

The Impact of Online Self-Assessment on Learning Outcomes and Self-Assessment Skills among Grade 11 Students in Vietnam

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Abstract

The application of information technology to self-assessment has received a lot of attention in recent years. Several previous studies have discovered a positive relationship between online self-assessment and academic performance. This study aimed to confirm the relationship between online self-assessment and learning outcomes and self-assessment skills among grade 11 students in Vietnam. With a total of 160 students, this research had been designed as quasi-experimental. The two groups did the self-assessment in different ways over the six weeks of impact implementation. To perform an online self-assessment, the intervention group employed interactive online exercises that delivered instant feedback on Liveworksheets. Throughout this period, the control group engaged in traditional self-assessment. The study found that the intervention group's final test scores (7.7) were higher than the control group's (6.3), and their self-assessment skills were more developed at the end of the study. The study confirms the positive relationship between online self-assessment and learning outcomes and self-assessment skills among grade 11 students in Vietnam. The findings suggest that online interactive exercises with immediate feedback can improve learning outcomes and that regular online self-assessment can enhance students' self-assessment skills. Conceptually, this study contributes to the growing body of research on the application of information technology in education and gives insight into the potential of online self-assessment as a promising tool to promote student learning and development. The results of this study can serve as early data to investigate the effectiveness of online self-assessment in diverse educational settings.

Keywords: Interactive Online Exercises, Learning Outcomes, Online Self-assessment, Self-assessment, Skill.

Introduction

Self-assessment plays a crucial role in self-regulated learning (Andrade, 2019; Garrido Astray et al., 2019; Yan, 2020). While not a new concept, self-assessment has been identified in numerous previous studies as the learners' ability to plan, monitor, and control their thoughts, feelings, and actions (Hadwin et al., 2015; Karmaker, 2020; Punhagui & De Souza, 2013; Schumacher et al., 2013; Steuber et al., 2017; Wolters & Benzon, 2013). In education, self-assessment refers to learners' capacity to evaluate and monitor their understanding of a specific subject area (Boud et al., 2015). Alternatively, self-assessment is defined as a cyclical process that enhances learners' skills by detecting the gap between present ability and desired ability (Yew et al., 2016).

A critical aspect of the learning journey is the process of self-assessment, in which individuals engage in a reflective evaluation of their learning, abilities, and skills to determine their areas of proficiency, as well as limitations, and establish objectives for personal growth and improvement. It not only promotes better self-awareness in learners but also enables them to take charge of their academic advancement. As a result, self-assessment is extremely important as an integral element of the learning process since it allows students to get a full awareness of their cognitive capacities and

take responsibility for their growth and development.

Several studies have found that self-assessment empowers students to become owners of their learning (Azar & Tanggaraju, 2020; Luo et al., 2021; Mäenpää et al., 2020; Oh et al., 2021; Rini et al., 2020; Rizk, 2016; Wiliam & Leahy, 2020); other studies describe it as making learners co-owners of the learning process by having them critically reflect on their learning while addressing the needs of the learning task (Fletcher, 2016; Muñoz-Escalona et al., 2018). This process allows learners to review previous course content, assess their knowledge, and identify their weak points (Elkhatat et al., 2021), motivating them to learn actively (Styers et al., 2018) and influencing their self-regulated learning (Papanthymou & Darra, 2018).

Whether the student is a “owner” or a “co-owner”, self-assessment requires that learners be aware of the goals of a task and monitor their own progress toward them. The act of self-assessment that is, engaging in a self-reflective process that enables individuals to discern their own unique learning styles, preferences and needs is a crucial aspect of the pedagogical journey.

Through self-reflection, learners can gain a more profound comprehension of their own cognitive faculties, enabling them to identify the modalities and approaches that are most efficacious for their learning. Consequently, the process of self-assessment becomes an invaluable tool for learners, providing them with the ability to optimize their academic output and achieve their goals in a more expeditious manner. Additionally, by engaging in self-assessment, students are better equipped to identify their areas of difficulty, enabling them to seek out the necessary assistance from their instructors or peers, and ultimately overcoming any obstacles that may hinder their academic success.

Therefore, self-assessment is an indispensable component of the learning process, contributing to the growth and development of learners, and promoting a culture of self-directed and autonomous learning. As a result, learners must develop the ability to analyze task requirements, set learning goals, and track their understanding, as they actively participate in the learning process (Meusen-Beekman et al., 2016; Ratminingsih et al., 2018; Tur et al., 2019; Wallin & Adawi, 2018; Wanner & Palmer, 2018). Self-assessment can also help students develop critical thinking skills, as they learn to evaluate their own work and identify areas for improvement. By setting goals and tracking their progress, students can become more motivated and engaged in the learning process.

The role of self-assessment in the learning process is to provide students with a tool to evaluate their own learning and identify areas where they need to improve. Self-assessment can also help teachers identify areas where students may be struggling, and provide targeted support to help them overcome those challenges (Alseddiqi et al., 2012; Childress et al., 2020; Ishikawa et al., 2021; Rick & Phlypo, 2019). In order to be effective, self-assessment should be an ongoing process that is integrated into the learning environment. Students should be taught how to self-assess and given opportunities to practice and refine their skills. Teachers can also provide feedback and support to help students develop their self-assessment skills. Overall, self-assessment is a valuable tool for students to take control of their own learning, identify areas where they need to improve, and set goals for future growth and success.

With the trend of incorporating information technology into teaching, self-assessment is not insusceptible to this influence (Borg & Edmett, 2019; Chang & Wu, 2018; Christensen & Knezek, 2017). The transition from traditional paper-based self-assessments to online self-assessments on mobile devices is taking place (Ching-Ter et al., 2017; Scherer et al., 2015; Valtins et al., 2020). Online self-assessment has been shown to be an effective self-regulated learning method in a variety of subjects (Fan et al., 2021; Koehler & Meech, 2022; Lawson et al., 2012).

Online self-assessments can be accessed anytime and anywhere, making it easier for students to complete them. Students can complete assessments on their own devices, reducing the need for paper-based assessments and making it easier to keep track of their progress. Automatic scoring of online self-assessments reduces the time and resources required to grade assessments manually. This can also provide students with immediate feedback, allowing them to address areas of weakness more quickly. Many studies show that online self-assessment has a positive impact on student learning and motivation (Nikou & Economides, 2016).

Additionally, online self-assessments can be more engaging than traditional paper-based

assessments. Multimedia elements, such as videos, images, and interactive activities, for example, can be incorporated into online assessments to make them more visually appealing and interactive. Therefore, students are less stressed as a result of taking online self-assessments (Stančić, 2021). When students feel at ease taking an assessment, their participation in the assessment process increases, which promotes self-efficacy (Seifert & Feliks, 2019). Furthermore, it is used to increase student motivation in a variety of learning contexts, such as flipped classroom courses or online courses (Broadbent et al., 2021; Cacciamani et al., 2021; Lock et al., 2021). Learners can easily communicate with classmates and teachers through social networks and communities at any time and from any location in order to assess their knowledge and receive immediate feedback using the online assessment system (Lesage et al., 2015; Y. N. Lin et al., 2019).

Online self-assessments can provide valuable data for teachers to analyze. Teachers can use this data to identify trends and patterns in student performance, and to adjust their teaching strategies accordingly. As a result, teachers can focus more on activities that require students to interact physically while teaching in the classroom. Academic performance, student motivation, and engagement in blended learning and online learning have piqued the interest of researchers in recent years (Azizan et al., 2014; X. Chen et al., 2020; Lo et al., 2020; Paniagua & Simpson, 2018; Tsai et al., 2020).

Students in Vietnam have had little experience with online self-assessment, even though, previous to the COVID-19 pandemic, the use of information technology in teaching and assessment was widespread across many schools and subjects (Anh et al., 2021). However, it was not until the post-COVID-19, normal period that synchronous and widespread digital transformation in teaching activities was implemented. The current literature on the impact of online self-assessment on academic performance and self-assessment skills lacks research conducted in Vietnam. Existing findings may not be applicable, as the country's educational system and cultural values differ from those of other countries where similar studies have been conducted. As a result, the goal of this study was to create an online self-assessment tool for grade 11 physics students and to investigate the impact of online self-assessment outside of classroom hours.

Given the potential benefits of online self-assessment, it is important to investigate whether it can improve students' learning outcomes and self-assessment skills in the Vietnamese context.

Therefore, this study aims to address the following research questions:

What is the relationship between online self-assessment and learning outcomes among grade 11 students in Vietnam?

Can online interactive exercises with immediate feedback improve learning outcomes compared to traditional self-assessment methods?

Does regular online self-assessment enhance students' self-assessment skills?

Liveworksheets is a platform designed to assist teachers in creating interactive worksheets that can be completed by students online (Bārdule, 2021). These worksheets incorporate various question types commonly used in self-assessments, such as multiple choice, drag and drop, pairing, fill in the gaps, and others. The platform is a tool for producing interactive worksheets that present material in different formats and question styles (Rudenko et al., 2021).

Liveworksheets provides various customization options, including the integration of multimedia elements, such as audio, videos, and images, that can enhance the engagement of students during self-assessments. Additionally, the platform allows teachers to effortlessly share the worksheets with their students via email, messaging apps, or a learning management system.

By using Liveworksheets, teachers can create interactive exercises that offer a more dynamic and engaging self-assessment experience for students. The ability to personalize the worksheets with multimedia elements and the ease of sharing them make Liveworksheets a valuable tool for educators seeking to facilitate student learning and self-assessment.

With Liveworksheets, teachers can input conventional exercises in the form of PDF or Word files and transform them into interactive online exercises in several formats. This application simplifies the process of creating engaging and interactive exercises that can aid in student learning and self-assessment. The use of Liveworksheets is an innovative approach to online learning. It allows

for real-time feedback and interaction between the students and the teacher, which can improve the effectiveness of the learning process.

In this study, we used Liveworksheets, an online platform that provides interactive activities and immediate feedback to students. Liveworksheets is effective in promoting student engagement, motivation, and learning outcomes in previous studies (Daher et al., 2022). The use of Liveworksheets in this study represents a novel approach to online self-assessment in Vietnam. This study's focus on grade 11 students and their self-assessment skills adds to the existing literature by examining a specific age group that has received limited attention in the literature. Furthermore, the study's use of the quasi-experimental method, with a control group, helps address the limitations of previous studies in this area. Finally, this study's findings can provide valuable insights for educators and policymakers on the potential benefits of online self-assessment in promoting student learning outcomes and self-assessment skills in Vietnam and other similar contexts.

Material and Methods

The study utilized a quasi-experimental design that involved two groups: an intervention group and a control group. The study's population consisted of grade 11 students in Vietnam, and the sample size was 160. Participants were selected using a purposive sampling technique to ensure that they met the inclusion criteria. The inclusion criteria included being a student in grade 11, having access to a computer with an internet connection, and giving informed consent to participate in the study. All students were informed that their Liveworksheets online self-assessments and academic results would be recorded, and that their personal information would be anonymized for research purposes. This policy was accepted by all participants.

The two groups were then randomly assigned to either the intervention or control group. After each lesson, both the control and intervention groups completed self-assessment exercises related to the week's content outside of class time. The intervention group received interactive online exercises that delivered instant feedback on Liveworksheets based on the links or QR codes provided by the teacher, while the control group engaged in traditional self-assessment. During the online self-assessment, students carried out different assignments as required and obtained instant feedback on their responses upon completing each task. At the same time, the teacher received email notification of the outcomes. We explicitly stated that students' performance on the online self-assessments would not impact their final test scores to discourage any attempts to cheat or seek answers from study materials during the assessment. At the end of the six weeks, both groups completed a post-test to assess their learning outcomes and self-assessment skills.

To measure students' learning outcomes, a pre-test, and a post-test were administered to both groups. The test comprised of multiple-choice questions that assessed the students' understanding of the topics covered in the self-assessment. The test was scored out of 10, and the student's scores were recorded for analysis.

To measure the students' self-assessment skills, a self-assessment rubric was developed. The self-assessment skills of students in the intervention group were compared before and after participating in the intervention. The self-assessment skills' scale consisted of eight criteria, which were as follows:

Recognizing assessment and self-assessing learning outcomes.

Collecting and processing information on learning outcomes.

Establishing learning objectives and tasks.

Comparing learning outcomes with established objectives and tasks.

Creating and revising study plans.

Implementing the proposed study plan.

Reflecting on personal strengths and weaknesses.

Developing a plan for personal capacity enhancement.

Each criterion was scored on a scale of 1 to 3, with 1 representing the lowest and 3 representing the highest level of attainment.

The data collected were analyzed using descriptive and inferential statistics. Descriptive statistics, such as means and standard deviations, were used to summarize the data. Inferential

statistics, such as independent samples t-test was used to compare the final test scores between the intervention and control groups, and ANOVA was used to compare the pre- and post-intervention self-assessment skills of the intervention group. The p-value was set at 0.05, and all statistical tests were two-tailed.

Overall, the study's quasi-experimental design was robust and allowed for a thorough investigation of the relationship between online self-assessment and learning outcomes and self-assessment skills among grade 11 students in Vietnam. The selection of participants, the random assignment of participants to groups, and the use of pre- and post-tests and a self-assessment rubric all contributed to the validity and reliability of the study's findings.

Results

The study aimed to confirm the relationship between online self-assessment and learning outcomes and self-assessment skills among grade 11 students in Vietnam. The study involved 160 students and was conducted over six weeks. The intervention group employed interactive online exercises that delivered immediate feedback on Liveworksheets for online self-assessment. The control group, in contrast, engaged in traditional self-assessment.

The statistical analysis conducted to support these findings included the use of the t-test and ANOVA. SPSS software was used to analyze and compare the learning outcomes of the control and intervention group. Table 1 shows the results of the statistical test of the difference between the intervention and control groups' final test scores.

Table 1: A summary of the test's average statistical parameters

Group	n	M	SD	Levene's Test for Equality of Variances		Sig. (2-tailed)
				F	Sig.	
Intervention	80	7.7	0.28	1.824	0.161	0.005
Control	80	6.3	0.34			

The results of Levene's test for Sig = 0.161 > 0.05 show that the variance of the test mean between the intervention and control groups is not different. The test results on the difference between the two mean values of the tests between the intervention group and the control group had Sig = 0.005 < 0.05. As a result, there is a difference in the mean score of the test between the intervention and control groups. The intervention group's mean test score was 7.7 points higher than the control group's mean score of 6.3. This demonstrates that there is a difference in learning outcomes between the intervention and control groups after the impact of online self-assessment via Liveworksheets. It also shows a positive relationship between online self-assessment and learning outcomes.

The intervention group's self-assessment skills were analyzed and compared using pre- and post-test data. The average scores of the criteria of self-assessment skills of students in the intervention group are shown in Table 2 based on statistics of points according to the level of each criterion:

Table 2: Student self-assessment skills in the intervention group

Criteria	Pre-test		Post-test	
	M	SD	M	SD
1	1.48	0.64	2.49	0.68
2	1.44	0.59	2.35	0.73
3	1.68	0.73	2.50	0.62
4	1.54	0.64	2.15	0.64
5	1.36	0.58	2.34	0.67
6	1.38	0.58	2.25	0.72
7	1.61	0.70	2.63	0.56
8	1.50	0.57	2.44	0.74

Table 2 displays the average scores and standard deviations for each criterion of self-assessment skills for students in the intervention group in two evaluations, prior to and after the

pedagogical experiment. The findings show that after six weeks of impact, students' self-assessment skills improved in all criteria, more or less.

As a whole, the study confirmed the positive relationship between online self-assessment and learning outcomes and self-assessment skills among grade 11 students in Vietnam. The findings suggest that interactive online exercises with immediate feedback can improve learning outcomes, and regular online self-assessment can enhance students' self-assessment skills.

Discussion

One novel finding in this study is the effectiveness of interactive online exercises with immediate feedback on Liveworksheets in improving learning outcomes and self-assessment skills among grade 11 students in Vietnam.

This study builds upon previous research that has found a positive relationship between online self-assessment and learning outcomes (Prisacari & Danielson, 2017) but goes a step further by demonstrating the specific benefits of interactive online exercises with immediate feedback. This finding is particularly relevant in the current educational landscape, where many schools are turning to online and blended learning models due to the COVID-19 pandemic. The use of interactive online tasks with immediate feedback can help educators facilitate self-assessment and improve student learning outcomes, even in virtual environments. This finding is consistent with previous research that has shown the effectiveness of online self-assessment tools in promoting self-regulated learning and improving academic performance (Alanzi, 2021; Hsu et al., 2022; Pinto-Llorente et al., 2017).

Online self-assessment allows students assess themselves whenever and wherever they want, which helps to alleviate the anxiety and pressure that some students feel when using traditional assessment methods (Tay, 2015; Yang et al., 2022). Furthermore, technology-based self-assessment tools frequently include features that encourage learners to interact with the system and motivate them to learn (Rodríguez et al., 2019). Motivation is a critical factor in student learning (Azar & Tanggaraju, 2020; Lin et al., 2017; Luo et al., 2021; Mäenpää et al., 2020; Oh et al., 2021; Rini et al., 2020; Tokan & Imakulata, 2019). Furthermore, the features of assessment tools via interactive online exercises encourage students to view self-assessment as an enjoyable task that they can master. This leads to increased academic engagement and success.

Because COVID-19 required many teaching activities to be conducted online, educators were looking for ways to improve student learning through the use of online tools (Katsarou & Chatzipanagiotou, 2021; Strauß & Rummel, 2020; Yusof et al., 2022). Many studies have been conducted on the use of information technology in the teaching of physics in high schools; however, very few studies have been conducted on the impact of online self-assessment on student learning outcomes in Vietnam.

In most cases, self-assessment is an important learning characteristic because it allows students to accurately reflect on their work and progress. Effective self-assessment is frequently associated with high scores, which is an intriguing discovery to share. As a result, our case study on the relationship between online self-assessment, self-assessment skills, and academic performance raises critical issues for future practice and research.

Nevertheless, there were several limitations to this study that should be considered. One of these limitations was the small sample size, which may limit the generalizability of the findings to other populations and contexts. Future research could replicate this study with a larger sample size to increase the external validity of the results. Additionally, this study did not control for other factors that may have influenced the development of self-assessment skills, such as prior knowledge and motivation. Further research could investigate the causal mechanisms underlying the effectiveness of Liveworksheets for promoting self-assessment skills by using intervention designs that control these factors.

Furthermore, the role of the teacher in the use of Liveworksheets should also be considered. Although Liveworksheets can be an effective tool for promoting self-assessment skills, the teacher's guidance and feedback are essential in helping students develop these skills. Teachers should provide clear instructions on how to use Liveworksheets for self-assessment, as well as timely feedback on students' self-assessment performance.

Conclusion

The online self-assessment on Liveworksheets is not only appropriate for improving learning efficiency but also for objectively assessing learners' self-assessment skills. These findings are useful for learning analytics researchers and practitioners interested in using online self-assessment for learning. Using multimedia resources in conjunction with immediate feedback is an appropriate solution for creating an online self-assessment environment for learners, contributing to digital transformation in educational activities, and meeting the current trend of globalization.

Despite several limitations, this study adds to the growing body of research on the effectiveness of online self-assessment tools and provides a foundation for future research in this area. It is hoped that the findings of this study will encourage educators to explore the potential benefits of using Liveworksheets and other online self-assessment tools in their teaching practices and to continue to develop innovative approaches to enhance student learning and performance.

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