of using OERs. To address this problem, a development initiative was launched to address the question: "*How we can improve teacher decision-making around the use of OERs?*" A design-based research model was adopted to iteratively develop and evaluate a tool called the *CatchIt App*. This research model is based on the ongoing development and evaluation of tools through the ongoing collaboration of researchers, developers, and teachers. The CatchIt App included: (1) an *Import Feature* to import existing standards-based assessment data in math into the CatchIt database, (2) a *Decision-Making Algorithm* that used assessment data to scan and sort tagged resources linked to student skills to create a list of "best bet" resources related to improving math skills; these personalized collections of vetted OERs (i.e., lesson plans, instructional videos, games, songs, practice materials, etc.) had previously been tagged for alignment to the Common Core State Standards and state standards, and (3) a *Feedback Loop* whereby educators and students were prompted to rate, review, and comment on the selected individual OERs and provided an opportunity for a teacher to determine how well a student liked a resource and would recommend it to others. Participants were four 5th grade math teachers, the students in their classes, and four students judged as at-risk for math failure by their teacher were targeted for more intensive data collection efforts. Visits were made biweekly over a seven-month period to collaborate with teachers and to collect data and determine what should be changed to improve usability, feasibility, reliability, validity, and fidelity of implementation. Overall the CatchIt App was reported as a highly useful tool to ease and improve decision-making related to the use of supplemental materials in 5th grade math for the teachers in this school. The four target students and the majority of other students similarly reported that they liked the CatchIt App, and preferred its resources over other math resources. More research needs to be conducted to demonstrate that more targeted and efficient use of OERs can lead to improved learning outcomes that can be measured on math measures that are technically adequate. However, the data indicate that both students and

teachers are motivated by the role of student choice in selecting resources from a targeted set of "best bet" resources. This finding should be used as a central component of future research on the use of OERs in schools.

Introduction

The U.S. Office of Technology (USOT) defines open education resources (OERs) as teaching, learning, and research resources that reside in the public domain or have been released under a license that permits the free use, reuse, modification, and sharing with others (NETP, 2017). These resources are intended to increase equality, keep content relevant and of high quality, empower teachers, and save money. With this definition in mind, the USOT has endorsed the benefits of school districts transitioning to openly licensed educational resources to improve student learning.

Despite this endorsement, the greatest barrier to the effective use of OERs is the time required to locate, identify, evaluate, and integrate them into existing curriculum and their instruction. Researchers found that locating credible OERs was time consuming, and in some cases, impractical due to the confusing multitude of repositories and distribution channels (Leacock & Nesbit, 2007). Data collected in previous early-adopter implementations from 2016 – 2019 indicated that many teachers spent approximately 10 hours each week outside of the school day, (36 week/year = 360 hours of uncompensated time) searching the Internet for supplemental resources to support student learning (McCord & Ben-Hanania Lenz, 2020)

When teachers do find the time to search, vet, and link relevant OERs, there is no systematic feedback loop to support communication between students and teachers on the student's opinion of how the OERs are impacting their learning (McCord & Lenz, 2020). In short, the number of decisions that teachers are required to make to provide differentiated instruction undermines the potential benefits of using OERs. In addition, since OERs requires access to thousands of websites, information on student performance upon completion of OERs is difficult to manage and determine their impact on learning.

These issues must be addressed if OERs are going to be effectively integrated into the instructional process in ways that will improve student learning. Even in those school districts that have made a commitment to using OERs, OERs are used to supplement the core curriculum, which positions the use OERs as an add-on to the regular curriculum. Therefore, the time required to make decisions related to integrating OERs as supplemental resources places additional decision-making demands on the teacher. However, that is the planning challenge that most teachers initially face in effectively using OERs

To address this challenge, *ZUNI Learning Tree* applied for and was awarded a grant from the U. S. Department of Education Small Business Innovation Research initiative* to develop tools to improve teacher decision-making practices about the use OERs to improve learning in 5th grade math classes. Implementation, evaluation, and design activities took place over an eight-month period (June 2020 through January of 2021, during the Covid-19 pandemic.

The decision-making tool was developed using a designed-based research model. This research model is based on the ongoing development and evaluation of tools through the ongoing collaboration of researchers, developers, and teachers. Using the ZUNI Learning Tree Web-based App and OERs library as a foundation, the research team, comprised of ZUNI researchers and four fifth grade math teachers, teaching in a small school district in Southeast Arkansas, developed the CatchIt App. General usage data and feedback were collected on all students in

each class, while more intensive data, in the form of interviews, observations, and questionnaires, were collected on the four teachers and the four target students in each class. Data were collected over a seven month period.

The CatchIt App included: (1) an *Import Feature* to import existing standards-based assessment data in math into ZUNI's database, (2) a *Decision-Making Algorithm* that will use assessment data to scan and sort tagged resources linked to student skills that will become suggested "best bet" resources related to improving math skills; these personalized collections of vetted OERs (i.e., lesson plans, instructional videos, games, songs, practice materials, etc.) had previously been tagged for alignment to the Common Core State Standards and the Arkansas state standards, and (3) a *Feedback Loop* whereby educators and students were prompted to rate, review, and collaborate on the selected individual OERs and provided an opportunity for the teacher to determine the degree to which a student liked the resource and would recommend it to others. The Feedback Loop provided an opportunity for an exchange of information and to collaborate on the assignment of future resources as supplemental assignments. Together these features allowed the teacher to create personalized set of "best-bet" resources for each student. The teacher could then select which resources to assign, and the student could then select the order in which resources might be completed to increase learning for a specific skill area.

The four participating teachers used Eureka Math as the primary curriculum, but reported early in the project that the supplemental math resources in their curriculum were limited. The iReady test from Curriculum Associates test was used as the primary math assessment. While the test suggested instructional resources from Curriculum Associates, based on test scores, teachers indicated that students quickly became bored with the iReady suggested resources. All teachers reported that they did not have time to search the internet and vet resources for individual students. They reported that finding supplemental resources was very important in the provision of additional math instruction and practice, because many of the students in their 5th grade classes were performing at the first and second grade levels.

Initial implementation started with professional development in how to use the ZUNI Learning Tree App and the process for accessing the ZUNI library of OERs. Teachers first launched and used the ZUNI Learning Tree App across the first few months of the school year in their classrooms. After professional development in the initial version of the CatchIt was provided, the CatchIt App was then introduced to students by the ZUNI Researchers. Weekly online meetings were held with teachers to debrief implementation experiences. ZUNI researchers visited teacher's classrooms and their students about every two to three weeks, based on scheduling availability. Visits were made biweekly to collaborate with teachers and to collect data and determine what should be changed to improve usability, feasibility, reliability, validity and fidelity of implementation over a seven month period.

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An analysis of the data led to the following findings and conclusions:

1. A variety changes were made to increase CatchIt usability. These changes were based on watching teachers and students interact with the CatchIt App as well as discussing problems and suggestions made by both teachers and students. These changes led to more efficient

access to and use of the suggested resources generated by the CatchIt App for both teachers and students.

2. Teachers reported that the App should suggest about five OERs for each student, rather than all the resources possible. They found that more than five OER suggestions of OERs per student led to difficulty managing and assigning a large amount of resources. Initially, when they were reviewing and assigning resources for just their four target students, it seemed efficient; when they had to look at assignments for 20 students, it was more time consuming.

3. The current amount of class time that teachers assigned supplemental math resources was 30 minutes daily; teachers recommended that the OERs generated by the CatchIt App should be used for at least 20 minutes daily of the 30 minutes allocated.

4. Overall all four teachers, the four target students , and the majority of other students across the four classes, reported high-levels of satisfaction with using the CatchIt App. When providing feedback, some students had difficulty distinguishing between problems with school-based technology and internet speed (e.g., slow internet connections) and problems experienced in using the CatchIt App. Therefore, satisfaction responses collected in questionnaire and surveys required individual follow-up. Future research activities should take this problem into consideration to accurately identify design changes for the App.

5. Three target students stated that the games helped them to better understand decimals. All students reported to their teachers that they wanted them to use OERs more often.

6. Teachers reported that they felt that resources generated by the CatchIt App would be an import addition to virtual learning and indicated that it is essential for students and parents to have access to engaging resources at home. There was considerable concern that students were doing very little at home and, if the majority of materials available for virtual learning needed to be printed, this might be a barrier to learning. They felt the online interactive tools and games could help minimize the learning gaps some students experienced. Teachers also expressed concern about how to grade student completion of supplemental resources (e.g., completion of interactive games) and managed in their systems as part of the use of ongoing formative assessments and progress monitoring.

7. An ongoing concern of teachers was the difficulty they experienced using the iReady assessment which linked test results to Curriculum Associates' resources and the need to import the IReady assessment data into the CatchIt App to get suggested resources. Teaches reported that the CatchIt App and its usability, and possibly the feasibly of using the App on an ongoing basis for all students, would be greatly increased if the assessment of student math skills was built into the App rather than needing to import assessment data from an outside assessment. This concern was expressed by all teachers during the research period.

8. All four teachers concluded that they believed that the use of the CatchIt App improved their decision-making in use of OERs and improved student learning. Given that the teachers were faced with integrating more online learning experiences into their teaching due to the pandemic, they saw the CatchIt App as a way of meeting increased demands to individualize under a variety of teaching conditions.

9. Teachers felt that an increased use of OERs as a larger resource in the math curriculum depended on at least four critical variables. First, how strict a school is on allowing teachers to use OERs would influence the overall use of OERs in their classrooms. Second, increased use of OERs would depend of how easy these resources are to locate, share, and assign to students and share information with other teachers. Third, use of OERs would increase if

they could more efficiently link assessment data to resources to increase the validity of their use in the learning process. Five, more research and evidence that the use of OERs will improve student achievement would play a significant role in OERs becoming used as a central part of the core curriculum.

Conclusions

Overall the CatchIt App was reported as a highly usable tool to ease and improve decision-making related to the use of supplemental materials in 5th grade math for the teachers in this school. The four target students and the majority of other students in the classes of the four teachers similarly reported that they liked the CatchIt App. More research needs to be conducted in order to demonstrate that a more targeted and efficient use of OERs can lead to improved learning outcomes that can be measured on math measures that are technically adequate. However, the data indicate that both students and teachers are motivated by the role of student choice in selecting resources from a targeted set of "best bet" resources. This finding should be used a central component of future research on the use of OERs in schools.

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About the Authors

Dr. Keith Ben-Hanania Lenz has over 30 years of experience in conceptualizing and developing innovative research, development, and training projects to improve instruction and outcomes for adolescents and adults with disabilities. He has been a major contributor and author in the development and validation of the *Strategic Instruction Model*, *The Learning Strategies Curriculum*, and *Content Enhancement Routines*. He currently coordinates Special Education Graduate Programs and teachers in the Elementary, literacy, & Special Education Department at UCA. For more information, he can be reached at this email address: blenz1@uca.edu

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