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Exploring the Influencing Factors and Validity of Formative Assessment in Online Learning

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Abstract

Online learning is increasingly popular as the pandemic spreads around the globe. This shift in learning preferences presents opportunities and difficulties for the assessment of learning. As a method of assessment used throughout the learning process, formative assessment can encourage students' interest in learning, enhance learning outcomes, support teachers' strategic planning and maximize teaching results. However, the effectiveness of online formative assessment has been questioned. This study uses a qualitative research methodology based on Grounded Theory to analyze the validity of formative assessment in online learning by examining the factors unique to online learning that affect it. After reviewing previous studies and interviewing 45 online learners, this paper three-level-coded the sources and analyzed them. Findings show that the validity is influenced by the lack of functional alienation caused by the effects of the subject's emotional game and adaptability, objective environment and technology and poor interaction. To help implement formative assessment in real classroom practices, two models were established based on the findings, namely the Formative Assessment Model (FAM) and Online Formative Assessment Validity Model (OFAV). This study asks about the influence factors and explores how much the validity of formative assessment shows in online practice, and provides new feasible ideas and suggestions for the future development of the field of educational assessment.

Keywords: Assessment functions, Asynchronous interaction, Formative assessment, Grounded theory, Online formative assessment validity model, Online learning.

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Contents

Contribution of this paper to the literature

The combination of studies and theories in the fields of online learning and formative assessment not only is consistent with previous studies but also create a new way to review literature and solve educational difficulties. Furthermore, this study filled the research gaps by putting formative assessment into a more flexible and dynamic site. Since the validity of formative assessment caused debates, this study assumes that putting it in an online situation is also a new way to find the answer. These are contributions to the fields of education and assessment. This research is an effort to understand the factors influencing the formative assessment in online classroom practices. The model in it gives an example for further research of online formative assessment. Findings also provide significant implications to educators and policy makers to draw attention to and encourage online learning and formative assessment in the time of life-long learning and post-pandemic.

1. Introduction

The education industry is suffering as the Covid-19 pandemic spreads globally. Due to the urgency of the situation, the majority of nations had to close their schools to stop the epidemic's spread. Data supplied to the United Nations Educational, Scientific and Cultural Organization (UNESCO, https://www.unesco.org) showed that due to widespread school closures, about 70% of students worldwide were unable to continue their studies while millions of students in other nations were affected by smaller closures. In response, schools prefer to use online teaching methods and strategies aimed to "stop class but continue learning" to ensure that teaching and learning take place. With the advent of online learning and the resurgence of the epidemic, some countries and regions have reopened face-to-face instruction to students, adopting both online and face-to-face learning.

Online learning has gradually been adapted to and accepted over time as a result of the spread of the epidemic and changes in learning styles. Students and teachers have formed their distinct viewpoints on formative assessment in online learning. When used online, formative assessment, a crucial assessment technique that promotes teacher professional improvement and increases learning effectiveness, must contend with numerous challenges. Starting from the subject's emotional engagement and adaptability to the limitations of technology and network, the lack of teacher-student communication and interaction contributes to the absence and alienation of formative assessment functions, making the validity of online formative assessment questionable. This study intends to dig deeper into the influencing factors of formative assessment in online learning through in-depth interviews and to explore the effectiveness of its implementation.

2. Literature Review

2.1. Online Learning

As the pandemic passes with time, there are many studies about online learning. Online education will continue to be an essential part of university educational offerings even after the pandemic (Deming, 2020). Robinson and Hullinger (2008) made the point that student's learning outcomes and engagement in online learning become new benchmarks in higher education. Opportunities always come with risk, Zhu, Zhang, Au, and Yates (2020) pointed out that in a self-regulated learning perspective, students' intention to learn online is significantly predicted by self-regulatory factors and attitudes. Also, LaTour and Noel (2021) showed the interest in how will students allocate their time and tasks in this self-directed learning environment, and found that there might be some binge behaviors. In the technique area, Miguel, Caballé, Xhafa, and Prieto (2015) aimed to solve the existing drawbacks that limit their potential in collaborative learning activities and provided an effective trustworthiness approach. Mukhtar, Javed, Arooj, and Sethi (2020) considered the advantages included remote learning, comfort, accessibility, while the limitations involved inefficiency and difficulty in maintaining academic integrity. They recommended that faculties train to use online modalities and develop lesson plans with reduced cognitive load and increased inter-activities. Bergstrand and Savage (2013) indicated that students felt they had learned less in online courses and were treated with more respect in offline courses. So, they rated online courses less highly than in-class courses. It reflects the fact that in online courses, students do not learn as well and do not have a higher sense of emotional gain than in off-line classes. This shows that online learning is developing, and although its importance and research significance should not be underestimated, the implementation of online teaching measures is hindered by more complex influencing factors than in the case of off-line teaching. More studies should investigate how to start from the influencing causes and then improving the quality and validity of online teaching and learning.

2.2. Formative Assessment (FA)

Formative assessment (FA)'s meaning was expanded by Bloom, Hastings, and Madaus (1971) to the stage where it is widely known today, referring to the assessment that generates feedback specifically to improve and accelerate learning (Sadler, 1998). Black and Wiliam (2009); Black and Wiliam (2010) also gave the definition of FA and showed it put various inter-active approaches into classes. However, to date, there is no internationally agreed definition of FA. The quality of interactive feedback in FA is the point of contention in determining the quality of learning activities (Black & Wiliam, 2009). The students may also be the agents of these FA practices through peer assessment and self-assessment. The teachers' role in the process is to help students become motivated and proficient in carrying out ideas. In addition, for FA practices to be most effective, teachers may work together with students to achieve a mutual understanding of the learning goals and establish criteria for attainment of these goals on different levels (Black & Wiliam, 2009). For an assessment to be formative, it requires feedback which indicates the existence of a 'gap' between the actual level of the work being assessed and the required standard (Taras, 2005). As with online learning, FA is closely related to students' learning ability. The influence of student motivation on learning behavior was re-emphasized by Granberg, Palm, and Palmberg (2021). Nicol and Macfarlane-Dick (2006) demonstrated the importance of feedback and FA to student learning ability. Weurlander, Söderberg, Scheja, Hult, and Wernerson (2012) provided a student perspective on FA. On another point of view, Furtak et al. (2016) noted that the teacher's ability affects students' learning. However, there is still much debate about FA. A review of the FA literature shows that there is no consistent discourse or approach in trying to demonstrate the positive effects

of FA (Dunn & Mulvenon, 2009). Ruth Butler pointed out that focusing on points or assessment can have a damaging effect on students. There is no strong academic evidence of the validity of FA today, but it is a side-effect of the malleability of putting FA into practice in classroom activities (Wiliam & Black, 1996). Teachers and students are the agents most used as research entry points in the known literature. It is better able to explore the person's input, perceptions, and unique suggestions about FA from classroom practice and experience through this way. The literature also indicates that there should be a focus on the effectiveness of research FA to help the development of it in classroom practice.

2.3. FA in Online Learning (OFA)

When putting FA into an online learning environment, it has many impacts from different aspects. Black and Wiliam (2003) stated that valuable feedback is able to start thinking. This shows the importance of feedback and interaction. Kerton and Cervato (2014) reviewed how students interacted with various online assessments. Orsi and Juliano (2021) demonstrated the importance and impact of online formative assessment (OFA) practices. Han, Sun, and Li (2020) showed the online learning video pop-up study is based on the interactive learning aspect, exploring the impact on learning outcomes and providing the possibility of synchronous communication for OFA by exploring specific teaching methods. The study also proposes a model of teacher questioning to promote students' critical thinking about asynchronous online communication, and provides concrete and feasible suggestions for OFA (Feng, Xu, & Wang, 2013).

In summary, the literature affirms the importance of online learning and formative assessment in the field of education, pointing out the high research significance and discussion value of both. However, due to the short development time of both, the literature mostly presents one-sidedly. Little mature literature has been produced that combines both online learning and formative assessment. FA's agents are teachers and students, and as planners, doers, and reflectors of fa implementation, their understanding and perceptions of FA are a crucial part of the study. Compared to offline teaching, online teaching is subject to different influencing factors that also affect whether the final OFA can be implemented effectively. However, while the literature has mostly focused on the interpretation and updating of theories in each specific field, this study adopts a qualitative research approach that will synthesize the known theories and studies of both. It takes a qualitative research approach based on *The Grounded Theory* and using agents' empirical data as the basis for analyzing the influencing factors specific to formative assessment in online learning environments. It also focuses on the quality of agents' interactive feedback and conducts an exploration of the effectiveness of OFA.

3. Methodology

3.1. Research Design

The design of this study is based on semi-structured in-depth interviews and thematic analysis to explore the underlying influencing factors and to discuss and form a prototype of the influencing mechanism of OFA. The study aims to demonstrate the key role influences, functional performance and implementation effects of OFA from the perspective of the students. To reach the goal, a semi-structured interview outline was created. The main interview questions focused on the following topics: the content, implementation, feedback, and effectiveness of online learning tasks; the emergence and management of emotional intentions, frequency quality, expressions and special situations in teacher-student interactions in online learning as compared to off-line learning; teacher and student adaptation and satisfaction; how the professor and student roles would be switched in an online teaching and learning practice. The assessment is supported by a logical framework, which the questions of respondents were specifically based. Also, the interviewer asked follow-up questions according to their answers.

3.2. Sources and Analyze

As an exploratory study, undergraduate students were selected as the target group for this study in Macao universities. Purposive sampling was used, and respondents had to fit certain requirements for the interviews to have the desired impact: firstly, as students are online learning's primary target audience and are the main participants of future education, the interviewees were primarily considered to be students to ensure its validity and authenticity. The majority of the interviewees were young students with a bachelor's degree. The age range of the respondents was set at 18-30 years old by combining the definitions of young students from domestic and international - learning experience was employed as a comparison factor. Thirdly, interviews with a sample of students from various programs were undertaken to provide a diversified perspective on other fields. Fourthly, a number of significant parameters, including gender, educational level and cultural background were also included as sampling criteria in the sample selection to increase the study's validity. Fifthly, the study's main region of emphasis was Macao, with samples taken from additional regions to assure validity and theoretical saturation testing.

The interviews were conducted face-to-face with 45 online learners, either in Macao or online, during February 2022. Each interview lasted between 40 and 60 minutes and was audio-recorded with the consent of the interviewees from which a transcript was made. To protect the privacy of the interviewees, they were anonymously coded in four steps. For example, Male (Female) - Arts and History (Science and Engineering Technology, Medicine) - China Mainland (Macao, Hong Kong and Taiwan, Overseas) - 1st respondent is marked as M (F) - AS (SE, Me) - CM (MHT, OS) - 1. A total of 45 online learners were interviewed comprising 21 males and 24 females. The respondents' undergraduate years were mainly from Year 2 to Year 4; their majors ranged from literature and history, science and engineering to medicine. The geographical location of their online learning varied, mainly divided into Mainland China, Hong Kong, Macao and Taiwan, and overseas. The duration of their online learning was at least half a year, and they all had a combination of online and offline learning experiences.

The 'grounded theory', which Glaser and Strauss created in 1967, distinguishes individual experiences while attempting to arrive at a theory from data-systematically acquired and evaluated in social research, was used as a reference and basis for the coding analysis in this study. Through the three-level coding and focused analysis of the text, the implementation process of OFA was sorted out and summarized to form the Formative Assessment Model

(FAM). The Online Formative Assessment Validity Model (OFAV) was formed to explore the effectiveness of OFA by focusing on the influencing factors of OFA, the quality of interactive feedback and improvement measures reflected in the textual materials.

4. Findings

4.1. Emotional Gaming and Adaptability of the Agents

According to a preliminary analysis of the interview materials, while online learning offers both teachers and students a great deal of flexibility in terms of time and location, it also causes students to struggle more than in off-line learning with balancing emotion and rationale. Online teaching and learning also puts more pressure on teachers to accommodate different learning styles.

4.1.1. The Struggle and Constraints of Students' Emotional Preferences and Rational Cognition

FA has been recommended as a promising (Black & Wiliam, 1998) and even particularly suitable Clark (2012) classroom practice to help students become self-regulated learners. The interest of students is piqued, and they develop emotional and perceptual preferences as a result of rich and varied kinds of assessment for learning. The efficiency of logical learning, on the other hand, is more useful and practical for students. *The teacher did make an effort to set up a variety of online learning activities for us, but I still think that the in-person classes were where I learned more. (F-AS-OS-5)*

The emotional gaming component of students' learning is a drawback of the behaviorist learning motivation hypothesis: some students are strongly motivated to learn by outside incentives, which makes it challenging to cultivate an internal love of learning. *I can sometimes put off studying because of the freedom of internet activities; I can't give my schoolwork my whole focus. (F-AS-MHT-17)*

Due to contextual factors and lack of self-control, students find it challenging to keep "the eye down" and attain desirable learning outcomes when learning online even though it offers the flexibility of time and location. *Online lessons are really laid-back, and I can do anything without drawing attention to myself. Although I enjoy how convenient online classes are, I am aware that I am ineffective and don't learn much from them. (F-AS-OS-8)*

The cost of evasion is reduced as students have more freedom when learning online and emotionally enjoy the unrestricted learning environment. However, rationally they know that their learning results are not satisfactory. At the same time, because of the different adaptation to online learning, students and teachers have the potential for resistance. *I enjoy studying online occasionally since it is more practical. You won't have any issues at all as long as you don't switch on the Mac or the camera. However, if I have a great desire to learn, I prefer face-to-face. (F-AS-CM-2)*

In this context, the phrase "cost of evasion" refers to the price students pay for skipping class, not participating in class discussions, etc. There is a cost in the field of economics called “sunk cost”. Students also have to consider sunk costs associated with their commitment to learning and making learning decisions. Due to COVID-19's suddenness, online education was widely implemented in a short amount of time. Since many schools lack comprehensive assessment and monitoring mechanisms and a solid understanding of student learning, the cost of evasion is directly reduced. Face-to-face teaching enables teachers to control the classroom. Attendance and question times are visible and simple for the school to monitor. The cost of evasion of students is correlated with their attendance and performance in the classroom. Their semester grades will suffer if they do not adhere to the school's attendance policies or do poorly in class. Students are compelled to think about their academic success because grades are correlated with student growth. Due to network and technological limitations, the school and instructors must decide whether to reduce the proportion of marks given for attendance in online classes because of lagging and other problems. For instance, some students might not be able to respond in time to a roll call owing to a slow Internet connection or might even get stranded in the chat room, in which case the teacher might mark the student absent. The students who are actually in the room will, however, feel that this is unjust and will either explain the circumstance to the instructor after the network is reconnected or request that their friends explain it to the instructor on their behalf. Due to the Internet, there is no way for the teacher to know if a student is absent. Such occurrences are common. Some institutions expressly deduct attendance for online learning from test results to protect the rights of their students. OFA is impossible to complete since this enables students to "pretend" that they have a bad network and avoid the pertinent classroom questions and interactions.

4.1.2. Teachers' Adaptation to and Mastery of Online Teaching

Because of internal motivation and outside influences, groups of teachers adapt to new teaching approaches to varying degrees. According to Furtak et al. (2016), teachers' abilities to interpret students' thoughts, prompt questions, and provide feedback generally increased statistically significantly. Distinct levels of adaptation are displayed by different teacher groups when it comes to their ability to adapt their teaching methods in response to student feedback to better achieve their learning objectives, pique the curiosity of their students and perfect the use of OFA. Previous research has demonstrated the significance of teachers' professional learning experiences in fostering long-lasting practice change (Wilson, 2013). Teachers are actively involved and play a big part in the FA process. For example, periodic exams are used in primary and secondary schools to assist teachers in revising their pedagogical approaches and to provide feedback and correction to students' learning utilized include teacher-administered tests, recordings of regular observations, and interviews (Wu, 2017). Teachers' appropriate pedagogical abilities, arrangements and supervision are crucial to the implementation of OFA, and teachers need to explore how to adapt and control online lessons.

Online classrooms are especially vulnerable to unusual circumstances. A lack of control over the online classroom and a lack of maturity in how to address and deal with exceptional situations result from teachers not experiencing or being trained to handle special scenarios before teaching online. *In many cases, teachers and students did not take a proactive approach to solve special situations, preferring an asynchronous, non-interactive classroom model (F-AS-MHT-14).*

Younger teachers show a higher level of adaptability, stronger control over the online classroom, and a better capacity to handle unique situations, which increases the effectiveness of their OFA. For instance, he or she

will research online learning trends to proactively gain knowledge and skills in online teaching, test various software and improve the way FA is carried out in online learning. FA is more successful when interactions between teachers and students are positive, effective, and even productive.

In contrast, "extensive experience in a particular topic", a quality related to teacher himself and level of expertise somehow determines the students' willingness to connect with them positively varies. *We get more feedback from teachers who are more willing to research and adapt to this new situation. (F-AS-MHT-3) Schools train teachers specifically for online learning, so teachers are well versed in setting up discussion rooms etc. (F-AS-CM-16)* Schools offer teachers support to enhance their teaching abilities, such as vocational training. This can be used as an external incentive to assist teachers in reducing the time required for their adaptation to OFA, improving their adaptation to online teaching, better comprehending the needs of students and facilitating interactions between teachers and students so that they can use this information to inform their teaching strategies and better complete OFA. Aina and Ogegbo (2021) also advised colleges to engage in the professional growth of their faculty staff to make sure they are knowledgeable about evaluation and instructional techniques.

The behavior of both students and teachers during the OFA is different from that during the assessment of off-line learning. Additionally, because teacher-student interactions are frequently asynchronous in online learning and more time is spent on the process of FA, it is more challenging to analyze and provide feedback on interactions.

4.2. Distance and Synchronicity of Interactive Feedback

Despite the widespread adoption of online assessments for collaborative learning and continuous evaluation, there are still issues that limit their effectiveness (Miguel et al., 2015). Effective relationships between teachers and students are necessary for FA, and these interactions are frequently inextricably tied to non-verbal, emotional connections. The chance of communication failure is increased by the spatial nature of non-face-to-face communication, variations in agent personalities, or the presence of unusual conditions during communication.

4.2.1. Sense of Distance Due to Non-Face-to-Face Communication

Non-verbal communication is mostly used in cultural communication, but in teaching it can have a significant effect on students' understanding and cognition. It also is highly dependent on the personality of the teacher, students' expectations, posture, tone of voice and facial expressions (Zhao, 2007). In practical examples, teachers explained something to individual students, adjusting their teaching methods in a timely and immediate manner according to when students showed puzzled expressions or other body language, etc. (Wiliam & Black, 1996). In online classes, not all teachers and students have the ability to turn on their cameras and microphones due to technical limitations and privacy factors, so some non-verbal communication is not possible in online classes. The inability to communicate effectively in a different space creates a sense of "space" and "distance" in communication.

According to M-AS-MHT-13, *I prefer the traditional teaching method because I can feel the eye contact and interaction with the teacher. It is convenient for the teacher to make timely and corresponding adjustments to the teaching contents and methods according to the students' knowledge acceptance at any time.* FA can be improved through emotional communication and positive interaction, and teachers and students can make adjustments based on the feedback to improve teaching or learning outcomes. *Online communication makes it seem that there is a wall between us and that we are not in the same room as each other, whereas face-to-face conversation is more vibrant and three-dimensional. (F-AS-OS-14)* emphasizes how difficult it is to guarantee one's level of learning due to the "spatiality" of online communication. Even if all contacts are synchronous, the absence of non-verbal communication elements fosters a sense of isolation because there is no sense of communication or desire to communicate when there is no online interaction. *Everyone keeps nodding, reacting, or replying to you in (off-line) group discussions with the teacher in front of you, and I feel good about that." (F-AS-CM-22)*

4.2.2. Interactive Asynchrony that is Highly Dependent on Technical Support

E-assessment is more common and preferred due to the growing reliance on digital tools and platforms (Watermeyer, Crick, Knight, & Goodall, 2021). FA involves both synchronous and asynchronous interactions. The design of a perfect lesson using input from marking, homework assignments or summaries written by students at the conclusion of their own classes are examples of asynchronous interactions (Black & Wiliam, 2009). For the OFA, interaction efficacy is necessary. Some students and teachers can communicate effectively with real-time communication thanks to the Internet. However, there might be inadequate communication since teachers and pupils are unable to adjust to technology. Teachers frequently use asynchronous OFA to ensure the efficiency of interactions and the integrity of the classroom, although there are some variations in the outcomes of implementation. Some students find that the cost of avoiding learning is lower and that they are less motivated to study as a result of the extensive amount of time available for asynchronous learning. FA is made more challenging by teachers' inability to quickly recognize the characteristics of students' thinking and emotional performance during asynchronous encounters.

Online learning is flexible in terms of time and location and is very convenient for both teachers and students. The OFA, however, also has several drawbacks due to the flexibility of time and location. Online students increasingly choose comfortable venues for classroom activities, such as their homes or coffee shops with no constraints. However, as a result, the surrounding environment is also a crucial consideration. Online classes cannot effectively use FA because it is impossible for students to call teachers and classmates at any moment due to privacy concerns, public order, etc. Some students also mentioned a "lack of learning atmosphere" and bad emotional intentions causing negative learning behavior in a more comfortable and relaxed learning setting.

After each lesson, students can ask questions in the module and the teacher will receive an email reminder after the student has asked a question. Also, other students can see the questions and the teacher's response. (M-SE-MHT-2) to encourage students to actively reflect on and discuss the course material, the teacher makes use of the website's "discussion" feature. Teachers can respond to inquiries or enquire more deeply at any moment thanks to timely email reminders, which effectively enable assessment and feedback on instructional arrangements. Despite the fact that this contact is asynchronous, technology's capability benefits interactions. There was a counter example presented. *For me, it's*

best to ask and respond to questions right away. (M-AS-CM-1) Asynchronous communication is favored by teachers out of respect for classroom rules and order. The restrictions of asynchronicity, however, cause students' desires to communicate with the teacher or their peers to eventually weaken or even vanish. The intended outcome is not achieved by asynchronous communication.

Due to the asynchronous nature of the teacher-student connection, the lack of teacher-classroom expertise, and the low cost of student interaction evasion, the establishment of OFA faces difficulties. Some teachers have chosen alternative strategies to solve this issue. However, the measures developed to accommodate online teaching and learning have become functionally alienated, distorting the meaning of FA.

4.3. Lack of Function and Alienation

In the US, FA is a term used to describe teaching strategies that involve identifying and responding to students' thoughts during instruction (National Research Council, 2001). The use of test findings to support teaching assessments is frequently referred to as "formative assessment" in curriculum and pedagogy. Although there is a lot of evidence that FA improves student learning, the argument for its use in the classroom is still debatable.

FA is notoriously challenging to execute in online teaching despite the fact that teachers should be proactive in anticipating students' requirements before the session. Students are not only the agent of assessment, but are also participants throughout the class. The asynchronous nature of the exchanges and the emotional obstacles to online communication had an effect on teacher-student and student-student interactions. It is clear from this study that OFA has broken down. FA is meant to bring out the genuine nature of students' thinking so that teachers may hear it, build on it, and use it to guide their education (Furtak, 2011). However, due to poor teaching environments, low internal motivation, unclear definitions of FA, and low levels of adaptation to online learning by both students and teachers, in practice FA becomes an act of monitoring and controlling students' learning. Corresponding strategies, such as encouraging students to conduct self- and peer-assessment, are also lacking. At the same time, some teachers use a marking strategy and mistake FA for summative evaluation because they have a poor understanding of the meaning of FA and lack a clear definition of it. The conclusion is that good advice and guidance are disregarded in favor of gradation, which is overemphasized (Black & Wiliam, 2010). Due to the strict structure of the assessment, the immaturity of the online learning management architecture and the expense of learning avoidance, students are compelled to participate in the formative evaluation process. Due to the weakness of the initial lesson plan and the teachers' poor control of classroom time, classroom arrangements were also vulnerable to change, necessitating the removal of several evaluation components. First to go were self- and peer-assessment, and since online learning is mostly teacher-delivered, FA suffered from a loss of usefulness as a result of online learning's drawbacks.

The whole-class discussions teachers orchestrate are opportunities to attend and respond to students' ideas (Cowie & Bell, 1999). Initially the corresponding assessment activities were also used formatively to satisfy the summative assessment function (Wiliam & Black, 1996). The lack of corresponding explanations and guidance in literature and scholarship, as well as the fact that when implementing OFA, teachers tend to adopt a more intuitive approach to marking to avoid the effect of online delays, meet school requirements and facilitate teaching and learning assessment. The relevance of teacher involvement and their function in directing FA have been overlooked because of the focus on student assessment.

The rigidity of assessment also affects how teaching is organized and how assessment is used. A single assessment system should have both formative and summative functions, according to an educational assessment team in the UK (Wiliam & Black, 1996). Teachers are under pressure from external educational supervisors and school authorities to set up assessment measures in a way that meets the needs of students' learning and feeds into teachers' instruction. FA is a crucial component of the teaching and learning process that complements summative assessment. Because interaction and communication are limited in the online classroom, teachers have changed FA to be more accessible and scored exams to satisfy the demands of school audit and monitoring. Scores are frequently significant, but insufficient for directing the development of instruction and learning (Black & Wiliam, 2010). These alienate the OFA's function.

The matching book reading assignments have been set by the teacher and are documented on the school website. The number of books read will be tracked by the teacher, who will then assign the appropriate number of points. (F-AS-CM-1) Thanks to the website's technical assistance, teachers and the school may easily calculate the number of books students have read. However, the standard of the reading is unknown. Assessment is made easier, but there is no way to gauge how deeply students are reading. *The online lessons are monotonous and entirely theoretical. Off-line is more challenging and hands-on. (F-Me-MHT-4).* The instructor will modify the teaching strategies so that the online lessons concentrate on theory while the off-line sessions are set up with comparable practical content. *Since the practical classes are not offered in the online classes, they are moved to the off-line classes instead. Once the epidemic is over, the missed classes are quickly made up. (M-AS-CM-18)*

OFA is expected to produce subpar teaching and learning outcomes due to the alienation of its purpose. In fact, by utilizing attendance and task completion as a mechanism to start FA, teachers have twisted the concept and definition of FA. The effectiveness of OFA and whether teachers should continue using it in online instruction are hotly contested topics at the moment.

4.4. The Lack of Validity of Implementation in OFA

4.4.1. No Supervision, Little Motivation, Unsatisfactory Learning

Due to the aforementioned factors, students' internal motivation to learn is insufficient, they lack self-control, the supervision by the external teacher is insufficient, and schools lack an effective OFA system which reduces learning costs and makes it difficult to achieve deep learning. Additionally, OFA also fails to effectively pique students' interest in learning.

For a long time, I would wake up right before class since ... is unattended. I occasionally opened an online course, continued to doze off, signed in, and then went about my business. (M-AS-MHT-3) notes that because online classes had such

flexible scheduling and he struggled with self-control, his performance there was frequently severely lacking. His degree of satisfaction with the learning outcomes is low because of the lack of monitoring and self-control. *If I had (the camera on), I might have learned something. (F-AS-OS-5)* Without the limitations, the learning satisfaction is lower. The OFA does not function to its favor since the teacher's FA measures are not executed well and the class turns into a one-person and one-way communication.

4.4.2. Less Emotional Communication and Less Effective Teaching

Ineffective interactions result from communication breakdowns and poor emotional communication in online learning. Due to the limits of technology and networks, online engagement is frequently asynchronous, and since non-face-to-face communication lacks the non-verbal component of communication, interaction in the online classroom is challenging to create. Poor teaching results are the consequence of interactions between teachers and students that are unproductive or inefficient, which prevents teachers from using FA to identify students' learning requirements and modify their lesson plans accordingly.

The interaction between teachers and students in online classes is less effective than it is in traditional teaching methods because of technical problems and privacy concerns. As a result, there is a lack of communication between teachers and students in terms of voice, body language and facial expressions. *Online classes are described as being non face-to-face, lacking emotional expression and communication, making engagement challenging and leaving participants feeling "cold" (M-SE-CM-15).* Teachers struggle to effectively interact with pupils and control and monitor their learning. Formative assessment is less successful when implemented online due to poor communication. *(What works) is learned, but it is definitely halved. (M-AS-CM-19)* highlights how learning is stressful, and instruction is not as effective as it should be when communication is not finished smoothly. The application of OFA and its efficiency are also challenging to demonstrate.

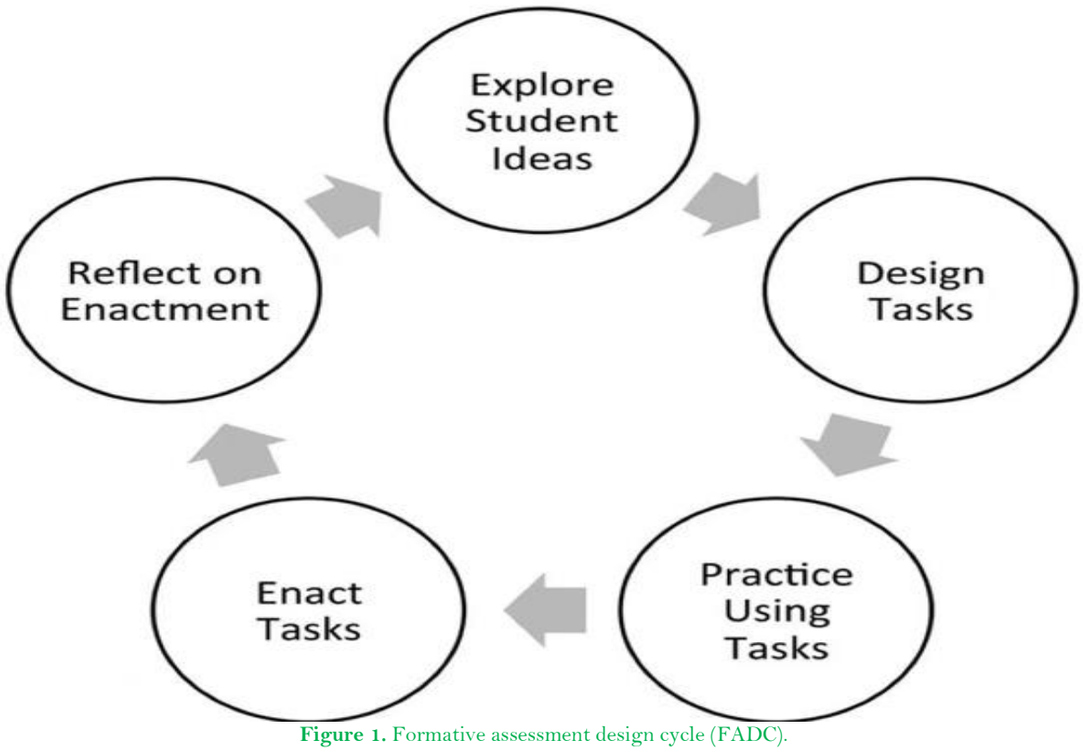

Figure 1. Formative assessment design cycle (FADC).

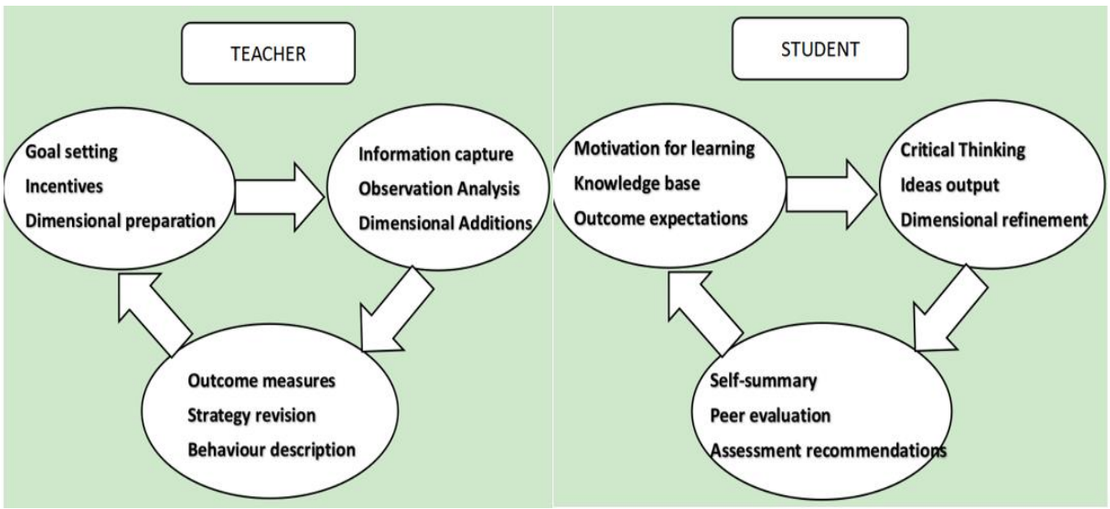

Figure 2. Formative assessment model (FAM).

5. Discussion

The formative assessment design cycle (FADC, Figure 1) is a five-step professional development cycle (Furtak & Heredia, 2014; Furtak et al., 2016) that aims to situate teachers' work and to draw upon their own knowledge

and experiences to develop, enact, and revise a set of common FA (Furtak, 2009). Formative Assessment Model (FAM, Figure 2) adds a student perspective to further refine the progression for natural selection alongside FA, showing the activities of both subjects in the implementation of the task. With the intention of examining the elements influencing OFA from the emotional awareness and rational behavior of both agents, the entire process is split into two main components, the teacher and the student, to create a clear comparison. In addition, there are three main steps in the implementation of the tasks, which are different for the two subjects but follow a cyclical structure.

Teachers emphasize that planning educational objectives, related tactics to encourage and support engagement, dimensions of thinking and even "solutions" for questions or producing reflection are necessary when doing FA. Following that, teachers must quickly record the information from students' conversations so that it can be added to their knowledge and thinking dimensions. Teachers should identify learning gaps, construct new learning systems and anticipate future teaching steps through FA (Bennett & Gitomer, 2009). For students, the focus is on fostering emotional involvement with FA, and having aspirational expectations for learning outcomes. Formative assessment designs should be able to engage student attention and engender student commitment to self-evaluation (Buchanan, 2000). To consolidate and deepen the assessor's understanding of the topic, conversations with teachers and peers are necessary (Snowball & Mostert, 2013). Personal reflection, peer assessment and comments to the teacher about completion and participation in class come next. Teachers improve their own learning strategies and drive to participate in FA after reflecting. The application of FA tasks is efficient in this procedure.

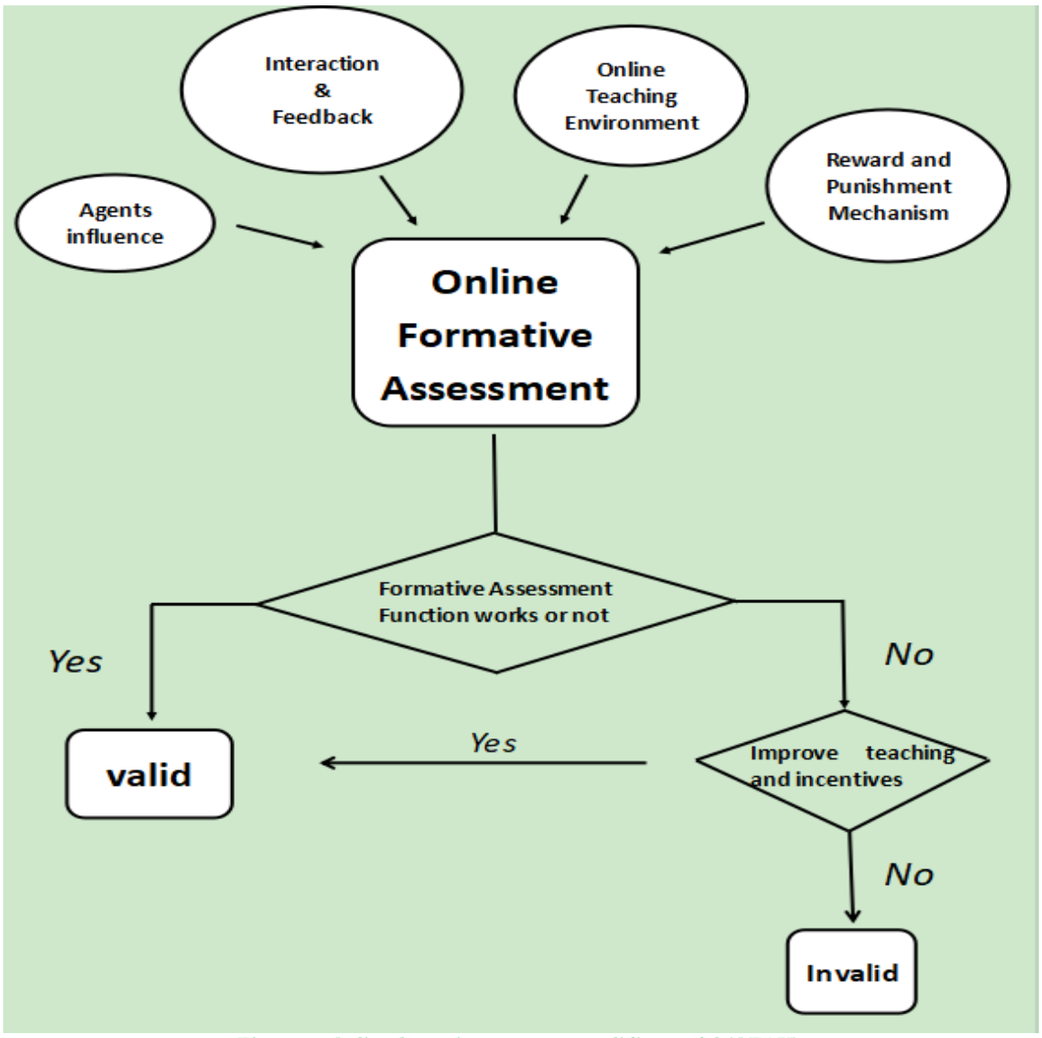

Figure 3. Online formative assessment validity model (OFAV).

Based on Black and Wiliam (2009) theory of FA, the study aims to apply the theoretical basis to a wider range of teaching and learning contexts, and in so doing, to guide and facilitate teaching and learning practices. This research pursues this goal by theoretically incorporating formative evaluation into online learning environments that are flexible and diverse. The online formative assessment validity model (OFAV, Figure 3) illustrates that FA is influenced by numerous factors in the process of interaction and development, which may then produce deficits and alienation of function under the influence of negative factors, which leads to a lack of validity of OFA if no corresponding remedial measures are taken.

The model is founded on traits that are embodied in the practice sample and theoretical guidance. The subjects' emotions and actions have effects on OFA. Communication between teachers and students during this period is heavily reliant on technology and the Internet. It is typically asynchronous, creating an additional special sense of space. The findings also meet with other researchers' views, pointing out that formally, online assessment is manifested differently while its functions have been expanded greatly in the online environment making assessment lack constructive alignment (Zhang, Li, & Lam, 2022). The accompanying teaching reward and punishment mechanisms must also be modified to reflect the changes in instructional strategies. A number of

influencing factors have a double-edged nature and will be advantageous if they are appropriately regulated in teaching practice.

6. Conclusion

This study employed interviews and a qualitative research methodology based on grounded theory to examine OFA. The academic discussion on the integration of online learning and FA is still in its embryonic stage and has not yet attained a coherent academic theory, according to scholarly theory and literature review. Based on the definition, effect, and debates of FA, the FADC model was further refined to form the FAM, which scientifically shows the process and specifics of FA implementation. The study makes the observation that students struggled with emotion and logic. Teachers, on the other hand, must become more flexible and improve the methods they use for OFA. This study emphasizes the sense of communicative space during examining the effect of asynchronicity in OFA interactions. The influenced teaching and learning practices contribute to some dysfunctional aspects and alienation in the OFA implementation, which raises the possibility of a roll out of OFA for learning which is ineffective and or inefficient. Based on the findings of the study, an OFAV model was formed to show the influencing factors and the effectiveness of OFA implementation in an online learning environment.

6.1. Research Contributions

This study comprises and summarizes the theoretical logic in the field of assessment, puts FA into the discussion in an online teaching environment. Also, the review fills the gaps in theories related to FA task implementation and influencing factors. It adds and innovates on the basis of other researchers' previous models of FA to form a reasonable new model. In addition, the theoretical implications put FA into more different teaching and learning environments through the model of OFA, which meets the need and fill the gaps of lifelong learning education.

The logical processes and influencing factors shown by the models provide practical guidance for the application of FA in real practices. The theory of the model developed in this study provides answers on how to effectively carry out FA tasks in online teaching and learning to achieve desired outcomes, what factors to focus on and what processes to follow. These are the practical contributions of this study.

6.2. Limitations and Suggestions

It is challenging for this study to offer solid support for the research findings through a large number of instances and data due to the constraints of qualitative research. We do not believe that all academic study is valuable, as Black and Wiliam (2003) contend, either because research in the humanities is not useful and largely uninteresting, or because it cannot be shown that such research will be useful in the future. In addition, due to the lack of function of OFA in the practice sample, this study does not discuss in depth and investigate "self-assessment" and "peer assessment".

Not only the online teaching and learning environment, future studies should focus on how to implement FA-related activities in more diverse and specific environments. At the same time, it is necessary for researchers to find how to make effective use of multidisciplinary knowledge and technology to explore and enhance accepted ideas of FA education as technology develops.

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