Digital Formative Assessment Tools: Applications to Improve Student Learning

เครื่องมือประเมินผลระหว่างเรียนเชิงดิจิทัล: การประยุกต์ใช้เพื่อพัฒนาการเรียนรู้ของผู้เรียน

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Abstract

Digital formative assessment plays a vital role in education because of its functions in offering real-time feedback, monitoring student progress, and promoting personalized learning experience. The integration of digital formative assessment (DFA) tools has become popular in modern education. This review explores the concept of formative assessment and digital formative assessment, which encompassing a digital learning environment, student-centered learning and assessment, and student collaborative learning and assessment. It also categorizes various DFA tools and provides examples for application, including entry and exit slips, quizzes, polls, exercises, peer feedback, and self-reflection. In addition, this review provides guidance on how to integrate DFA tools into teaching practices, which promote student active learning, student engagement, and a supportive learning environment.

Keyword: Digital Formative Assessment, Student Learning

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บทคัดย่อ

การประเมินผลระหว่างเรียนเชิงดิจิทัลมีบทบาทสำคัญในด้านการศึกษา เพราะช่วยให้ข้อมูลย้อนกลับแบบทันทีทันใด การติดตามความก้าวหน้าของผู้เรียน และส่งเสริมประสบการณ์การเรียนรู้เฉพาะบุคคล เครื่องมือสำหรับการประเมินผลระหว่างเรียนเชิงดิจิทัลได้รับความนิยมมากขึ้นในการศึกษายุคใหม่ บทความนี้ได้ศึกษาหลักการของการประเมินผลระหว่างเรียนและการประเมินระหว่างเรียนเชิงดิจิทัล ซึ่งครอบคลุมถึงสภาพแวดล้อมการเรียนรู้ดิจิทัล การเรียนรู้และการประเมินที่เน้นผู้เรียนเป็นศูนย์กลาง และการเรียนรู้และการประเมินแบบร่วมมือกันของนักเรียน นอกจากนี้ ยังแบ่งประเภทของการประเมินผลระหว่างเรียนเชิงดิจิทัลและยกตัวอย่างการประยุกต์ใช้เครื่องมือการประเมินผลระหว่างเรียนเชิงดิจิทัล เช่น การใช้ Entry และ Exit Slips การทำแบบทดสอบ การใช้แบบสำรวจ การทำแบบฝึกหัด การประเมินย้อนกลับจากเพื่อน และการสะท้อนคิด รวมทั้งให้คำแนะนำในการประยุกต์ใช้เครื่องมือการประเมินระหว่างเรียนเชิงดิจิทัลในการจัดการเรียนการสอน ซึ่งช่วยส่งเสริมการเรียนรู้เชิงรุก การมีส่วนร่วมของนักเรียน และสร้างสภาพแวดล้อมการเรียนรู้ที่สนับสนุนนักเรียน

คำสำคัญ: การประเมินผลระหว่างเรียนเชิงดิจิทัล, การเรียนรู้ของผู้เรียน

Introduction

There is an increased interest in promoting formative assessment to students. With the fast-growing technology, there are various kinds of educational tools to increase students' learning. In the area of assessment, digital technology is important for formative assessment. Several digital formative assessment tools can be used to promote learning, leading to better engagement in learning and having more fun to involve in new technologies.

Formative assessment plays a pivotal role in education. It is an integral part of the learning process, involving ongoing feedback and assessment practices which aimed at enhancing student understanding and performance as well as informing instructional decision making (Black & Wiliam, 2009). Additionally, there is evidence showing that providing ongoing feedback to both students and teachers during the learning process eventually enhances learning outcomes (OECD, 2005; Xuan et al., 2022), and also improves self-regulated learning among students (Hattie & Timperley, 2007).

Technology plays a pivotal role in transforming teaching and learning practices. The emergence of digital technology has transformed formative assessment practices and offers a new platform to enhance the assessment process. Digital formative assessment (DFA) is the use of technology-based tools and platforms to collect real-time feedback on student learning progress and adjust instructional strategies. This method uses digital resources to enhance the formative assessment process, including monitoring student progress, providing personalized feedback to students, and customizing instruction (Sullivan et al., 2021). Studies have indicated that utilizing digital formative assessment tools in educational settings can foster student engagement, monitor student learning progress, increase personalized learning experience, and ultimately enhance student learning outcomes (Gikandi et al., 2011).

They also enable educators to collect and analyze real-time data on student performance, allowing more informed instructional decisions and interventions (Gikandi et al., 2011). Research on DFA has received less attention in the field of education (Çekiç & Bakla, 2021). Consequently, this review paper aims to showcase digital formative assessment tools and offer the practical implications for educators and teachers in applying digital formative assessment tools in classroom practices to promote learning.

Concept of formative assessment

Formative assessment differs from summative assessment in that it involves a systematic approach to collect evidence of student learning and offer timely feedback for improvement during the learning process (Black & Wiliam, 2009; Sadler, 1989). The goals of formative assessment are to inform instructional decisions, guide teaching practices, and support student progress toward learning goals (Çekiç & Bakla, 2021; Kaya-Capocci et al., 2022). Moreover, educators can identify strengths and weaknesses, diagnose misconceptions, and adjust teaching strategies (Black & Wiliam, 2009; Sadler, 1989). Educators can create a supportive learning environment where students feel empowered to take ownership of their learning journey (Sadler, 1989). Additionally, formative assessment promotes metacognitive skills development among students when teachers design lessons to respond to learning needs, enhancing a deeper understanding of content and promoting lifelong learning (Hattie & Timperley, 2007).

According to OECD (2005), the elements of formative assessment encompass using varied approaches to assessing student understanding, providing feedback and adaptation of instruction, being active involvement of students in learning process, establishing learning goals and tracking student progress, using varied instruction methods to meet diverse student needs, and establishing classroom culture that encourage interaction and use of assessment tools. Moreover, Wiliam and Thompson (2008) propose five key strategies of formative assessment, including 1) clarifying and sharing learning intentions, 2) engineering effective classroom discussions, questions, and learning tasks, 3) providing feedback that moves learners forward, 4) activating students as instructional resources for one another, and 5) activating students as the owners of their own learning. Black and Wiliam (2009) mention that formative assessment is all activities by teachers and students that provide information to help modifying teaching and learning. Consequently, formative assessment is used to improve teaching and learning and ultimately benefits both teachers and students.

Concept of digital formative assessment

Formative assessment can be carried out through technology. Digital formative assessment (DFA) refers to the use of digital technologies and tools to facilitate ongoing assessment practices aimed at enhancing student learning and informing instructional decisions (Gikandi et al., 2011; Sullivan et al., 2021). Moreover, it includes all features of the digital learning environment that provide

information to be used as feedback to modify the teaching and learning activities in which students are engaged (Black & Wiliam, 2009, 2010). These digital formative assessment tools offer several benefits to both teachers and students. These tools are dynamic and personalized learning. It offers the flexibility to design assessment to tailor individual learning needs and preferences to meet the needs of each individual learner. These assessment tools can collect and analyze real-time data on student performance. Thus, it provides real-time immediate feedback to correct mistakes during the learning process. It can be used to track student progress and create better learner engagement in their learning. Through features such as instant scoring, gamification, and multimedia content, digital tools can create immersive learning experiences that motivate student learning (Faber et al., 2017). They also provide a positive impact on affective aspects in terms of motivation, engagement, and positive attitudes (Çekiç & Bakla, 2021).

There are three key features of digital formative assessment tools (Black & Wiliam, 2010, 2018; Looney, 2012). Those encompasses: 1) the digital learning environment, 2) student-centered learning and assessment, and 3) student collaborative learning and assessment. The digital learning environment is the use of digital platforms and tools where assessment can be conducted, feedback can be given, and learning progress can be tracked. These tools leverage digital technologies to create interactive and engaging assessment experiences for students. Student-centered learning and assessment are the use of digital tools to support each student's active involvement in his/her own learning, where the assessment process is tailored to meet individual student needs and learning styles. These tools enable educators to gain insights into students' progress and provide targeted support to enhance their learning outcomes. Student collaborative learning and assessment is classroom culture that encourages interaction and peer assessment to facilitate student learning. These tools promote collaboration among students, allowing them to engage in group activities, peer assessment, and collaborative projects, fostering a sense of community and shared learning experiences. By incorporating these features, digital formative assessment tools play a vital role in creating an interactive and student-centered assessment environment that supports collaborative learning and enhances the overall educational experiences.

Table 1 Features of digital formative assessment

Features	Characteristics
The digital learning environment	- Use of assessment tools in digital learning environment - Track student progress - Provide varied instruction methods - Use of multi-modal materials/tools

Student-centered learning and assessment	- Student choice - Self-directed reflection - Self-assessment - Automated feedback - Scaffolding
Student collaborative learning and assessment	- Interaction - Peer assessment - Peer feedback - Interaction with specific problem and challenge

Digital formative assessment tools

Digital formative assessment tools refer to software applications, online platforms, or technology-enabled resources that facilitate the process of formative assessment in an educational setting. Digital formative assessment tools encompass a wide range of applications, including online quizzes, polls, surveys, interactive games, and collaborative platforms (Çekiç & Bakla, 2021). These tools leverage digital technology to provide real-time feedback, track student progress, and support ongoing evaluation of learning objectives (Faber et al., 2017). These DFA tools are important to contribute to the process of learning, but there may be a lack of guidance on how to select appropriate tools (Çekiç & Bakla, 2021; Faber et al., 2017). It is essential for teachers to know how to design their instructional practices and assess students' performance using these tools to facilitate a meaningful learning environment (Chen & Chen, 2023).

This study provides digital formative assessment tools depending on types of formative assessment, including entry and exit slips, quizzes and polls, exercises and feedback, peer assessment, and self-reflection.

1. Entry slip/ Exit slip

Entry and exit slips are types of formative assessment strategies used by educators to gauge student understanding. An entry slip is administered at the beginning of a lesson to assess students' prior knowledge or misconceptions of the upcoming content. It can be various forms such as short quizzes, open-ended questions, or reflection. On the other hand, an exit slip is provided at the end of a lesson to evaluate students' comprehension of the content covered during the lesson. It allows teachers to assess whether learning objectives were met, identify the areas of misunderstanding, and determine the effectiveness of the instructional strategies during the lesson. It can be short quizzes, reflection, summaries, or tasks (TEAL Center, 2008). Incorporating entry and exit slips help teachers to gain insights into student learning, adapt their instructions to meet individual needs, and enhance student engagement, understanding, and overall academic achievement.

An example of a digital tool that can be used as entry or exit slips is *Google Jamboard*. It is a collaborative digital whiteboard tool that allows educators and students to create, share, and collaborate on visual presentations, brainstorming sessions, and interactive activities. It can be used to assess student understanding, encourage active participation, and provide immediate feedback. It can be used to provide a visually stimulating and interactive learning environment that encourages active participation and collaboration.

Figure 1 Jamboard (https://jamboard.google.com/)

2. Quizzes and Poll

Quizzes, a series of questions, are used to test students' knowledge, understanding, or skills on the particular topic or subject area. There can be various formats, including multiple-choice, true/true/false, short answer, or essay or essay questions (National Research Council, 2001). Gikandi et al. (2011) mention that quizzes can serve multiple purposes in the learning process as they can assess student comprehension, identify strength and weakness areas, as well as provide feedback to students.

Polls can be used to gather instant feedback and better understand students' needs and satisfaction. Polls can collect data or opinions from students on particular topics. It consists of a single question or a set of questions. It is valuable for teachers to gauge students' opinions, provide feedback on teaching methods, and promote active participation in the classroom (Molin et al., 2020).

Several digital platforms offer features covering quizzes and polls. Digital quizzes can include features with instant scoring, immediate feedback, and gamification. Digital polling allows teachers to gather real-time responses from students and display the results instantly, which help facilitate interactive and collaborative learning (Mortensen & Nicholson, 2015). They also contain features of showing participants' rank, correct and incorrect answers that both teachers and students can see their performances (Zhyhadlo, 2022). Consequently, both quizzes and polls are effective in promoting student engagement, and providing timely feedback in the classroom.

Examples of digital tools offering quizzes and polls are Nearpod, Kahoot, and Blooket. There are as follows:

Nearpod is the learning tool that provides interactive lessons, interactive video, gamification and activities. Nearpod offers flexibility in teaching and learning. Teachers can make decisions on their teaching with Nearpod whether it is live participation, student-paced or teaching in front of the class. This tool allows teachers to create interactive multimedia lessons with assessment, such as quizzes,

polls, drag and drop, and open-ended questions. It also offers timely feedback and analytic tools to show student progress and understanding that can help teachers to adapt their instruction or address the misconceptions during the lessons.

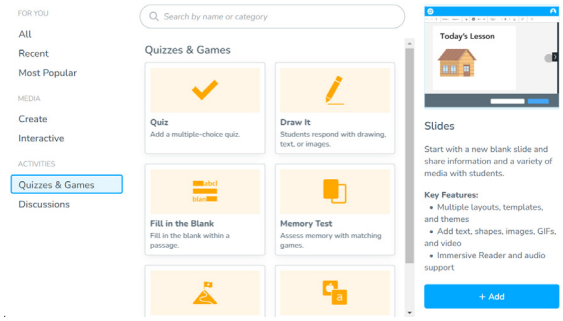


Figure 2. Nearpod (https://nearpod.com)

Kahoot! is a game-based learning platform that combines interactive games, quizzes, and polls to engage students in interactive learning with fun experiences. This tool enables teachers to assess students' understanding, monitor progress, and provide immediate feedback in an engaging way. It offers teachers to create interactive quizzes, true/false questions, and polls. Moreover, this platform provides features of AL-enhanced creators, which can generate questions for teachers. Through gamification, it can reinforce learning and increase focus and motivation in learning. Moreover, it can facilitate self-regulatory learning skills (Nadeem & Falig, 2020; Zhyhadlo, 2022).

Blooket is the game-based platform that creates interactive learning experiences and promotes classroom engagement. There are several game modes that teachers can create and customize to match with their lesson. Students are also encouraged to participate in games with challenges and receive rewards when they answer correctly or receive points, which is called 'get the blook'. Blooket helps them to promote their learning and helps them to participate in learning actively. It allows teachers to assess student understanding, monitor progress, and provide immediate feedback with various kinds of assessment.

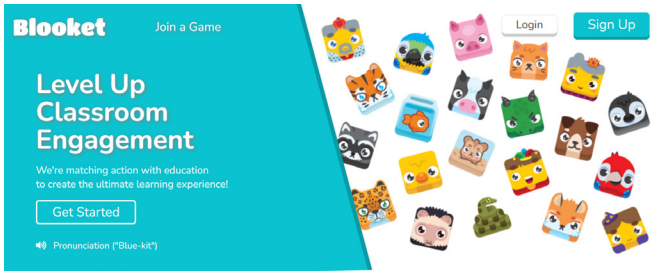


Figure 3. Blooket (https://www.blooket.com)

Wordwall is an online platform that provides a wide range of interactive activities and games to students. There are a variety of interactive assessment activities and games including Hangman, Whack-a-mole, Gameshow quiz, Labelled diagram, and so on. Teachers can customize their teaching activities to match with the teaching plan. It allows teachers to assess students' understanding, monitor progress, and provide immediate feedback (Zhyhadlo, 2022).

Figure 4. Wordwall (https://wordwall.net/th)

3. Exercise and feedback

Exercise is any activity or task designed to engage students in active learning. It provides students to apply and reinforce their learning. Well-designed exercise promotes active participation, critical thinking, and learning collaboration (TEAL Center, 2008).

Feedback is information provided to students regarding their performance of the task, assignment, or learning activity. It plays an important role in promoting students' learning and increasing their metacognitive skills (Black & Wiliam, 2010). It also helps students to identify their misconceptions and set goals for their learning, which can improve learning outcomes (Sadler, 1989). Effective feedback is timely, specific, and actionable, focusing on both strengths and areas of improvement (Hattie & Timperley, 2007). According to Hattie and Timperley (2007), timely feedback is essential for students to develop self-regulatory skills. They suggest the "feed" for covering three types of teachers' feedback, including 1) feed-up, setting the goals for students so that they are aware of the intended learning objective using the question, "Where are we going?", 2) feedback, addressing how students monitor and assess their learning performance using the question, "How are we doing?", and 3) feed-forward, encouraging students to plan their next step to improve their performance using the question, "Where to next?". There are seven principles of effective feedback, including 1) helping to clarify what good performance is, 2) facilitating the development of reflection in learning, 3) delivering high quality information to students about their learning, 4) encouraging teacher and peer dialogue about learning, 5) encouraging positive motivation and self-esteem, 6) providing opportunities to bridge the gap between current and desired performance, and 7) providing information that help shape the teaching (Nicol & MacFarlane-Dick, 2006).

Examples of digital tools offering exercise and feedback are ClassDojo, Whiteboard.fi, and Classkick. There are as follows:

ClassDojo is a classroom management platform that has multiple functions. It facilitates two-way communication from teachers to students and from teachers to parents; as a result, it promotes collaboration and engagement between teachers, students, and parents. ClassDojo can be used to assign tasks and it has features that allows teachers to award points or feedback to students for their achievements in classrooms. Moreover, it enables teachers to create digital portfolios for students, where they can present their work, projects, and achievements.

Figure 5. ClassDojo (https://www.classdojo.com)

Whiteboard.fi is an online interactive whiteboard tool designed to collaborate in real-time. It provides a virtual canvas where teachers can create, share, and interact with digital whiteboards. Teachers can use Whiteboard.fi to assign tasks or exercise and use this tool to provide timely feedback to students by reviewing and commenting on students' work directly on the whiteboard. It promotes real-time collaboration between teachers and students. In addition, it allows engaging and interactive classroom activities, assess students' understanding, and monitor students' progress during learning.

Figure 6. Whiteboard.fi (https://whiteboard.fi)

Classkick is the platform where teachers provide immediate and individualized feedback to students. It is the digital workspace where teachers can create interactive assignments with a variety of multimedia content. When students work on their assignment, they can receive guidance and feedback immediately from teachers in real time by giving points and awards to reinforce students and addressing misconceptions or areas of improvement and offering help. They also can collaborate with their peers in real-time to work on their tasks. This tool promotes real-time collaboration and promotes immediate feedback to students in the classroom.

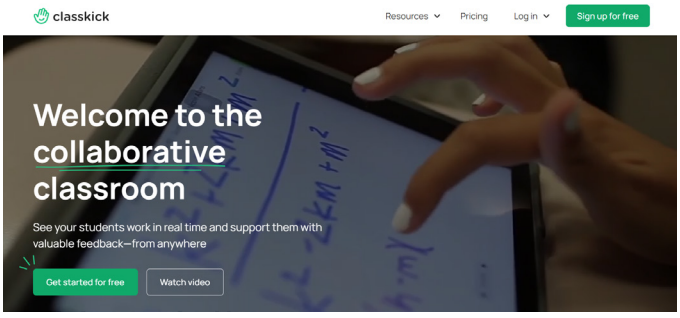


Figure 7. Classkick (https://classkick.com)

4. Peer feedback

Peer feedback is the strategy that students provide feedback to their peers on work, or understanding of a task or assignment. Peer feedback helps students to improve their learning outcome through reflection and suggestions for improvement. One of the strategies that can be used as peer feedback is called “TAG feedback”. T stands for telling peers something that they did well. A stands for asking a thoughtful question, and G stands for giving positive suggestions to your peers. Examples of digital tools offering peer feedback are Flipgrid and Miro.

Flipgrid is a video-based platform that allows teachers and learners to create interactive learning where students can respond to prompts, questions or assignments using short video recordings, which helps students to enhance their creativity and reflect on their learning. Flipgrid assesses student understanding, communication skill, creative thinking skills, and critical thinking skills of students. It also has a peer feedback feature that allows students to view and respond to other’s video responses. They can provide feedback to their peers.

Miro is an online collaborative platform that allows teachers and students to collaborate, brainstorm, and organize ideas visually. It enables interactive real-time collaboration and allows students to work together to share their ideas. Moreover, teachers can provide feedback on the digital whiteboard and offer timely guidance and suggestions to students. Students can work together and give feedback and provide some suggestions for improvement to other’s work. It encourages students to reflect on their work and make revisions based on received feedback.

5. Self-reflection

Self-reflection is when teachers encourage students to reflect on their work, whether it is accomplishment or challenges. Students can evaluate their actions and feelings of what they have achieved. It involves self-awareness and introspection. Teachers can ask students to reflect on their beliefs, values, strengths, weaknesses, and areas for growth. Self-reflection promotes students’ self-regulation (Clark, 2012). Examples of reflection questions are as follows (TEAL Center, 2008): What was your task, the ultimate goal, or the outcome for this activity? What are so important concepts and ideas that you discovered/learned? Why are they important? How did you solve the problem or tasks? Did you reach your goal? Explain. Would you make changes if you had to do it again? Explain.

An example of digital tools offering self-reflection is Ziplet.

Ziplet is designed to facilitate formative assessment and students’ reflection. There are features to create surveys, polls, quizzes, and open-ended questions. Teachers can create questions and gather feedback and reflection from students on their learning or their understanding of concepts. It encourages self-reflection and continuous improvement.

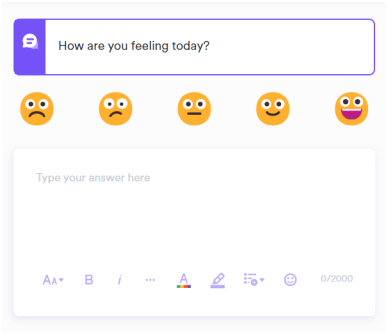


Figure 8. Ziplet (https://ziplet.com)

Table 1 Summary of digital formative assessment tools and its key features on formative assessment

Type of formative assessment	Example tool	Feature of formative assessment		
		Digital learning environment	Student-centered learning and assessment	Student collaboration learning and assessment
Entry slip/Exit slip	Jamboard	/	/	/
Quizzes and Polls	Nearpod	/	/	
	Kahoot!	/	/	
	Blooket	/	/	
	Wordwall	/	/	
Exercise and feedback	ClassDojo	/	/	
	Whiteboard.fi	/	/	
	Classkick	/	/	/
Peer feedback	Flipgrid	/	/	/
	Miro	/	/	/
Self-reflection	Ziplet	/	/	

Application of digital formative assessment tools for improving learning

In order to facilitate learning, educators can integrate digital formative assessment tools into teaching practices. This paper presents the strategies for integration of digital formative assessment tools in classroom as follows:

1. Integration of polls and quizzes: Poll students about how they did on the quiz

Integrating polls and quizzes helps collecting student feedback and assessing their performance.

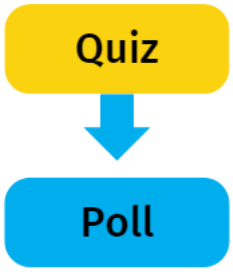
Teachers can create and administer the quiz using digital formative assessment tools, such as Nearpod, Blooket, or Wordwall. These platforms offer interactive and engaging ways to assess student knowledge on specific topics. After students finish the test, teachers can ask them to review the quiz results to figure out their misconceptions and areas of improvement. Then, Teachers create a poll to

gather feedback from students about their understanding and reflection of the quiz such as which question did you find the most difficult? Which topic was the easiest for you? How confident are you in your performance on the quiz? Nearpod can be used to create and distribute the poll. Then, teachers analyze poll results to gain insights into students' perception on the quiz in order to adjust their teaching approaches, addressing misconceptions or supporting students in particular areas.

This method helps teachers to gather insights and reflection from students about their learning experiences and use those insights to improve teaching practices to promote student engagement, reflection, and collaboration in the learning process.

Table 2. Integration of polls and quizzes

Create the quiz	Create and administer the quiz
Review quiz results	Review the results of student performance
Create a poll	Create a poll to gather feedback from student about their performance on the quiz
Analyze poll responses	Analyze the response to gain insight into student perceptions and experiences with the quiz.



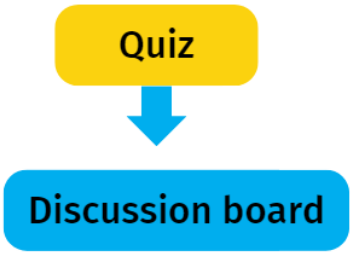
2. Integration of quiz and discussion: Facilitate discussion about the quiz and what's next

Integrating quiz and discussion can gain insights about student performance and inform teaching strategies. Teachers create and administer the quiz. The quiz can have various question types, including multiple-choice questions, true/false questions, and short answers. After students have completed the quiz, teachers let students review the quiz results and provide feedback to them. This feedback helps students to identify their strengths and weaknesses. Each quiz item can include detailed explanations of the correct and incorrect responses to help students understand the reasoning of the correct answers. Teachers encourage students to discuss in class about the quiz, specifically misconceptions and areas for improvement, such as: What questions did you find most difficult and why? Digital formative assessment tools can be used as discussion boards to help students express their opinions broadly and creatively. Teachers also can provide feedback to the individual.

This method helps students to better understand the content and learning materials. By addressing misconceptions, students can correct their errors and better understand what they have learned. Moreover, discussion about the quiz makes the learning process more interactive and engaging. The feedback in this process fosters continuous improvement in both teaching and learning.

Table 3. Integration of quiz and discussion

Create the quiz	Create and administer the quiz
Review quiz results	Review the results of student performance
Facilitate class discussion	Encourage students to discuss about the quiz results on the discussion board



3. **Integration of quiz and exercise: Get students to create their own questions and find the answers by themselves**

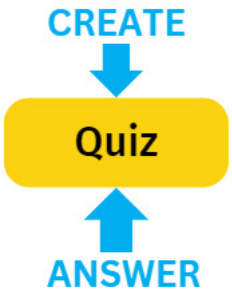
Integrating quiz and exercise can foster students' critical thinking and encourages active learning. Teachers allow students to create their own questions and find the answers by themselves.

Teachers assign tasks to students to create the questions by themselves. Before that, teachers show examples of how to formulate questions and provide the strategies for finding the answers. Teachers then ask students to find the answers to their questions and provide the reasons for their answers. Students can further exchange their questions to their peers and let them answer the questions created by their peers. Teachers then encourage the feedback from their peers on the accuracy and quality of the questions and answers.

This method helps students to enhance critical thinking and improve their understanding about what they have learned. It also promotes active learning and collaboration with peers.

Table 4. Integration of quiz and exercise

Create the quiz	Students create the quiz by themselves
Find the answer	Students find the answer to their questions
Facilitate peer review	Encourage peer review and provide feedback to their peers



4. Integration of quiz and reflection: Ask students to reflect on their learning

Integrating quiz and reflection helps students improve their learning and promote metacognitive skills. This method is similar to the Integration of quiz and exercise, but it integrates self-reflection to promote metacognitive skills to students.

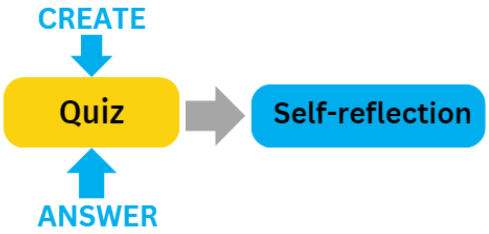
First, teachers ask students to create their own quiz using digital formative assessment tools and then find the answer of those questions and explain the reasons behind answers. Then, teachers

ask students for self-reflection about the quality of the questions and strategies to provide the answers, which show their learning process. Students can think about their performance and write down their thoughts using digital tools for reflection.

This method helps students better understand the content. It can enhance students' motivation and engagement in their learning process. Moreover, it promotes metacognitive skills by enabling them to think about their own learning strategies.

Table 5. Integration of quiz and exercise

Create the quiz	Students create the quiz by themselves
Find the answer	Students find the answer to their questions
Self-reflection	Encourage students to reflect on what they have done



As a result, integrating digital formative assessment tools into teaching practices offers numerous benefits for students. These strategies help to create more interactive, engaging, and reflective learning environment. These methods support a more personalized and effective learning experience, leading to continuous improvement of students.

Conclusion

Formative assessment is an ongoing process that collects evidence of student learning and offers timely feedback for improvement. Digital tools can be utilized to promote formative assessment, which is referred to as digital formative assessment (DFA). DFA encompasses three key features, including digital learning environment, student-centered learning and assessment, and students collaborative learning and assessment. These tools provide real-time feedback, monitor student progress, and offer personalized learning experiences. This review provides various kinds of formative digital tools that support different types of formative assessment, including entry and exit slips, quizzes, polls, exercises, peer feedback, and self-reflection. Additionally, it suggests ways to integrate these tools to design the effective formative assessment, such as combining polls and quizzes, quizzes and discussions, quizzes and exercise, and quizzes and reflection. Selecting the right digital tools to match with student's needs and the specific types of assessment is necessary. For example, Nearpod and Kahoot! are excellent for interactive and visual learners. Flipgrid and Ziplet support reflective learners. In addition to the tools discussed, several other digital tools could serve as formative assessment tools, such as Google Forms, Plickers, Socrative, Padlet, and Formative.These tools offer additional options for educators seeking to implement effective formative assessment in diverse learning settings.

In conclusion, by incorporating digital formative assessment tools into educational practices and encouraging students to take ownership of their learning and assessment, educators can promote active learning and engagement. This approach also creates a supportive and responsive learning environment, fostering continuous improvement and lifelong learning among students.

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