Investigation of Traditional and Web 2.0 Supported (A Sample of Kahoot) Formative Assessment and Evaluation in Science Course

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Abstract
The purpose of this study is to examine the views of the course teacher, students' and participant researcher's field notes about traditional (smart board, pen and paper, oral) and Web 2.0 supported (A Sample of Kahoot) formative assessment in 5th grade science course. The study employed case study design. The participants of the study were a science teacher, 58 students and a participant researcher. The data of the study were obtained from a semi-structured teacher/student opinion form and field notes consisting of the participant researcher's observations. The data were analysed descriptively with Maxqda Plus software. At the end of the study, common positive views on traditional and Kahoot formative assessment were determined; however, in Kahoot formative assessment, it was determined that the teacher had difficulty in classroom management (too much noise in the classroom environment). In the traditional formative assessment process, students stated that they disliked solving the questions on the board incorrectly and in the Kahoot formative assessment process, they disliked the competitive environment in the classroom. In line with these results, it can be said that in order for formative assessment to achieve its purpose, teachers need in-service training on classroom management and creating a classroom environment where students feel comfortable.
Keywords: Formative Assessment, Formative Assessment in Science Education, Web 2.0 Supported Formative Assessment, Formative Assessment Process.

Introduction

Assessment is defined as obtaining information to describe all the activities that teachers and students carry out to change teaching and learning (Black & Williams, 1998). Formative assessment is a type of assessment that meets the needs of students (Boston, 2002). Formative assessment is effective as long as teachers adapt formative assessment strategies appropriately to the teaching process and students use the formative assessment process to strengthen their individual development (Trauth-Nare & Buck, 2011). In order for formative assessment to be effective (Andrade & Cizek, 2010), it is important to determine learning objectives and criteria accepted as success indicators, to carry out effective classroom activities that are indicators of learning and understanding, to give students feedback that can help them progress, to support effective peer education among students, to help students take responsibility for their own learning (Black & Wiliam, 2009). Effective formative assessment in the learning process gives important clues about what should be done in the teaching process and what should be paid attention to (Vonderwell & Boboc, 2013; İlhan et al., 2022; Kişin & İlhan, 2022)

The positive effects of formative assessment on the learning environment (Abedi, 2010; Bailey et al., 2017) are recognised as a tool that promotes rich learning experiences (Anwar, 2019; Hussein, 2019; Tsulaia & Adamia, 2020; Ogange et al., 2018). Despite this, it can be said that most of the studies on

assessment focus on summative assessment (Irons & Elkington, 2021) and formative assessment has received less attention than it deserves in the field of education (Abedi, 2010; Bailey et al., 2017). Some teachers do not use formative assessment tools (Buchanan, 2000; Hatziapostolou & Paraskakis, 2010; Hsu et al., 2011) or do not have sufficient knowledge and experience about the nature of formative assessment and pedagogical strategies (Trauth-Nare & Buck, 2011). With the proliferation of digital formative assessment applications as a result of the developments in technology in recent years, it is important to provide guidance for teachers and students to choose the most effective one among these applications and to use them effectively (Çekiç & Bakla, 2021; Kaya-Capocci et al., 2022).

Interactive gamified e-quizzes used in formative assessment make teacher-student and student-student interaction fun and more active as long as there is no internet and technology access problem (Zakia, 2019; Zainuddin et al., 2020).

Purpose of the Study

The aim of this study is to examine the views of the course teacher, students, and the participant researcher's field notes about traditional (smart board, pen and paper, oral) and Web 2.0 supported (A Sample of Kahoot) formative assessment and evaluation in 5th grade science course.

Significance of the Study

When the literature is examined, there are studies on Formative Assessment and Web 2.0 supported assessment and evaluation, but there is no study comparatively examining traditional and Web 2.0 tools and formative assessment and evaluation in secondary school science teaching. In addition, the data obtained at the end of the study revealed that the teacher may have problems in classroom management in the assessment and evaluation process with web 2.0 tools. In order to minimise this problem, both theoretical and practical activities about providing effective classroom management in the use of Web 2.0 tools can be done in the education and training processes of pre-service teachers or in-service training programmes of teachers.

Implementation Process and Role of the Researcher

The implementation was carried out with the participation of a science teacher and students of three classes (A, B, C) within the scope of the Matter and Change Unit of the 5th grade science course. In two classes, Traditional Formative Assessment and Evaluation (TFAE) was implemented and in one class, Web 2.00 (A Sample of Kahoot) Supported Formative Assessment and Evaluation (KSFAE) was implemented. The researcher, who has been using Kahoot application for many years in different courses and in different formats (online and face-to-face) with students studying at the faculty of education in higher education, gave detailed information about the use of the application to the teacher who would conduct the study before the implementation and made trials with the teacher. The teacher voluntarily wanted to use this application in his/her lessons. In line with the teacher's request, the researcher participated as a participant observer to help the teacher use Kahoot in the classroom in the lessons where the teacher would use the application. The researcher created field note data by writing her observations throughout the implementation.

Table 1 The Implementation Process of TFAE and KSFAE

	Implementations	Implementation Frequency	Type of feedback / Type of interaction
[1]Traditional Formative Assessment and Evaluation (TFAE) [2]Web 2.0 (A Sample of Kahoot)	[1]Students solve questions on the board with teacher support	[1]In some courses	[1]Instantly in front of all students
	[1]Students solve questions on the board without teacher support	[1]In some courses	

[1]Traditional Formative Assessment and Evaluation (TFAE) [2]Web 2.0 (A Sample of Kahoot)	[1]Students take quizzes with pen and paper	[1]at the end of the unit	[1]The correctness or incorrectness of the student's answers is reported to the student individually during the day or in the following days
	[2] Students solve the questions projected on the smart board individually on paper or on the board	[1]in some courses	[1]The student sees his/her correct or incorrect answer individually.
	[2]Kahoot Live (The question is projected on the smart board, each student marks the correct option with his/her mobile phone or tablet)	[2]at the end of the unit	[2]If a student is in the top three, he/she appears on the leader board on the smart board. [3]The correct and incorrect choices of the students are reflected on the board.

Table 2 Data Collection Process

Formative Assessment and Evaluation Methods	Teacher	Participants			Data Collection Tools
		Class A	Class B	Class C	1-Semi-structured Teacher Opinion Form 2-Semi-structured Student Opinion Form 3- Participant Researcher Observation Notes
Traditional Formative Assessment and Evaluation (TFAE)	E	n=19		n=20	1,2
Web 2.00 (A Sample of Kahoot) Formative Assessment and Evaluation (KSFAE)	E		n=19		1,2,3

Method

This study was conducted according to the case study (McMillan & Schumacher, 2010), which deals with process activities and events (Creswell & Creswell, 2017), in which the researcher deals in depth with an event in which the researcher is a participant. In this study, in order to ensure/increase the validity of the study by reflecting the reality objectively (Creswell & Clark, 2017), inductive content analysis of the data was carried out by making direct quotations from the views of the participants. In order to ensure/increase the reliability of the study, the implementation process and the role of the researcher were explained in detail (Creswell & Clark, 2017).

Participants of the Study

The participants of the study were 58 5th grade students, a science teacher, and a participant observer researcher according to the purposive sampling method. In addition, the views of the teacher and the researcher who participated in the implementation process as an observer were also analysed.

Data Collection Tools and Data Analysis

In the study, a semi-structured student opinion form was given to two classes (A and C classes) in which TFAE was used and one class (B class) in which KSFAE was used in the science course and the students' opinions were transferred to the computer as they were. The common and non-common views of the students about TFAE and KSFAE were determined and the data were analysed with Maxqda Plus by induction.

Findings

Students' Views

In this study, it is seen that students have positive views on both traditional and Kahoot formative assessment and evaluation practices (Figure 1). The students had the opinion that both applications

contributed to their learning to have an idea about their own level. In addition, students stated that they were happy when they solved the questions correctly on the board or when they appeared on the leader board in the use of Kahoot. They also stated that time was insufficient when solving the questions in both applications.

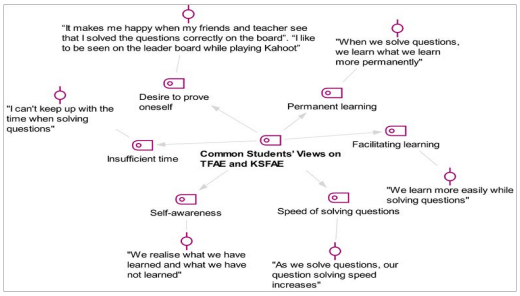

Figure 1 Common Students' Views (SV) on TFAE and KSFAE

As can be seen in Figure 2, there are suggestions that the students should solve the questions on the board in turn and that the teacher should support the students by accompanying them while solving the questions on the board. Additionally, it is seen that the students do not like to solve the question incorrectly in front of their friends and teachers.

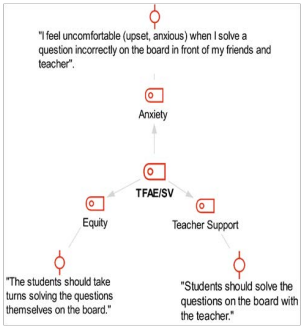

Figure 2 Students' Views on TFAE (TFAE/SV)

As can be seen in Figure 3, in addition to the students' views that solving questions with KSFAE applications is fun, there are also students' views that prefer pen and paper exams and that they are disturbed by the competitive environment and the noise in the classroom during the KSFAE application.

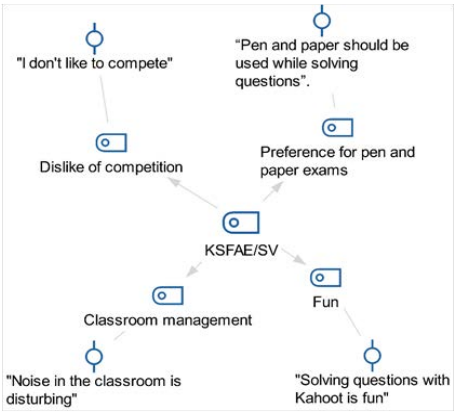

Figure 3 Students' Views on KSFAE (KSFAE/SV)

Teacher Views

When Figure 4 and Figure 5 are analysed, it is seen that the teacher has more positive views on TFAE, but has negative views on KSFAE (the application takes a lot of time, there is a lot of noise in the classroom, the same students are always on the leader board, it decreases the motivation of other students, etc.).

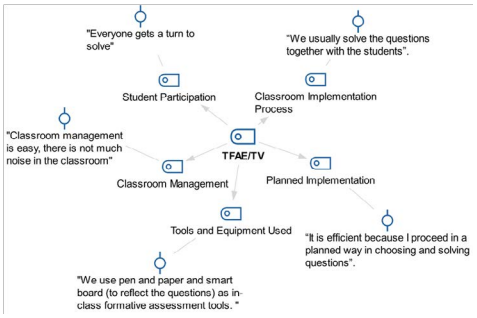

Figure 4 Teacher Views on TFAE (TFAE/TV)

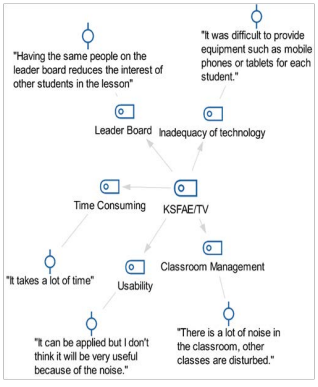

Figure 5 Teacher Views on KSFAE (KSFAE/TV)

Field Notes of the Participant Researcher

The field notes of the participant researcher in Figure 6 show similarities with the opinions of the teacher and students. The different revealed is that in TFAE, the teacher focused on the questions that many students could not solve, whereas in KSFAE, the teacher could easily and quickly realise which students had difficulties.

Discussion and Conclusion

In this section, in order to be able to see Figures 1, 2, 3, 4, 5 and 6 in the findings as a whole, the participants' views on TFAE and KSFAE were analysed under four main headings (in line with the joint decision of two experts) (Table 3). Under the cognitive heading, the views on learning-teaching, under the *affective* heading, the views on being happy, being sad, being sad, liking etc., under the *classroom management* heading, the views on TFAE and KSFAE implementations and the reflection of these implementations on the classroom environment, and under the *tools-equipment* heading, the views on the situation and preferences related to the tools and equipment were analysed.

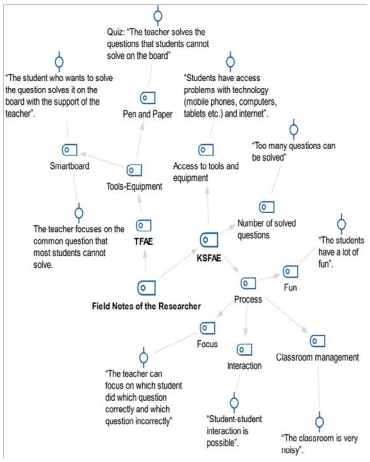

Figure 6 Field Notes of the Researcher on TFAE and KSFAE

Table 3 The Data Discussed Briefly Obtained from Figures 1, 2, 3, 4, 5 and 6 Together

: Positive Views, : Negative Views Suggestions: , : Current Situation TFAE: Traditional Formative Assessment and Evaluation KSFAE: Web 2.0 (A Sample of Kahoot) Formative Assessment and Evaluation		Research Notes		Teacher Views		Students' Views		
		TFAE	KSFAE	TFAE	KSFAE	TFAE	KSFAE	f
Cognitive	Question solving supports/facilitates learning					👍	👍	43
	Self-awareness (being aware of the level of learning)					👍	👍	45
	Making the learnt information permanent					👍	👍	44
	Increasing the speed of question solving					👍	👍	35
	Both the teacher and the students get quick feedback on the students' learning levels		✔					
Affective	Dislike of competition						👎	7
	Bein fun		👍				👍	19
	Being uncomfortable with solving a question incorrectly on the board					👎		25
	Being happy to solve the question correctly on the board					👍		30

Affective	Happy to see his/her name on the leader board							10
	Having the same students on the leader board has a negative effect on other students							
Classroom Management	Insufficient course time							40
	The classroom is uncomfortably noisy							15
	More planned and efficient							
	The teacher either solves the questions that most of the students have difficulty in solving on the board, or the students who want to solve the question solve the question on the board with the support of the teacher.							
	Each student takes a turn to solve questions on the board							
	Each student should take a turn to solve questions on the board							18
	Students can get teacher support while solving questions on the board							
Classroom Management	The teacher should help the student when he/she solves questions on the board							18
	There is student-student interaction							
Tools-Equipment	Limited access to technology (computers, smart phones, tablets, etc.) and internet for students at school							
	Questions should be solved with pen and paper							7

When Table 3 is analysed, it is seen that the students have common positive views on TFAE and KSFAE and CRBSL in the *cognitive* domain. The researcher, on the other hand, stated that the students and the teacher received very fast feedback about the students' learning level.

In the *affective* domain, some students stated that they disliked the competition in KSFAE. Similarly, some students stated that they were uncomfortable with solving the question incorrectly on the board in TFAE. From this point of view, it can be said that the students experienced the feeling of feeling unsuccessful in the FAE process. This *feeling of failure* may cause students to dislike the lessons over time. Moreover, the teacher also stated that seeing the names of the same students on the leader board in the KSFAE process would negatively affect other students. In the case of not being able to solve the questions or solving them incorrectly, students may feel bad about themselves and may withdraw from the lesson or even from the school in TFAE or KSFAE. However, some students stated that they were happy when they solved the question correctly on the board in TFAE or when they saw their names on the leader board in KSFAE. Seeing that students are successful in the lesson may positively affect

their attitudes towards the lesson. Yet, when the literature is examined, McCarthy, in his 2017 study, stated that formative assessment in the classroom and online positively affected students' interaction with their peers. In this case, it can be said that course teachers have important responsibilities in making student interaction positive and making students feel comfortable.

The common negative view of the teacher, student and researcher on KSFAE under the heading of *classroom management* is that the lessons are too noisy. It can be said that the course teacher in this study tends to create a disciplined and quiet classroom environment (the teacher is more active in the lessons and the students are quietly listening or solving the question), but in the student-student, teacher-student interaction, there is too much noise in the classroom and the teacher has problems in classroom management. However, it is a natural process for students to have fun using game-based web 2.0 tools in the lesson as they have fun playing games. Nonetheless, excessive noise in the classroom may negatively affect teachers and students in other classes. Both theoretical and practical studies can be organised for pre-service teachers and teachers on effective classroom management in the use of game-based web 2.0 tools. Again under the heading of *classroom management*, both the teacher and students expressed the common view that difficult questions were solved on the board, either by the teacher or by volunteer students with the support of the teacher. Yet, some students had suggestions/ requests that each student should have a turn to solve the questions on the board and that the teacher should support them while solving the questions on the board. The researcher, on the other hand, expressed a positive view that there is student-student interaction in the classroom in KSFAE.

In the *Tools and Equipment* heading, both the course teacher and the researcher have a common view that there is a limitation of technology and internet access in the school. From this point of view, it can be said that schools need more technology and internet access and support. Furthermore, some students had the suggestion/request that formative assessment and evaluation should be done with pen and paper rather than digitally. It can be concluded that the frequency of use of pen and paper or Web 2.0 supported tools should be done carefully and an education and training environment should be tried to be created for each student.

References

Abedi, J. (2010). Research and recommendations for formative assessment with English language learners. In H. L. Andrade, & G. J. Cizek (Eds.), *Handbook of Formative Assessment* (pp. 181-197). Routledge.

Andrade, H., & Cizek, G. J. (2010). *Handbook of Formative Assessment*. Routledge.

Anwar, S. (2019). Formative assessment tool for active learning. *European Journal of Biomedical and Pharmaceutical Sciences*, 6(1), 480-485.

Bailey, E. G., Jensen, J., Nelson, J., Wiberg, H. K., & Bell, J. D. (2017). Weekly formative exams and creative grading enhance student learning in an introductory biology course. *CBE - Life Sciences Education*, 16(1).

Black, P., & Wiliam, D. (1998). Assessment and classroom learning. *Assessment in Education*: *Principles, Policy & Practice*, 5(1), 7-74.

Black, P., & Wiliam, D. (2009). Developing the theory of formative assessment. *Educational Assessment, Evaluation and Accountability*, 21, 5-31.

Boston, C. (2002). The concept of formative assessment. *Practical Assessment, Research, and Evaluation*.

Buchanan, T. (2000). The efficacy of a World-Wide Web mediated formative assessment. *Journal of Computer Assisted Learning*, 16(3), 193-200.

Creswell, J. W., & Creswell, J. D. (2017). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Sage Publications.

Creswell, J. W., & Clark, V. L. P. (2017). *Designing and Conducting Mixed Methods Research*. Sage Publications.

Çekiç, A., & Bakla, A. (2021). A review of digital formative assessment tools: Features and future directions. *International Online Journal of Education and Teaching*, 8(3).

Hatziapostolou, T., & Paraskakis, I. (2010). Enhancing the impact of formative feedback

on student learning through an online feed back system. *Electronic Journal of E-learning*, 8(2), 111-122.

Hsu, J. L., Chou, H. W., & Chang, H. H. (2011). EduMiner: Using text mining for automatic formative assessment. *Expert Systems with Applications*, 38(4), 3431-3439.

Hussein, H. J. (2019). The impact of using Socrative based formative assessment to enhance student achievement in a nutrition course: A digital forward assessment. *Journal for Researching Education Practice and Theory*, 2(1), 34-56.

Irons, A., & Elkington, S. (2021). *Enhancing Learning through Formative Assessment and Feedback*. Routledge.

Ilhan, N., Güngör, H., & Gülseven, E. (2022). Scale of attitudes towards online formative assessment: Teacher' attitudes during COVID-19 Pandemic. *International Journal of Educational Methodology*, 8(2), 241-257.

Kaya-Capocci, S., O'Leary, M., & Costello, E. (2022). Towards a framework to support the implementation of digital formative assessment in higher education. *Education Sciences*, 12(11).

Kişin, M., & İlhan, N. (2022). Teachers' and pre-service teachers' levels of beliefs and practices about assessment in science courses. *Inonu University Journal of the Faculty of Education*, 23(1), 20-43.

McCarthy, J. (2017). Enhancing feedback in higher education: Students' attitudes towards online and in-class formative assessment feedback models. *Active Learning in Higher Education*, 18(2), 127-141.

McMillan, J. H., & Schumacher, S. (2010). *Research in Education: Evidence-Based Inquiry*. Pearson.

Ogange, B. O., Agak, J. O., Okelo, K. O., & Kiprotich, P. (2018). Student perceptions of the effectiveness of formative assessment in an online learning environment. *Open Praxis*, 10(1), 29-39.

Trauth-Nare, A., & Buck, G. (2011). Using reflective practice to incorporate formative assessment in a middle school science classroom: A participatory action research study. *Educational Action Research*, 19(3), 379-398.

Tsulaia, N., & Adamia, Z. (2020). Formative assessment tools for higher education learning environment. *WEST–EAST*, 3(1), 86-93.

Vonderwell, S. K., & Boboc, M. (2013). Promoting formative assessment in online teaching and learning. *TechTrends*, 57, 22-27.

Zakia, A. (2019). *The Interactive of Formative Assessment through Gamification Tool of 'Kahoot!' in Learning English*. Walisongo State Islamic University.

Zainuddin, Z., Shujahat, M., Haruna, H., & Chu, S. K. W. (2020). The role of gamified e-quizzes on student learning and engagement: An interactive gamification solution for a formative assessment system. *Computers & Education*, 145.

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