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Shaking Up Assessment: Integrating Low and High Technology Tools

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Abstract: Assessment is an important component of education because it communicates whether the academic goals are met within a class. Generally, assessments offer opportunities for educators to target their teaching goals and to measure the extent to which the expected goals are attained (Madani, 2016). Incorporating the right technology provides opportunities to enhance teaching and learning. This article presents several low- and high-tech tools that middle grades educators can integrate into their instructional practice as a developmentally responsive way to facilitate the assessment process.

Keywords: assessment, digital tools, technology integration, technology toolkit

Background

Assessment is an important component of education because it communicates whether academic goals are met. Assessment paired with instructional goals is the cornerstone of a teacher's instructional methods. It can become easy to stick to tried and true methods of assessment that do not fully take advantage of the technical innovations within education. Innovative assessment measures can be both low- and high-tech, with each offering various affordances that impact the instructional environment. Middle school students are substantial consumers of technology and integrating innovative assessment methods has the potential to increase engagement and motivation. The purpose of this article is to discuss ways teachers can use technology to address assessment in a middle school class.

There is a plethora of assessments for learning in education; however, for the purposes of this article, special attention will be paid to pre-assessment, formative, and summative assessments as these methods offer a holistic view of students' academic performance. Assessment is viewed as a strategy to detect and determine students' content understanding, abilities, and processing.

Additionally, assessments are used as an intervention in the classroom to promote learning through data collection and

constructive feedback (Black & Wiliam, 1998). Assessment is seen as one of the essential teaching and learning methods. It requires several instructional tools and strategies and aids educators in identifying the needs and competencies of their learners accurately. Generally, assessments offer opportunities for educators to target their teaching goals and to measure the extent to which the expected goals are attained (Madani, 2016). Assessments are important at the middle school level as they make the teaching-learning process valid and reliable as teachers can adjust their instruction based on the data collected from their assessments.

The position paper for The Association for Middle Level Education (AMLE) (2021) illuminates the importance of ongoing and authentic formative and summative assessments in the classroom. Specifically, successful middle schools have "varied and ongoing assessments [that] advance learning as well as measure it" (Bishop & Harrison, 2021, p. 9). This information is pertinent to collect as it assists in shaping and tailoring learning goals for current and future instruction. Jackson (2009) argues that to compete in a global society, middle school students "require innovative assessments that go beyond standardized tests" (p. 9). Further, authentic assessments that mirror the real-world have had a positive impact on student learning, autonomy, motivation, self-regulation, and metacognition (Villaruel et al., 2017). Again, these sentiments align well with AMLE's views on curriculum where "instruction fosters learning that is active, purposeful, and democratic" (p. 9).

Types of Assessments

Pre-assessments occur before instruction and formative assessment. Formative assessment occurs during instruction and summative assessment occurs at the end of instruction. Pre-assessments act to establish a baseline of student performance from which student growth or learning gains can be measured (Lazarowitz & Lieb, 2006). This type of assessment is typically low stakes, where the student is not penalized for their gaps in knowledge on the way to mastering content and skills. The aim of formative assessment is to expose student thought, allowing teachers the ability to draw on established conceptualizations of student learning and integrate these ideas into teaching, thereby ensuring a deeper understanding of concepts (Heritage, 2007). Finally, summative assessments are intended to show a unification of student learning. Unlike formative assessments, which are usually used to provide input to students and teachers, summative evaluations are generally high-stakes and are used to measure students' overall learning growth (Gardner, 2010). Tech Thought (2018) provides a succinct description of each assessment measure and their appropriate use (Table 1).

Successful middle schools have "varied and ongoing assessments [that] advance learning as well as measure it" (Bishop & Harrison, 2021, p. 9).

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Table 1: Assessment Types

Diagnostic	Assesses a student’s strengths, weaknesses, knowledge, and skills prior to instruction.
Formative	Assesses a student’s performance during instruction, and usually occurs regularly throughout the instruction process.
Summative	Measures a student’s achievement at the end of instruction.
Norm-Referenced	Compares a student’s performance against a national or other “norm” group.
Criterion-Referenced	Measures a student’s performance against a goal, specific objective, or standard.
Interim/Benchmark	Evaluates student performance at periodic intervals, frequently at the end of a grading period. Can predict student performance on end-of-year summative tests.

Educational Technology vs. Instructional Technology

Technology plays a pivotal role in our lives. Students entering middle school in 2019 were amongst the first groups of children that have not lived in a world without smartphone devices. These students have experienced the proliferation of smart devices, applications, and emerging technologies that are not only changing the way we live but the environment and the ways in which we learn.

Technology, as its most general, is defined as “a system created by humans that uses knowledge and organization to produce objects and techniques for the attainment of specific goals” (Volti 2009, p. 6). Burmaoglu, Sartenaer, and Porter (2019) explored how to conceptualize *technology*, with their final definition including the fluid and adaptability that the term needs to embody: “Technological emergence is a cyclic process in highly creative scientific networks that demonstrates qualitative novelty, qualitative synergy, trend irregularity, high functionality, and continuity aspects in a specified time frame” (p.1). More often, when educators discuss the role and application of technology, we think about instructional and educational technology. Januszewski and Molenda (2013) posit that learning is facilitated and improves performance through educational technology. It is important to note that *educational technology* and *instructional technology* are often used synonymously. However, the former is often used as the broader term, whereas *instructional technology* often refers to the process (Ely, 2008). Aziz (2010) takes this a bit further and focuses on the nuances of the definition that ensure longevity. He classifies educational technology under five components: implementation considerations; appropriateness; facilitate learning through sense, memory, and cognition; enhancing teaching practice; improving learning outcomes. When we look to accreditation bodies and pillars in educational technology standards, the CAEP

organization (2022) includes elements related to the use of specific categories of tools that demonstrate educator mastery in ways that support student learning, whereas the International Society for Technology Education (ISTE) (2020) frames the standards in which educational technology functions in and stresses the importance of pedagogy over tools.

Much of what comes to mind when thinking about technology is high-tech options that permeate our everyday lives; however, the definition’s broad nature often discounts the low-tech solutions that can equal or surpass many of the high-tech alternatives. Low-tech is often simple, using traditional or non-mechanical methods (e.g., graphic organizers, sticky notes, grouping strategies, alternative writing tools), whereas high-tech is often computer-based using sophisticated devices (e.g., smartphone, computer, Web 2.0 tool, Virtual Reality). Using low-tech options can capitalize on time and budget efficiency, as well as appeal to multisensory learning. Incorporating the right technical hardware and software provides opportunities to enhance teaching and learning for both the student and teacher.

Integrating Low- and High-Tech Strategies

The following examples provide various low- and high-tech tools that can be used to enhance assessment strategies within instructional contexts. Just like with all forms of technology, it is important to consider the meaningful integration and sound pedagogical underpinnings that guide assessment selections and to not use technology just for the sake of using it.

Graphic Organizers

Graphic organizers are low technology tools that can be integrated into all content areas. There are several types of graphic organizers, but the main purpose of this tool is to generate a visual representation of how concepts are related in content areas. Graphic organizers can be designed by teachers alone or in collaboration with their students (Irwin-DeVitis & Pease, 1995). This tool can be used for formative and summative assessment.

Assessment Category: Formative, Summative

Technology Category: Low-tech

Similar tool to consider: Mind42 <https://mind42.com>

Plickers

Plickers is a free classroom response system that allows students to engage in formative assessment while providing a sense of confidentiality to their responses. Considered a low technology tool, Plickers consist of supplying each student with one card to manipulate to show what they believe are the best responses to teacher questions. The teacher will use their own technology in the form of a smartphone or iPad to scan student responses. Since 85% of adults in the U.S. own a smartphone (Pew Research Center, 2021), it is possible that using this classroom response system will incur little to no extra cost. Studies have investigated the effectiveness of using Plickers for formative assessment to enhance student learning in the classroom (Elmahdi, Al-Hattami, & Fawzi, 2018). This low technology tool is ideal for assessing in any middle school

content areas, as one card per student is fairly easy to access, and the high technology tool used with this system is provided by the teacher, thus avoiding the potential pitfalls of a school that has yet to institute one-to-one technology.

Tool Link: <https://get.plickers.com/>

Assessment Category: Formative

Technology Category: Low-tech

Similar tools to consider: Gradecam | <https://gradecam.com/>

Immediate Feedback Assessment Technique

The Immediate Feedback Assessment Technique (IF-AT) form, first recorded by Epstein, Epstein, and Brosvic (2001), is an alternative for recording answers to multiple-choice questions to conventional Scantron bubble sheets. IF-AT was founded on psychological principles for human learning. Like a lottery ticket experience, the student selects the best choice and scratches to reveal the correct response. If the answer is correct, the student will see a star after the film is scratched from the surface. If a star does not appear, this indicates to the students that they selected the wrong answer and should make another attempt. The IF-AT is a welcoming approach to assessing in a middle school classroom as students are allotted another opportunity to select the best response, which potentially decreases test-taking anxiety and prompts students learning based on receiving immediate feedback (Maurer & Kropp, 2015). The IF-AT form can be used independently or collectively for pre-assessment, formative, and summative assessments.

Tool Link: <http://www.epsteineducation.com/home/>

Assessment Category: Pre-assessment, Formative, Summative

Technology Category: Low-tech

Similar Tool to consider: Test Scanner |

<https://www.apperson.com/>

Manipulatives

Manipulatives are physical objects that are used as teaching tools to engage students in hands-on learning. They can be used to introduce, practice, remediate, or assess a concept. They can be purchased, brought from home, or created by the teacher or student. Manipulatives are defined as "objects that appeal to several senses and that can be touched, moved about, rearranged, and otherwise handled by children" (Kennedy, 1986, p. 6). This tool can be virtual, but for the purposes of this paper, it is considered as a low technology tool. Manipulatives can be used in all content areas as a formative assessment to show understanding of concepts learned in a middle school class.

Assessment Category: Formative

Technology Category: Low-tech

Similar tools to consider: National Library of Virtual Manipulatives | <http://nlvm.usu.edu/en/nav/vlibrary.html>

Exit Slips

Exit slips are a quick and easy way to keep students engaged with a lesson as it ends. This low-tech tool can be used as a closure activity to review content and assess student learning (Frey & Fisher, 2007). At the close of class, students will

write down their thoughts on the lesson, typically responding to a teacher-developed content specific prompt. A grade is not given, but the answer to the student shows the process of thought and helps the instructor to correct any material misunderstandings.

Assessment Category: Formative, Summative

Technology Category: Low-tech

Similar tools to consider: Socrative | <https://socrative.com/>

Kahoot

This assessment tool is a great way to add gamification strategies to your instruction. Within Kahoot, instructors create student response learning games in the form of quizzes. There are various options for student collaboration through team-based play either individually or within groups through synchronous or asynchronous options. Kahoot is very user-friendly with various templates, pre-made questions, or through the sharing of existing games. Metrics are provided through reports that offer educational information on each students' performance, a breakdown of each question, and the ability to download the full report in a spreadsheet.

Tool Link: <https://kahoot.com/>

Assessment Category: Formative

Technology Category: High-tech

Similar tools to consider: Gimkit | <https://www.gimkit.com/>

Edpuzzle

Edpuzzle is an interactive video tool. Within this assessment tool, instructors are able to edit video content while adding various quizzing options to assist in meeting instructional goals. Options such as integrating audio content, comments, and resources extend learning beyond the initial video. The platform offers administration techniques that ensure students review the content and aren't able to move past essential information. Additionally, metrics provide instructors with information about embedded quizzes and have the ability to download for integration within Learning Management System grade books.

Tool Link: <https://edpuzzle.com/>

Assessment Category: Formative

Technology Category: High-tech

Similar tools to consider: Vizia | <https://vizia.co/>

Flip

Formerly Flipgrid, this tool brings video production into virtual discussions all arranged through various "grids" organized by topic. Instructors can post a reflective question through various multimedia options. Consequently, students respond by recording or uploading a video recording. Instructions have options to set parameters on video length and responses, and students have options to enhance their content using text, images, stickers, and GIFs. Flip also connects educators and students to the community, allowing for easy sharing and collaboration. There is a searchable "Disco Library" with a wide range of accessible topics, as well as adding your own creations to this library to share with the world.

Tool Link: <https://info.flip.com/>

Assessment Category: Formative, Summative

Technology Category: High-tech

Similar tools to consider: Seesaw | <https://web.seesaw.me/>

Spiral

Spiral seeks to transform the 1:1 experience for teachers and students. Within this platform, various applications are available to maximize the educational experience within the classroom and the use of devices. The tools available are limited to four types including quizzing or questioning, creating interactive videos, collaboration management and group assessment measures, and interactive discussion abilities using multimedia. One of the best features of Spiral is its seamless integration with Google Classroom and the G Suite. The platform provides a centralized dashboard where all students, classes, and lessons are viewable. Additionally, there are links to the various applications available where planning is made easy.

Tool Link: <https://spiral.ac/>

Assessment Category: Formative

Technology Category: High-tech

Similar tools to consider: Nearpod | <https://nearpod.com/>

Formative

Formative is a great option for flipping classrooms. With options to integrate with Google Classroom or access through a link, this tool can be used with existing Learning Management Systems. Formative allows instructor opportunities to create various assessment activities such as quizzing, open-ended response questions, or uploading multimedia. Instructors have the ability to create activities from scratch or utilize the large library of shared content. Additionally, instructors can provide a wealth of resources and content to students that can be utilized in response to formative feedback. Instructors are able to track students by state standards that are already integrated within the platform, as well as provide real-time feedback to students. Data are downloadable to a spreadsheet for easy integration into Learning Management System's grade books.

Tool Link: <https://goformative.com/>

Assessment Category: Formative

Technology Category: High-tech

Similar tools to consider: Classkick | <https://classkick.com/>

Poll Everywhere

Poll Everywhere is an online technology tool that enables students to vote through text messaging (SMS), smartphone, or computer on custom teacher-generated polls. This digital tool allows the teacher to create various types of assessments ranging from multiple-choice, word clouds, clickable images, open-ended questions, etc. Additionally, it allows a certain safety in student response as all individual responses are anonymous. This type of assessment, although collective, can engage the most apprehensive student in your classroom. Poll everywhere can be used as a preassessment or formative assessment. This tool is considered high technology.

Tool Link: <https://www.polleverywhere.com/>

Assessment Category: Pre-assessment, Formative

Technology Category: High-tech

Similar tools to consider: Meeting Pulse | <https://meet.ps/>

Conclusion

Assessment is a key part of the student matriculation experience. It is used to determine how a student is progressing toward mastery. Assessment is important at the middle school level because it teaches students how to establish individual and group goals, shows them how to monitor their own success, and offers benchmarks to assess their own level of achievement. Students should experience the major types of assessment in every lesson (i.e., pre-assessment, formative, and summative) as it provides information to track comprehension of the content and to take an active role in the learning process.

Technology has impacted the way we experience the world and thus, the way we teach our students. Incorporating technology into instructional methods, specifically within assessment has the potential to support and engage students who experience a ubiquitous technology ecosystem. Specifically incorporating mobile technologies has shown to improve, "student perceptions of learning, engagement, and actual assessment scores" (Denker, 2013; Jones, Crandall, Vogler, & Robinson, 2013 as cited in Heflin, Shewmaker, & Nguyen, 2017, p.92). Many educators are driven by their desire for greater efficiency to shape positive student outcomes, impact feedback practices, and integrate innovative approaches (Bennett, Dawson, Bearman, Molloy, & Boud, 2017).

Additionally, as educators consider using technology-enhanced assessment measures, it is critical to consider various instructional strategies, software, and hardware options to ensure sound pedagogical practice. It is our hope that the tools and strategies featured in this article will help middle school teachers not only think about technology and assessment, but will combine the two to deliver effective assessments that appeal to digital learners.

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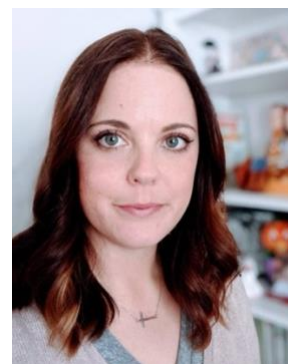
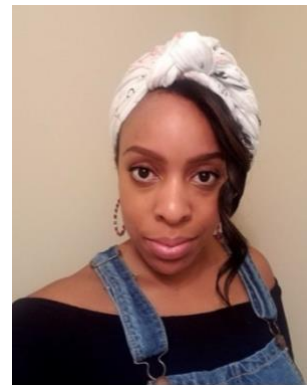
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About the Authors

Dr. LeNessa Clark is passionate about bridging the gap of theory and practice in technology and education. She is an English Language Arts teacher at Westside Comprehensive High School, where she finds new and innovative ways to engage students through the integration of technology. Pulling from her teaching experiences from secondary to higher education, she not only works closely with students, but offers forward thinking professional development on technology integration to teachers. She is a certified secondary ELA teacher in Illinois, Alabama and Georgia. She also holds an educational leadership certification. Her research interests include technology integration; specifically, electronic textbooks and adolescent comprehension.



Dr. Erin D. Besser is an educational technology enthusiast. She is an Assistant Professor in Educational Technology at Cal State Fullerton. She has taught courses related to instructional design, educational technology, educational learning theory, technology integration, and technology skill development. As a former K-6 educator, she holds a Multiple Subject teaching credential with three supplementary authorizations, is an ISTE certified educator, has several Google Educator certifications, and has received awards for innovation in teaching. Her research interests include the intersection of collaborative instruction and technology, digital badging as a mechanism for learning, using digital tools to leverage teaching and learning, and technology within teacher education.

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