

The Effects of Socrative-Based Online Homework on Learning Outcomes in Vietnam: A Case Study

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Abstract—In the educational digital transformation, the effective use of technological platform has been proved to support formative assessment and improve student learning outcomes. This research focuses on Socrative – a student response system (SRS) that has been appreciated by many recent studies. The quasi-experimental design is used to evaluate the impact of completing Socrative-based Physics online homework on students' learning outcomes. The authors used a survey with the participation of 305 grade 10 students from two high schools in central Vietnam, through the scores of end-of-semester exams and questionnaires, open-ended questions. The data was analyzed by using descriptive statistics with ANOVA test. The results showed that 152 students have participated in the homework on Socrative (experimental group), with an average score of 7.73/10 in the final exam; while the score of 153 students who did not participate in the activity (control group) was 5.31/10. The findings of the survey indicated that students have positive attitudes toward the use of Socrative as an online homework platform, and in addition, the students recommended that Socrative should be applied frequently in many subjects and exams in order to enhance their learning outcomes. In conclusion, the study argues that schools need to increase the use of SRS platforms as a solution to improve students' academic achievement and meet learners' needs for access to technology in the learning process.

Keywords—Socrative, online homework, learning outcomes, physics education, student response system (SRS)

1 Introduction

Digital transformation is an important process for incorporating technological solutions into our daily lives [1]. Many countries around the world have been implementing national digital transformation strategies, including the United Kingdom, Australia, Denmark, and others [2]. Digital transformation has an impact on a variety of industries, including business [3], [4], industry [5], and healthcare [6]. The digital transformation process not only improves the effectiveness of traditional methods, but it also leads to innovative approaches that integrate technological solutions into education [7], [8], [9], [10]. Digital transformation has begun to pique the interest of

educators in order to improve the learning process [11], [12]. This is regarded as a strategy for maintaining a high level of learning motivation and ensuring student active engagement while overcoming the constraints of traditional teaching approaches [13]. This has prompted numerous studies on improving digitization in education [14], [15], [16].

However, the process of implementing and implementing digital transformation is still quite sparse and ineffective. Many teachers only use technology for simple purposes such as storing data, finding resources on the Internet, and preparing presentations in Powerpoint [17], [18]. Several studies have found that teachers are fearful of using technology, unable to adapt to change, and unwilling to accept technological innovation due to a lack of support [17], [19], [20].

Until 2020, all of humanity must witness situations unprecedented in modern history. The Covid-19 pandemic occurred, causing many social and educational activities [21], to be halted locally, nationally, and globally [22]. Education has been a natural need to be met for a long time, but now we are faced with the question of how to be educated” [23].

The deployment of educational activities is not only a personal matter, but it is also a matter of survival for the school and society. Finding alternatives to face-to-face educational activities in schools is challenging for the world [24]. At this time, the urgent solution is digital transformation for online teaching. In fact, Covid-19 is simply reviving the need to investigate online teaching and learning opportunities that have long piqued the interest of researchers [25], while also drawing educators’ attention to the long-ignored potential of using technology to support education [26].

Teachers and students are not in the same defined place in online learning settings, which can cause interaction difficulties and challenges in assessing student learning results [27]. Teachers must consider the use of various educational technology tools and teaching methods to promote positive attitudes in order to pique students’ interest in learning content and improve forms of learning experiences. Several studies have shown that effective use of technology can improve and support regular assessment [28], [29]. Students can use technology to track their understanding whenever and wherever they want [30]. Technology can also aid in the provision of immediate feedback and the identification of student misconceptions [31]. Technology speeds up the tracking, tracing, storing, processing, and displaying of student outcomes and actions [30]. Furthermore, when it comes to providing students with immediate feedback, the right technology may be a “resource-saving solution” [32], [33].

The Student Response System (SRS) is a technology tool that can be utilized to encourage active student learning in the classroom [34]. The clicker system, which was invented in the 1950s, was SRS’s forerunner. However, with the emergence of mobile technology from the 1980s, this clicker technology was quickly supplanted by other SRS technologies. SRS had become widely used in colleges by 2003, with the introduction of phone and web-based SRS technology [35], [36], [37]. Individual feedback devices were first used in the 1960s, but were not widely used until the 1970s [7]. When these electronic tools become available, classroom interactions improve, particularly between teachers and students, making it easier to identify problems or

omissions in the learning process. It also effectively supports the process of transferring learning tasks to students, particularly online homework.

The educational environment is changing as a result of the rapid growth of technology. Some schools now have smart boards, tablets, Internet access, and computers that were not available a decade ago. Along with the advancement of technology, the approach to teaching and evaluation has shifted [38], the use of SRS is becoming more popular in education [39], and a number of online SRS platforms, such as Socrative, Edmodo, Weebly, and Class Dojo [38], are being utilized in many countries. This study focuses on the Socrative. Socrative allows teachers to create online tests, which students can access using any device (laptop, smartphone, or tablet) via a web browser [38]. Many studies indicated that Socrative is increasingly being used in the classroom for a variety of purposes, including improving student engagement and learning experience [40], [41], just-in-time teaching [42], active learning [43], making lectures more enjoyable for both students and teachers [44], collaborative learning [45], getting immediate feedback on instruction [46], and improving learning outcomes [47], [48].

The key infrastructural needs must be met in order for the benefits of adopting Socrative to show in a synchronized and effective manner. Teachers and students must have cell phones or personal computers with an internet connection. The quality of the network connection, in particular, has a considerable impact on the efficiency of SRS. Furthermore, the use of software, websites that allow the creation of online exercises, and open learning resources on the internet all contribute to the success of this activity.

In fact, in some rural, mountainous, and isolated areas of Vietnam, the proportion of pupils who own smartphones or computers remains low. Furthermore, while investment in IT infrastructure development (with fiber optic lines, 3G, 4G, and even 5G networks) is widely covered, it is not free, and the cost is high in comparison to students. The internet connection is of variable quality and speed, and it falls short of the requirements for implementing SRS in classrooms and on a large scale.

Thereby, in this study, Socrative was used to administer regular assessments via online homework. This research direction addresses the shortage of personal learning devices in part by allowing students to share devices from their loved ones at home. At the same time, reducing transmission line overload caused by multiple students online at the same time on the same internet connection.

According to a review of studies, higher education is more likely than general education to receive technology in assessment [15], [28], [31], [40]. At the same time, cultural and social backgrounds are being considered as a new context in testing and evaluation activities related to digital transformation [49], [50]. However, there is a lack of studies evaluating the impact of using Socrative as a web-based homework (WBH) platform on high school students, especially in Vietnam, a country that is initially approaching digital transformation in education. As an indispensable direction to research, the authors wish to discover students' attitudes toward using Socrative online homework at a high school in central Vietnam, as well as the impact on student learning outcomes. This study contributes to the understanding of Socrative's impact on learning outcomes and its use as a web-based homework platform. The research questions addressed by this study are as follows:

1. What impact do Socrative-based online homework have on student learning outcomes?
2. What is students' attitude toward Socrative-based online homework?

The authors have reviewed several studies mentioned web-based homework and Socrative, then presented the contents related to research methods. The quasi-experimental design was used in the study and indicated findings by analyzing data collected between the experimental group and the control group. Finally, highlighted and discussed issues that the research found.

2 Literature review

2.1 Web-based homework (Online homework)

In this day and age, a number of studies addressed that using WBH assignments in a scientific and flexible manner will provide numerous benefits.

The findings of Akcay Ozkan & Budak [51] showed that using WBH reduces class time pressure to prioritize time for other activities while also limiting re-teaching what students already know to avoid subjective psychology. Furthermore, teachers can direct students to consolidate, deepen, and expand on what cannot be done in class due to time constraints. Further reinforcement for this, Lee et al. [52] stated that teachers save time and are more convenient using online tools when copying, distributing documents, and evaluating students' online homework.

Magalhães et al. [53] addressed that WBH encourage students' interest in learning. According to some surveys, students find traditional homework monotonous and boring, but with online exercises, students are more interested in the interface and effects designed, especially when there is a high level of interactivity. Moreover, students can complete tasks at any time, from any location, and easily look up the necessary documents using only a smartphone or computer with an internet connection, which is very relevant to the interests of today's youth.

Also, Cheng et al. [54] highlighted that assisting teachers with feedback, evaluation, and commenting on results is one of the utilities of using online homework. In fact, with a heavy workload, the traditional method of grading, assessing, and commenting on homework for each individual student on a regular basis can be a burden and is frequently perceived as a challenge. Normally, teacher only randomly tests a few students or evaluates them in general, but does not have the conditions to grade or comment in detail on each task or individual student. Online exercises solved this problem by providing instant feedback. Teachers can easily update information about their progress, scores, and the percentage of tasks that students have completed using internet applications, giving them a foundation for evaluation and comment. Some applications allow for the random mixing of questions and answers, which results in more accurate assessment results. As a result, the situation of students copying each other's work is limited.

Several studies indicated that some students require extra help to stay motivated, study systematically, and completely prepare for tests. A web-based homework

platform is one technique to provide feedback on students' homework solutions. In principle, any SRS should have the ability to automatically grade responses and provide quick feedback on the validity of student work [55]. According to Balta and Güvercin [38], if a wrong response is received, a student attempts to answer the question again. Students can study the content, develop their understanding, and mastery of knowledge by performing puzzles and exercises with the assistance of technology devices.

2.2 Socrative

The rapid advancement of technology and the widespread usage of the Internet in education inspire teachers to increasingly assign homework online [56]. To ensure that the online homework system provides high educational efficacy, teachers must select effective software that is appropriate for students' conditions and abilities to use technology [57], as well as know how to use it. Using the internet environment to effectively exploit, store, and exchange information for students via SRS. This study focuses on using Socrative as an SRS platform.

Socrative is created by Boston University's students in 2010. This web 2.0 tool is used firstly for formative assessment. It enables teachers to manage classroom surveys, assignments, and quizzes, as well as aggregate findings in real-time and generate reports to track and visualize student learning. Teachers can create a report by email, save it to Google Drive, or save it as an Excel file in portable document format (PDF) after completing tests [38]. Teachers must construct multiple-choice questions and ask students to select the correct answer. Student comments are sent via the internet and can be displayed on the screen for immediate feedback. What's especially wonderful about this tool is that it's cost-effective and doesn't demand admin fees, unlike traditional clickers tools that do [34]. It is crucial to remember that the maximum number of students who may participate in a free Socrative class is just 50, whereas the professional version can allow up to 150 participants. There are public rooms and private rooms (Table 1).

Table 1. The Comparison of Free and Pro Features of Socrative [30]

Socrative Free	Socrative PRO
On-the-fly Questioning	Everything with Free, plus all the following:
1 public room for your classes	Up to 10 private or public rooms
50 students per session	150 student capacity
Space Race Assessment	Space Race countdown timer
Formative Assessments	Roster Import via CSV or Excel
Visualize Real-time Results	Restricted access to rooms with students ID# requirement
Device Accessibility	Personalized header for students
Reporting	Instant quiz share to colleagues with unique link
Share with an SOC code	Merge quizzes
Help Center Access	Silent Student Hand Raise
State and Common Core Standards	Shareable links for easy student login

The ability for teachers to shuffle questions and answer possibilities is one of the most useful features of the Socrative platform. For example, different questions will show on each student's mobile phone throughout the same examination. Furthermore, creating and reordering questions is a simple process. It also allows groups of students to go through tests in a contest to see who can answer the most questions correctly. When the correct response moves the avatar forward and the incorrect answer keeps the avatar where it is.

Teachers and students can access Socrative in several ways. As a result, the instructor must create a teacher account. Teachers will be granted a unique room code after registering an account. This code will be used by students to identify their virtual classroom, allowing them to access quizzes, homework, and surveys shared by the teacher. Importantly, students can log into Socrative with a room code in only a few minutes.

Socrative allows users to create quizzes and homework assignments in a variety of formats, including multiple choice, true or false, and open-ended questions [38]. It also provides the ability to attach images to questions and add explanations of correct answers so that students can receive immediate feedback. Furthermore, prepared materials can be shared with colleagues, and pre-existing quizzes can be imported into one's virtual classroom, allowing for collaborative learning. Overall, the program is simple to use and quite useful. It is highly recommended for those who want to assess student learning while also increasing classroom engagement [58].

In some studies, students who used Socrative for exams and classroom activities rated their experiences positively. [38], [59], [60]. These studies' survey data also show a positive attitude toward using Socrative to support second-year student learning. These studies also highlight the benefits that Socrative provides to users over other training and testing tools, such as increased learner motivation and engagement [38], [59]. Similarly, the use of Socrative to improve academic performance and learning outcomes has received positive feedback from participants. As a result, Socrative alters students' attitudes toward learning. Because the initial survey revealed a lack of interest in their classes; however, after using Socrative, students are more interested and have more positive perceptions in the post-experiment survey [60]. Furthermore, another study not only recognized Socrative's positive perception, but also prioritized its use as an assessment and training tool over "TurningPoint" [61].

On the other hand, some studies show an unexpectedly negative attitude toward or low acceptance of Socrative in the classroom. When Socrative and Kahoot! were compared, one conclusion was reached: Kahoot! outperformed Socrative in terms of student satisfaction and engagement [62]. The gaming aspect of Kahoot! helps to reduce student stress more than Socrative. Another finding revealed that their study participants were not as enthusiastic about using Socrative as they had anticipated [63]. The main difference, however, was due to a minor effect on the results, which the researchers attributed to curriculum challenges. In addition, students' perceptions were influenced by their lack of experience with mobile-based tests. In the previously discussed studies, the genre, difficulty, and nature of the items assigned to students via Socrative played a significant role in changing students' perceptions and learning engagement.

According to the studies discussed above, different researchers' efforts have addressed the positive aspects of new tools such as Socrative to varying degrees. However, negative effects have been identified; thus, this study contributes to understanding the impact of Socrative homework on student achievement and investigates student attitudes toward this platform in Vietnam.

3 Methodology

3.1 Research design

The impact of completing the Physics online homework on Socrative on students' learning outcomes was assessed using a quasi-experimental design in this study. Students in the final semester of the school year are randomly assigned to the control and experimental groups. The experimental group interacts with the Socrative exercises, whilst the control group prepares for the end-of-semester exams using standard resources. The impact of Socrative online homework on students' learning outcomes is measured using their final exam scores in Physics. Furthermore, student attitudes are examined using survey findings from questionnaires.

3.2 Participants

The research was conducted at two high schools in central Vietnam with a total of 305 grade 10 students, including 145 boys and 160 girls with an average age of 15 years. These students are enrolled in the same Physics program, have the same teaching conditions, and are learning Physics at the same level and quality.

3.3 Intervention

The online homework activities in this study are Physics exercises in the form of multiple-choice questions chosen in accordance with students' learning content. These activities are repeated ten times, corresponding to ten sets of Socrative-designed questions. Among the 305 students, 152 completed Socrative homework and are considered the experimental group. The control group consisted of 153 students who completed the same homework on paper in the traditional manner.

Every week, homework sets are posted on the Socrative platform; they match the learning material of that week and are replaced by the next set of exercises the following week. Socrative allows teachers to watch students' interactions in each question, allowing students to take the test numerous times and finish with the maximum possible accomplishment in each set of questions. Questions having a high mistake rate will be repeated in the following round of questions.

Socrative also shares the answers to the previous set of questions in addition to the new set of questions. As a result, students can see the instructions for solving, answers, and quickly correct their mistakes. Students are also permitted to leave comments after

completing their Socratic online homework, allowing teachers to interact with students' comments.

Before the end-of-term exam, an online questionnaire was distributed to students to gauge their attitudes toward using Socratic-based online homework.

3.4 Instruments

Data for this study was gathered from three sources:

First, the initial differences between groups were equated using students' final semester 1 test scores. This test evaluates students' academic performance during the first semester of the school year. In this test, students have 45 minutes to complete 28 objective multiple-choice questions and three essay questions in order to assess their knowledge of the requirements for the first semester program. Teachers choose these questions from a variety of sources, but they mostly revolve around basic types of exercises (about 70%).

Second, final exam scores were used to compare the learning outcomes of the two groups after the study intervention. The format and content of this test are similar to the first term's final exam, but the knowledge to be assessed meets the requirements of the second semester program.

Finally, conduct the survey using a questionnaire created by Balta and Güvercin. The questionnaire contains 8 questions in the form of Likert (1 - Strongly disagree; 5 - Strongly agree) and two open-ended questions to extract information to assess students' attitudes toward using Socratic to do online homework [38].

The questionnaire is designed with the content shown in Table 3 and is posted on Socratic for students to complete. Furthermore, the Cronbach's alpha coefficient was used to assess the instrument's reliability and the internal consistency of the survey questionnaire. The coefficient obtained was 0.905, indicating a high correlation between each item.

4 Results

The Post Hoc Test of Homogeneity of Variances table of the Levene test indicates the results Sig.= 0.620>0.05; shows that there is no difference in variance between the results of the first semester exam between the experimental and control groups. The F test in Table 2's Anova table reveals that Sig.= 0.731 > 0.05, indicating that there is no difference in the scores of the two groups of students.

Table 2. ANOVA Results 1

Score 1	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.485	1	.485	.119	.731
Within Groups	1237.961	303	4.086		
Total	1238.446	304			

The ANOVA test was then used to compare the second semester exam scores of the two groups of students [55]. The Sig.=0.488 >0.05 in the Table of Post Hoc Tests Multiple Comparisons of Levene test indicates that the variance between students in the two experimental and control classes is the same, so using ANOVA analysis is possible. Table 3 displays the ANOVA test results.

Table 3. ANOVA Results 2

Score 2	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	447.681	1	447.681	170.732	.000
Within Groups	794.503	303	2.622		
Total	1242.184	304			

The ANOVA results in Table 2 show that, with Sig.=.000<0.05, there is a difference in the second semester’s final exam scores between the control and experimental groups. When a student’s final semester 1 grades are controlled, the use of Socrative homework sets for the end of the second semester will have a significant impact.

The effectiveness of Socrative-based homework assignments is measured using students’ final second semester test scores. Students had taken a final exam after finishing 10 sets of homework. According to Table 4, 152 students out of 305 participated in the Socrative homework (experimental group), with an average score of 7.73/10, in comparison,153 students who did not participate in the activity (control group) had a score of 5.31/10.

Table 4. Descriptive values

Group	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Experimental	152	7.73	1.599	.130	7.47	7.99
Control	153	5.31	1.639	.133	5.05	5.57
Total	305	6.51	2.021	.116	6.29	6.74

According to the results of the attitude survey, students are enthusiastic about using Socrative to do homework online. Table 5 displays the average score of survey participants as well as the standard deviation for each question.

Each question has a maximum score of 5.00. Table 5 shows that the mean score ranges from 3.40 to 4.70, with a mean of 4.01. Overall, it demonstrates that students have a very positive attitude toward using Socrative as an online homework platform. Items 2, 5, and 7 are related to Socrative software, and others (remaining sections) are evaluating Socrative as an SRS platform for online homework sharing. Item #2 achieved the highest level (4.70), in comparison, item #8 achieved the lowest level (3.40).

Table 5. Descriptive Statistics of Questionnaire Items

#	Items	Mean	SD
1	This application served my purpose.	3.94	0.97
2	I liked Socrative.	4.70	0.92
3	I regularly prepared for the exam with this application.	3.62	0.92
4	With this application, I prepared for the exam with relish.	3.70	0.91
5	With Socrative, I prepared more for the exam.	3.86	0.85
6	I want this application to be used in the next exam also.	4.52	0.83
7	Socrative should be used in other subjects as well.	4.34	1.01
8	I expect to get a high mark in the exam with this application.	3.40	1.13

Along with the Likert questionnaire mentioned above, two open-ended questions with the following content are attached at the end: (1) What was the best use of sharing online homework on Socrative? (2) What are the limitations of sharing online homework on Socrative? Figure 1 depicts the classification of students’ responses.

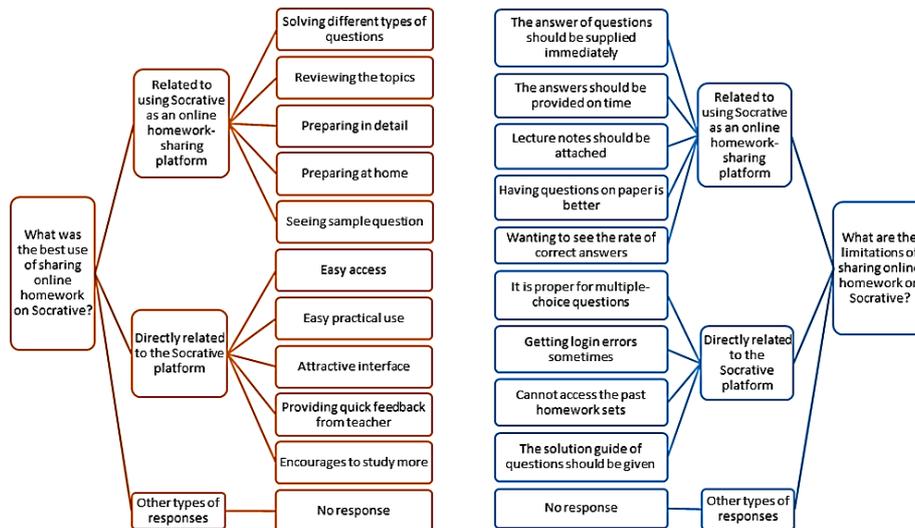


Fig. 1. The Students’ Responses Related to Using Socrative as an Online Homework Platform

According to the findings of this study, Socrative is a suitable tool for improving learning outcomes through the use of online homework. This conclusion is consistent with Altun’s study, which found that online exercises increased students’ motivation and academic achievement [56], and Babaali and Gonzalez’s study found that online homework systems are effective in supporting the teaching process [64].

Students’ attitudes toward Socrative have been revealed through feedback, indicating that Socrative is regarded as a useful tool. It encourages effective collaboration with learning content, promotes motivation to complete learning tasks at home, and engages students in the learning process. Learners are positive about the use

of Socrative and express a desire to use it in classroom learning activities. Similarly, Hadiri finds that when Socrative is used as an SRS platform, people's attitudes toward it change [46]. Other studies on students' attitudes toward using Socrative by Altun and Piatek are also very positive [44], [56]. Positive student attitudes show that, at least for the participants in this study, Socrative creates a positive learning environment in homework completion tasks and helps to improve academic performance.

5 Discussions

The usage of Socrative by participating students to do homework is believed to have increased student homework time overall. This most likely improved students' capacity to absorb the lesson and affected their learning performance. In other words, the difference in student achievement may be linked to the software's guidance and feedback, as well as the increased learning time. Furthermore, despite the fact that the majority of students performed well on the final test, there was a subset of students that performed horribly. The substantial association between students' final grades and the time of Socrative use during the review process, on the other hand, demonstrates the overall usefulness of Socrative. Furthermore, while performing homework sets using Socrative, it is obvious that the learning environment at home gives the opportunity to focus and not divert this concentration for other students, as it does in the classroom [65].

According to the author's observations, participating students had a positive attitude prior to using Socrative tests, possibly because students had previously used different web applications, particularly social media apps, and expected this new experience to be similar. This conclusion was supported by research on an initial pre-trial survey, which discovered that while participants had negative attitudes, they preferred Socrative interactions [60].

Furthermore, prior to the experiment, the students in this study were afraid to do the exercises on the web rather than on paper. The reason for this is that students have long been accustomed to doing traditional paper-based exercises and are concerned about their grades. This result is consistent with the findings of Chou et al., who also explained that the participants in their study were skeptical of Socrative's effectiveness, despite preferring web exercises to traditional paper tests. Students felt more comfortable with this after testing in this study, possibly due to the incognito mode during assignments or the use of nicknames [66]. Another reason for this shift in participants' attitudes could be that Socrative allows questions to be illustrated with visuals, which makes them easier to understand and helps students remember better, ultimately improving academic achievement. This is consistent with Waluyo's discovery that mobile-based testing tools like Socrative can improve student academic achievement. Simultaneously, it boosts the teacher's confidence when conducting formative assessment [67]. In fact, an online platform that actively engages and supports students also depends on the teacher's ability to design based on existing platforms, so the role of the teacher cannot be denied. strong positive impact on students' desire to participate in online learning.

According to some studies, the constant flow of technology can have a negative impact on teachers [68] and students [69]. There is still some concern among teachers who oppose technology, claiming that it harms the humanist perspective of education [70]. In some cases, the use of new technologies (mobile apps) does not always imply that student learning outcomes are improved satisfactorily. In general, initial perceptions of usefulness and ease of use, as well as social aspects, can influence students' attitudes toward technology use. Chou et al. discovered that students in secondary school who used the BYOD - (bring your own device) method with the Socrative test performed worse on formal tests than those who studied traditional guided court [66]. According to the authors, this was due to some students' unfamiliarity with the BYOD method. Both learning pathways produced comparable results in summative assessment.

However, the percentage of students who own personal learning devices remains low in many areas. The investment in developing internet infrastructure is of indeterminate quality and speed, and it falls short of the requirements for implementing SRS in classrooms and on a large scale. The successful implementation of Socrative in high schools in central Vietnam is a promising sign, demonstrating the potential of using Socrative in teaching to overcome many physical barriers. Furthermore, positive student attitudes show that Socrative is a good SRS that facilitates interactive teaching in and out of the classroom, and that it can be used in a variety of institutions and geographical regions.

According to the results of the student attitude survey, Socrative should be used on a regular basis in many subjects and exams in order to have a positive impact on students' learning outcomes. As a result, Socrative is an excellent tool for navigating a 21st-century learning environment.

6 Conclusion

This study shows that using Socrative-based homework leads to an increase in student learning outcomes. Moreover, the results also show that students are satisfied with homework on the Socrative platform because the feedback is given immediately, thereby supporting the improvement of students' understanding of the knowledge learned. Furthermore, when Socrative is used as an online homework platform, students are more committed to their homework. It can be assumed that when doing exercises in this format, the assistance of Socrative has a positive effect on students' ability to acquire and retain knowledge. As a result, it has a direct impact on student learning outcomes.

Based on students' feedback, Socrative is recommended for frequent use in many other subjects. In conclusion, because students perceive the use of Socrative online homework positively, this SRS platform can be considered as a foundation for implementing Socrative online tests, and using all types of school exams in the future. Also, further studies are necessary to generalize those students who do homework on the Socrative platform would have improved learning outcomes as this study did.

However, one limitation of this study is that the author only used Socratic to collect data on experimental group attitudes, while data on control group attitudes were ignored. The attitudes of the control group students were not assessed because they did not use Socratic as a homework tool. Future research will examine the impact of using Socratic in homework or classroom exercises on students' cognitive processes such as problem comprehension, critical thinking, problem solving, and so on. Furthermore, Socratic studies affecting interdisciplinary education must be investigated further in Vietnam. STEM education is currently a global trend [71], [72]. As a result, Socratic application and impact assessment are critical. Using Socratic on a regular basis as a tool to help students memorize knowledge actively according to the teacher's pedagogical intentions, thus significantly optimizing the positive effects on learners that Socratic brings.

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