The Effectiveness of Using Formative Assessment Tools in K12 Learning Environment

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1. Abstract

There has been a growing interest among educators over the past few years in formative assessment. Formative assessment, referred to as assessment *for* learning or assessment *as* learning, is a planned, ongoing process during which teachers collect information on students' academic performance to enhance the learning and teaching experience and achieve desirable outcomes (Heritage, 2010). It is a low-stakes type of assessment the intent of which is to provide teachers with valuable information about how effectively the instructional approach in place is working and how possibly students can achieve learner autonomy.

This research paper aims to determine the effectiveness of employing formative assessment in teaching. Specifically, it investigates whether this type of assessment has a positive impact on the students' motivational drives and their academic achievement. To gauge the effectiveness of formative assessment in students' learning, a few lesson observations were performed by the researcher in the English and Math subjects at Al Ittihad Secondary School. Surveys to and interviews with teachers and students were also carried out, with the intention that the findings would be shared with the teaching staff to improve the school overall performance.

One of the key findings of this research is that some teachers could not transfer the ownership of formative assessment to their students. This is due to a tendency on the part of these teachers towards adopting an exam-oriented teaching that, according to them, would benefit their students. The research also suggests that some teachers are not well endowed with the principles of formative assessment and according need more training in this field.

2. Literature Review

Admittedly, assessment is at the core of effective teaching since what students will learn is quite unpredictable, no matter how our teaching is designed (William, 2011). The main reason for any assessment a teacher carries out is 'to check if learning has taken place' (Gravells, 2021, p. 75). There is a wide range of assessment methods; however, all of these come under the umbrella of two broad categories: Formative and summative assessment.

The term 'formative evaluation' was first coined by Michael Scriven in 1967 to show the role that this type of assessment could play in gradually improving the curriculum. Formative evaluation is contrasted with summative evaluation. While the former focuses on *how* students are learning material throughout a course, the latter sheds light on *what* students have learned at the end of a course. In this respect, 'formative assessment looks forward while summative assessment looks back' (Capel et al., 2021, p. 68). Formative assessment, whose sole objective is to provide accurate information to be used as feedback to tweak the teaching and learning process, refers to all the learning activities undertaken by teachers and their students (William, 2011). In order to yield the intended positive outcomes, formative assessment has to be carefully designed and purposefully employed. This requires teachers using this type of assessment to be familiar with the three processes involved in teaching: (a) gaining insights into the actual levels of students, (b) finding out where they are going, and (c) figuring out how they can help them get there.

When practiced effectively, formative assessment can bring about profound effects on students' academic achievement and motivational drives. Brookhart (2010) maintains that thanks to formative assessment, a student's performance in a standardized test can increase from the 50th percentile to 75th percentile, regardless of whether this particular student is at a primary, intermediate, or secondary level. She ascribes this improvement in attainment to a variety of reasons including students' engagement in active learning, their sharp focus on learning goals, and their dynamic involvement in peer and self-evaluation. Furthermore, formative assessment provides students with constructive feedback on what they should do next to improve. The feedback they receive is often personalized and tailored to meet their individual learning needs. There is also the proposition that formative assessment 'promotes confidence that every pupil can improve' (Clarke, 2008, p. 10). That is probably because formative assessment is inherently motivating and places students at the center of the teaching-learning process, thus empowering them to be responsible for their own learning.

Conversely, formative assessment is associated with some drawbacks. One of the disadvantages of this type of assessment is that it adds to the teacher and student's load (Fincher et al., 2001). Not only does designing assessment for learning activities require a lot of preparation on the part of the teacher, but it also entails some extra work for the students. Another demerit to be considered is that students may not take this type of assessment seriously, as it does not contribute to their final grade. As a rule, students focus the most when they are doing summative assessment.

Whatever drawbacks are associated with formative assessment, educational research indicates that the valuable data gleaned from this form of assessment 'can give [teachers] important insights into the effectiveness of [their] teaching approaches and strategies' (Ryan et al., 2013, p. 198). Besides, students can benefit from this form of assessment, as it helps them 'adjust their own learning tactics' (James, 2008, p. IX). However, assessment *for* learning does not occur in a vacuum, which means that teachers should share the aims of this type of assessment with their students in order to motivate them. They should help their students build trust in this form of assessment so that they can perceive the benefits of such a powerful assessment method (Clarke, 2005).

3. Methodology

This research paper makes use of qualitative data gleaned from three sources: lesson observations, teacher and student questionnaires, and teacher and student interviews.

The subjects of this study were 38 twelfth graders and 4 teachers from Al Ittihad Secondary School in the emirate of Abu Dhabi. I am one of the lead teachers there, and part of my job is to observe teachers and write evaluation reports to share with the school administration.

Two lesson observations in the English subject and two in the Math subject were performed in the middle of the month of October to measure the impact of formative assessment on students' learning and their motivational drives. The focus of the lessons, formative assessment, was communicated with the four observed teachers prior to lesson delivery. Upon each lesson completion, I wrote my evaluation report and filed it to the school administration, as is the protocol in our school.

Data was also collected through online surveys completed by the 4 observed teachers and their students through Microsoft Forms. Online interviews were conducted with five students via Microsoft Teams and 4 teachers face-to-face. A consent form was sought from all participants,

and all parties involved agreed to participate in my research project. Additionally, I got the consent of my school principal to conduct my study.

The 38 students were given a link to the online survey by the end of October 2021. The Arabic translation of the survey was provided to make sure that all respondents would understand the questions perfectly before providing any answer. The formative assessment questionnaire for students was used to gather qualitative data on the participants' perception of formative assessment and to gain insights into their attitude towards it. The formative assessment for teachers, on the other hand, was administered to see how teachers view formative assessment and its efficacy as an informal assessment method. The results of both questionnaires (Appendix A for students and Appendix B for teachers) were analyzed using a Likert Scale (a 5-point agreement scale): 5 = strongly agree, 4 = mostly agree, 3 = not sure, 2 = mostly disagree, 1 = strongly disagree; and (a 5-point frequency scale) 5= always, 4 = often, 3 = sometimes, 2 = seldom, 1 = never.

Additionally, five participating students took part in an online interview (Appendix C) conducted Via Microsoft Teams one week after administering the questionnaire. The five questions were designed to gather additional qualitative data that would support the numerical data gleaned from the questionnaire. Similarly, the face-to-face interview with the four participating teachers (Appendix D) had five questions the purpose of which was to

4. Data Analysis

I observed four lessons during the month of October, three English lessons and one Math lesson. Prior to lesson observation, the observed teachers and I had an agreed focus — using formative assessment during instruction. All teachers are aware that assessment for learning is an integral part of a lesson, as this component is included in the lesson observation form that I am supposed to fill in.

Two of the English lessons were about writing. Students had to write a discussion essay on the advantages and disadvantages of social media. Both teachers took their students through the stages of the writing process to accomplish the task assigned to them. The other lesson was about reading comprehension. Students had to answer main idea and detail questions. In the Math class, however, the learning objectives of the lesson were for students to brush up on their knowledge of composite functions and learn how to apply the chain rule correctly.

As the agreed focus was how to implement formative assessment during instruction, all the teachers used this assessment method to check whether the learning objectives were achieved. In the English writing classes, both teachers gave their students a self-editing checklist to proofread their essays for mistakes. There was a shift in the students' role from writers to readers. Every student had to go over what they had written and look at it from the perspective of a reader. Some students (around 30%) were able to spot some mistakes and fix them without any support from the teachers. Other students could identify some of the mistakes they made, but they were not able to correct them. In such a situation, the teacher would refer them to other high-performing students who could help them. At the end of the editing process, students were engaged in peer review. Students had to exchange their writings with any classmate of their choice. The classmate had to read the draft and give some constructive feedback. Because the lesson was delivered online, students had to send a copy of their essay to their peers.

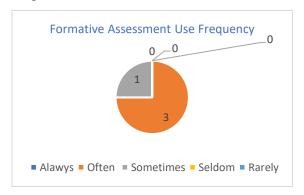
In the Reading class, students had to skim read a text and answer main idea questions. The formative assessment was carried out on Kahoot, which is game-based learning platform. There were three main idea questions, and students were asked to choose the correct option from a list of four alternatives in just 30 seconds. For each correct answer, the student would get 1000 points. This score was subject to speed, meaning the faster a student gave an answer, the higher his score would be. The learning activity was highly engaging but with varying degrees of success. For the detail questions, students had to log in to Mentimeter, which is an interactive presentation tool that makes use of live questions, quizzes, and polls to enhance students' engagement, and answer a set of five questions. Like the activity on Kahoot, speed was a determining factor in the students' scores. That is why some students were answering quickly without paying attention to the question. In the Math class, the teacher tapped on the students' prior knowledge about composite functions. He asked students to go to Quizziz, which is an online assessment tool similar to Kahoot and Mentimeter. Students had to choose a substitute for each given composite function. Students' engagement in the activity was remarkable, and high scores were achieved. The second assessment activity was an exercise about applying the chain rule effectively. The teacher adopted the deductive approach to demonstrate how the chain rule should be applied. After presenting two examples, he asked the students to do the exercise he had already prepared for them. Each student had to apply the chain rule successfully. Upon task completion, students had to exchange their

worksheets with one of their peers. Most of the students got the correct answers, but the ones who were unsuccessful sought help from their peers.

The teacher questionnaire was administered only to the four teachers who delivered the lessons which I observed. This questionnaire was important in that it helped me gain insights into the teachers' perception of formative assessment and their daily teaching practices. The interviews were conducted subsequently after the teachers had completed the questionnaires. These interviews are complementary to the questionnaires in the sense that they provide me with some clarifications related to the teaching practices I observed during lesson delivery.

Three of the teachers (75%) indicated that they *often* use formative assessment in their daily instruction. In the interview I conducted with them, the three English teachers posited that 'formative assessment help students learn from each other'. They maintained that 'a good classroom is a place where learning, not teaching, should take place'. The Math teacher (25%), however, *sometimes* uses this type of assessment (Fig. 1). When asked in the interview about the reason, he claimed that formative assessment 'requires a lot of time to prepare and execute, and [he] had to cover the Math curriculum for the first term, which is a priority'.

When asked about how much their students enjoy formative assessment, I was given a unanimous 'mostly agree' answer. This explains the high level of engagement I witnessed in the four classes (Fig. 2).



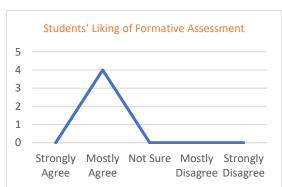
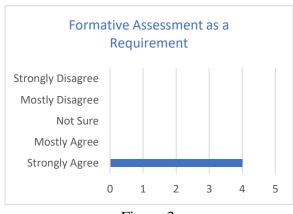


Figure 1 Figure 2

Although the agreed focus was formative assessment, teachers had to use this assessment method in all their lessons willy-nilly. It is a requirement to assess the students' understanding of the taught materials and a tool to gauge the progress they are making. Responses to question 3 in the questionnaire illustrate that teachers are aware of the importance of the use of formative assessment (Fig. 3). The four teachers opted for a 'Strongly Agree' answer to this question.



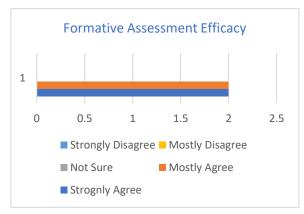


Figure 3 Figure 4

However, teachers are not in total agreement when it comes to the efficacy of this assessment method. Half the teachers strongly agree with the view holding that formative assessment is an effective tool to enhance students' learning, while the other half mostly agree with it (Fig. 4). This is due to the fact that 'some students do not take formative assessment seriously, as the feedback they receive from their teachers is not counted towards their final grade', reported the Math teacher. One of the English teachers suggested exam-oriented teaching as an alternative to formative assessment because such a teaching practice 'will help students be more familiar with the end-of-term exam, which will determine their final grade in any subject'.

The last question in the teacher questionnaire showed that all the teachers involved in the study lack a good understanding of what *authentic* formative assessment is. This lack is reflected in their need for professional development in this area. Three of them expressed this need by choosing 'Mostly Agree' as an answer to question 5, and one of them picked up 'Strongly Agree' as an answer (Fig. 5).



Figure 5

The student questionnaire was intended to produce numerical data to gain insights into the students' perception of formative assessment and its efficacy. The interview with the five students aimed at helping me to better understand their own perspective on this form of assessment.

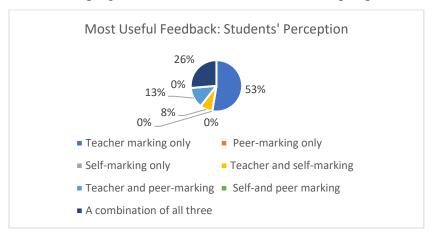


Figure 6

The data in the chart above (Fig. 6) illustrate the students' different perspectives on the type of feedback they receive from their teachers and peers. More than half of the students think that their teachers' marking is what counts the most. This answer comes as no surprise since students strongly believe that assessment is the domain of the teacher, not the students. 'It's the teacher who will give you a final grade at the end of each term' said one of the students I interviewed. This clearly indicates that students mistake formative assessment for summative assessment. 26% percent of the students think that a combination of teacher, self, and peer marking is the way to go. 'Some students are good, and they can help you with your work when you're stuck', reported one of the students in the interview session. 13% of the students believe that teacher and peer marking is very helpful to them, while 8% regard teacher and self-marking as the most important classroom practice. It is worth noting that the teacher is present in all the choices that the respondents made, which is suggestive of a belief that places the teacher at the heart of the teaching-learning process. This belief is reflected in the answer to the second question of the student questionnaire (Fig. 7)

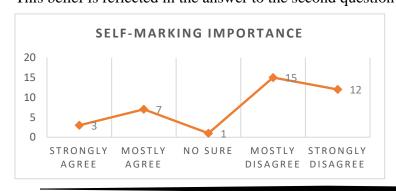


Figure 7

27 out of the 38 respondents mostly and strongly disagree with the idea that they can make any progress when they self-mark their own work, while 10 students agree with this idea. 'I cannot identify the mistakes alone when I go over my essay. Whatever I write seems ok to me', reported one of the students I interviewed. 'I can identify some mistakes and I can fix them. It's good to check your work before you submit it', said another student. As a rule, high-achieving students can engage in self-marking because they have grown independent from their teacher whereas low-achieving students need more structured support from their teachers and peers as they are led into the zone of their proximal development.

It is evident that the students' dependence on their teacher is at an all-time high when it comes to assessment (Fig. 8). The vast majority, precisely 80%, of the students strongly believe that the teacher should grade all their learning activities. Only few of them (5%) can see the benefits that accrue from self and peer assessment. 'There are some good students in our class, but they can never be as good as the teacher', answered one of the student interviewees. 'It's a matter of trust', added another student. That is probably why 58% of the students either strongly or mostly disagree with the statement holding that *all* peers can give useful feedback to the students (Fig. 9).

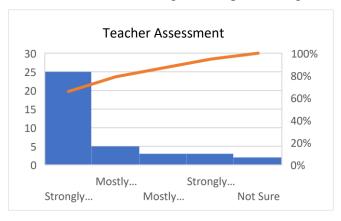




Figure 9

Figure 8

Although most respondents threw the quality of feedback they receive from peers into question, giving feedback to classmates was seen in a positive light (Fig. 10). 'Giving feedback to peers enhances the students' self-esteem. It helps them gain confidence in their abilities and work hard towards giving the necessary support to their friends', said one of the English teachers. Regardless of their academic level, students are willing to help their peers when opportunity arises. This is the

only way teachers can shift the focus from them as the sole providers of knowledge to their students.

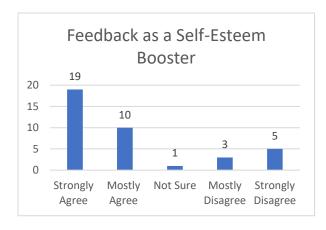


Figure 10

5. Interpretations

The bulk of literature bears clear evidence that formative assessment, when used as a natural part of the teaching and learning process, is a powerful tool that empowers both teachers and students. In this respect, the formative assessment process 'is an effective way for teachers to check students' understanding throughout the learning process and then use this information to guide instruction (Ferlazzo et al., 2021, p. 281). In the context where I work, unfortunately some teachers feel that formative assessment is something imposed on them - put in their own words, a 'burden'. It is something important for the lesson observer to mark as 'evident' in their evaluation report. With such a distorted view, it is no wonder that there is a clear-cut distinction between teaching and formative assessment, while in reality the transition between classroom instruction and formative assessment should be seamless. In effect, teaching and assessment should go hand in hand in all our teaching practices.

Let us look at the bright picture, though. There was a high level of student engagement in the four lessons I attended, especially the Math and English reading classes. This is partly due to the gamified nature of the formative assessment activities that students were engaged in. The designed learning activities were generally appealing to students, and they stimulated their engagement and

motivation. Another reason that accounts for the high student involvement in the lesson was the element of challenge. As a rule, students enjoy lessons where the level of challenge is right and where they can feel a sense of achievement. This is why formative assessment practices should be 'grounded in the idea that students need to feel a sense of accomplishment' (Quinn et al., 2014, p.141).

However, teachers should sensitize their students to the fact that these gamified activities are a means to an end. The main purpose of assigning them is to learn something while having fun. What happened though was that the students' focus was on how to answer the questions as fast as possible to get a higher score. I know that such a strategy is part of the game; still accuracy in answering the questions should be a priority.

In the English writing classes, peer review supported the writing process with a focus on editing. At this stage, students were using the Monitor (Krashen, 1993) to identify mistakes and fix them. It is true that the degree of success in this activity varied from one student to another, yet there were some students who were able to provide the appropriate support to their peers. Worth noting in the writing classes was the fact that students were taking over the roles of their teachers, who kept a low profile throughout the lesson stages. The students have indeed grown somewhat independent from their teachers and started gaining learner autonomy.

6. Conclusion

This research has sought to answer the question whether formative assessment can enhance students' learning, and the answer is a big yes. There is a lot of evidence in the observations I made in the writing classes that support the efficacy of implementing formative assessment in our daily instruction. However, some teachers need to gain a clearer perception of how they can employ this powerful tool and put it to good use. This could be achieved through attending a further professional program that would put a totally different perspective on formative assessment and its leading role in supporting students' learning.

Teachers should also sensitize their students to the importance of self and peer assessment if they want to turn their classes into a place where learning, not teaching, prevails. They need to understand that their main role is to help students grow independent from them so that they can embrace life-long learning. Assessment has always been an area where only teachers have the final

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Appendices

Appendix 1

	Teacher's name	subject	Date	School	Class	No. of Students
				AL Ittihad C3 School		
Performance Indicator	6 - Outstanding	5 – Very Good	4 - Good	3 - Acceptable	2 - Weak	1 - Very Weak
			Assessment to support p	rogress		
eacher uses ssessment to offluence lanning, eaching, and to conitor progress OF 3.2.4)	Assessment is used skilfully and effectively to inform teaching, to meet the learning needs of all groups of Ss and to optimise progress.	Assessment is used very effectively to inform teaching in order to meet the learn needs of all groups of Ss and to enhand their progress.		teaching in order to meet the rieeds of	Assessment is not used adequately to inform teaching or planning. Consequently, the needs of groups of 5s are not adequately met.	Assessment is not used to inform teachin or ourriculum planning and the needs of S are not met.
ormative ssessment tools re embedded in lassroom ractice	T consistently uses various methods of formative assessment to effectively measure and improve learning	T frequently uses formative assessme to assess learning in order to meet the needs of groups of Ss.	nt Toccasionally uses formative assessment strategies, with some success, to measure learning	Tuses limited formative assessment to assess learning in order to meet the needs of groups of Ss.	Trarely uses formative assessment to assess learning so the needs of groups of Ss are not adequately met.	T does not use formative assessment to assess learning so the needs of Ss are no met.
eacher uses larking, eedback and ollow-up to upport student rogress	T uses extensive and constructive marking and feedback. Ss routinely assess their own learning			Marking and feedback is evident. Ss are sometimes involved in assessing their own learning.	Ss work has little evidence of marking and feedback. Ss are rarely involved in assessing their own learning.	Ss work is not marked and no feedback is evident. Ss are not involved in assessing their own learning.
lethod of delivery	y			Comments		

APPENDIX A

STUDENTS' Questionnaire

Dear student,

Please read through the following questions and choose whatever applies to you. There is no right or wrong answers. I would appreciate your honest opinion when answering the questions.

- 1. Choose the type of feedback you think is the most useful for you to improve. اختر نو ع التغذية الراجعة الأكثر فائدة برايك
 - A. Teacher marking only
 - B. Peer-marking only
 - C. Self-marking only
 - D. Teacher and self-marking
 - E. Teacher and peer-marking
 - F. Self-and peer marking
 - G. A combination of all three
- 2. Do you think that self-marking helps you make progress? هل تعتقد أن التصديع الذاتي بساعتك على التطور؟
 - A. Strongly agree
 - B. Mostly agree
 - C. Not sure
 - D. Mostly disagree
 - E. Strongly disagree
- 3. Do you think that all the learning activities must be marked by a teacher?

- هل تعقد ان على المعلم ان يقوم بتصحيح جميع الأنشطة؟
- A. Strongly agree
- B. Mostly agree
- C. Not sure
- D. Mostly disagree
- E. Strongly disagree
- 4. Do you think that all your peers can give you useful feedback? هِلْ تَعْلُدُ انْ جَمِيعَ زِ مِلانَكَ بِإِمِكَانِهِمْ تَعْلَيْهُ رَاجِعَهُ مُفْدِدُ،
 - A. Strongly agree
 - B. Mostly agree
 - C. Not sure
 - D. Mostly disagree
 - E. Strongly disagree
- 5. Does giving feedback to your peers makes you feel more responsible for your own learning?

- A. Strongly agree
- B. Mostly agree
- C. Not sure
- D. Mostly disagree
- E. Strongly disagree

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APPENDIX B

TEACHERS' QUESTIONNAIRE

Dear Colleagues,

Please read through the following questions and choose whatever applies to you. There is no right or wrong answers. I would appreciate your honest opinion when answering the questions.

- 1. How often do you use formative assessment in your classes?
 - A. Always
 - B. Often
 - C. Sometimes
 - D. Seldom
 - E. Never
- $2. \ {\it My students enjoy participating in any form of formative assessment.}$
 - A. Strongly agree
 - B. Mostly agree
 - C. Not sure
 - D. Mostly disagree
 - E. Strongly disagree
- 3. Formative assessment is something that my administration encourages or requires the use of.
 - A. Strongly agree
 - B. Mostly agree
 - C. Not sure

- D. Mostly disagree
- E. Strongly disagree
- 4. Formative assessment can be a fast and effective way to learn about my students' strengths and weaknesses.
 - A. Strongly agree
 - B. Mostly agree
 - C. Not sure
 - D. Mostly disagree
 - E. Strongly disagree
- 5. I feel like I need more training in formative assessment and would participate in a workshop or training if it was available.
 - A. Strongly agree
 - B. Mostly agree
 - C. Not sure
 - D. Mostly disagree
 - E. Strongly disagree

End of document

APPENDIX C

FORMATIVE ASSESSMENT INTERVIEW QUESTIONS WITH STUDENTS

1. Why do you think your teacher encourages you to self-evaluate your work?

1-لماذا في اعتقادك يستجعك المعلم لتقيم عملك؟

2. How useful to your learning do you think receiving feedback from a peer is?

2- ما مدى استقادتك من التغذية الراجعة من زملائك؟

3. How useful to you learning do you think looking at other students' work is?

3- هل تستقيد من النظر الى عمل اقرانك؟

4. What is the most important factor in determining your final grades?

4-ما هو اهم عامل في تحديد درجتك النهائية؟

5. How important is your teacher's feedback?

5- ما مدى أهمية التغذية الراجعة من المعلم؟

6- Is there anything else you would like to tell me?

6- هل هذاك شيء اخر تود ان تضيفه ا