ORIGINAL ARTICLE
INTRODUCING 'SOCRATIVE' AS A FORMATIVE ASSESSMENT TOOL IN UNDERGRADUATE MEDICAL CURRICULUM

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Objective: This study aims to introduce Socrative (an online audience response system) as a formative assessment tool in undergraduate medical curriculum and to assess the attitude and perceptions of the students regarding the same. **Methods**: It was a questionnaire based cross sectional study conducted for 6 months in 2019 using a free version of Socrative. Quizzes were prepared and used as formative assessment to assess students' learning of the physiology content delivered in the modules of Special senses (Year II), Respiratory system (Year I) and Cardiovascular System (Year I) at Shifa College of Medicine. Students' survey was carried out online, at the end of the quiz to record the perceptions of Socrative as an assessment tool. Data was analysed using SPSS-21. Descriptive statistics were applied, $p<0.05$ was considered significant. For qualitative variables, frequency and percentage were determined and for quantitative variables, mean and standard deviation were determined. Test of association applied was independent sample t-test (for quantitative variables). **Results:** Students reported a higher mean scoring preference for Socrative based exam (50%) compared to the traditional paper based exam (37.1%). Majority (83.9%) of the students evaluated Socrative as a user friendly tool, saves time and resources (86.6%) and provides immediate feedback (88.7%). A good number of students suggested conducting more Socrative based assessments in future (75.8%). **Conclusion:** Using Socrative as a tool for formative assessment helps in providing timely and effective feedback, thereby enabling the students to reflect on their performance and focus on important concepts.
Keywords: Formative assessment, medical education, Pakistan, Socrative, technology.

INTRODUCTION

Formative assessment, which has been regarded as the assessment for learning, is increasingly being emphasized in the field of education.[1] It is intended to facilitate the learning process by providing feedback on performance and assisting students to progress under circumstances that are non-threatening.[2] Formative assessment can be carried out in many ways, including the traditional paper-and-pencil tests or assessments using modern technology, e.g., online quizzes.[1] One of the challenges faced by many institutions in higher education including the medical education is improving students' involvement, which is essential for accomplishing the learning outcome; therefore remarkable efforts have been put in this research area over the past few years.[3]

New technological advances have often been accredited with the potential to have a large influence on the field of education. Mobile technology has progressed very fast in the past few decades with the reduction in cost of ownership and improvement in user-friendliness. This has resulted in a dynamic increase in the acceptance rate of mobile devices amongst higher education students over the years. Mobile devices are believed to renovate the way, the students learn in the future and to make learning more enjoyable.[4] Furthermore, the higher education environment is becoming accustomed to the mobile technologies with the better provision of Wi-Fi coverage. This has made the incorporation of such technology into the classroom more practical compared to the early years.[5]

Using mobile technology particularly online platforms have become more common in education over the last decade. The platforms that apply game-based learning theories such as Kahoot!, Quizziz, Quizlet and Socrative, are being researched as formative assessment tools to promote student learning.[6] Socrative is a cloud based audience response system. It is a free package (with paid option for added features), that permits instructors to gather timely response from students in the form of multiple choice, true/false, or short answer questions. The service is accessible across platforms and devices (laptops, tablets, and/or smartphones) and is feasible for instructors to engage students and gather feedback by connecting the mobile technologies that students bring to class.[7]

The purpose of this study was to introduce Socrative as a formative assessment tool in undergraduate medical education at Shifa College of Medicine and to assess the attitude and perceptions of the students regarding the same.

METHODOLOGY

The study was approved by the Institutional review board and ethics committee of Shifa International Hospitals Ltd and Shifa Tameer-e-Millat University.

It was a questionnaire based cross sectional study which started in August 2019 and ended in January 2020 (6 months). A total of 186 students enrolled in undergraduate medical degree, MBBS (Bachelors of Medicine and Bachelor of Surgery) at Shifa College of Medicine, Shifa Tameer-e-Millat University, Islamabad were included in the study. Amongst them 92 students belonged to first year and 94 to second year, students belonging to rest of the years were excluded.

A free version of Socrative was used in this study. It comprises of two main modules, which are Socrative Student and Socrative Teacher modules. The teacher module permits instructor to register, create an account and to make and manage quizzes and visualize reports. The student module enables students to participate in the activities. It can either run on an internet connected web browser or can be installed as native application on any mobile device. Socrative offers ease of use by excluding the requirement for students to create account; they can join a simulated classroom via a room code generated by the instructor without prior registration.

Quizzes were prepared and uploaded on the Socrative and were used as formative assessment to assess students' learning of the Physiology content delivered in the modules of Special senses (Year II), Respiratory system (Year I) and Cardiovascular System (Year I). Students were briefed before the quiz about the Student login procedure. The quiz was launched with the settings of student immediate feedback, shuffle question order and shuffle answer order. The shuffling setting ensured different question and answer sequence for each student which can be effective in reducing the chances of plagiarism. During the quiz, students' progress and scores were monitored in real-time, which allowed the instructor to have a better control. All the three report types available in Socrative, i.e., Whole Class Excel, Individual Student(s) PDF and Question Specific PDF were generated at the end of quiz for analysis purpose.

Students' Survey was carried out, online, at the end of the quiz. In the survey, students were asked to fill-up questionnaire, which included the questions to compare the perceptions of students regarding the traditional paper based exam and online assessment using Socrative, evaluate the tool as a method of formative assessment, assess the acceptance of assessment tool, and additional comments from the students. Informed consent was taken from the students and faculty to use the data for research purpose.

Data were analysed using SPSS-21 and $p<0.05$ was considered significant. Descriptive statistics were used. For qualitative variables, frequency and percentage were determined and for quantitative variables, mean and standard deviation were determined. Test of association applied was independent sample t-test (for quantitative variables).

RESULTS

Table-1 shows the results of the survey questions which were meant to compare the perceptions of students regarding the traditional paper based exam and online assessment using Socrative. Likert scale was used for scoring with 0= strongly disagree, 1= disagree, 2= uncertain, 3= agree, 4= strongly agree.

Students reported a higher mean scoring preference for the Socrative based exam compared to the traditional paper based exam in terms of being able to work in a structured manner (3.02 *vs* 2.66, $p<0.001$) and having a good overview of their progress in exam (3.3 *vs* 2.63, p=0.001). Although, the students reported a higher mean score preference for the Socrative in terms of being able to concentrate well but the difference was not statistically significant (3.01 *vs* 2.87, p=0.297)

Table-2 shows the results of the students' survey questions to evaluate the tool as a method of formative assessment. Likert scale was used for scoring with 0= strongly disagree, 1= disagree, 2= uncertain, 3= agree, 4= strongly agree.

A total of 83.3% students either strongly agreed or agreed that they found the activity intriguing, and 83.9% of the students strongly agreed or agreed that this method of assessment is reasonable and user-friendly. A reasonably good percentage (86.6%) either strongly agreed or agreed that this mode of subject evaluation saves time and energy. Regarding logistics, 74.2% strongly agreed or agreed it was appropriate for conducting this activity. A vast majority of the students (88.7%) either strongly agreed or agreed that the feedback on assessment was timely and appropriate; 62.9% strongly agreed or agreed that this e-assessment method is better than the conventional assessment method. And 44.6% of the students either strongly agreed or agreed that all the conventional assessments should be replaced by e-assessments.
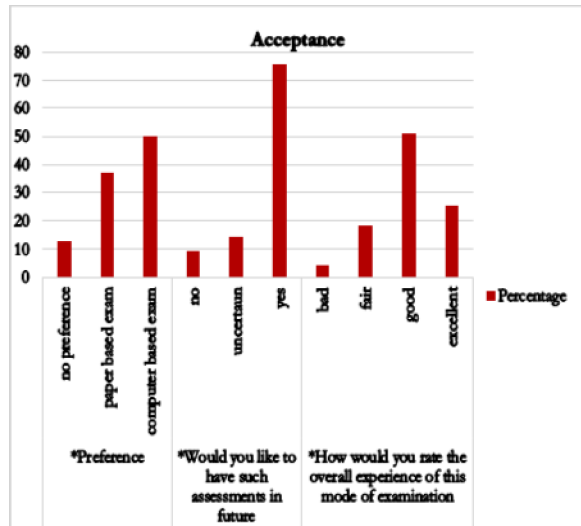
Figure-1 shows the results of the students' survey questions to assess the acceptance of assessment tool.

Table-1: Comparison of traditional paper based exam and online assessment using Socrative

Questions	Traditional (Paper based) Mean±SD	Socrative (Computer based) Mean±SD	p
I am able to work in a structured manner	2.66±0.882	3.02±0.967	**<0.001**
I have a good overview of my progress in exam	2.63±0.99	3.3±0.808	**0.001**
I am able to concentrate well	2.87±0.844	3.01±0.989	0.297

Table -2: Results of the students' survey questions to evaluate Socrative as a method of formative assessment

Questions	Strongly disagree n (%)	Disagree n (%)	Neutral n (%)	Agree n (%)	Strongly Agree n (%)	Mean±SD
I found this activity intriguing	1 (0.5)	13 (7)	17 (9.1)	89 (47.8)	66 (35.5)	3.11±0.876
This method of assessment is reasonable and user-friendly	2 (1.1)	15 (8.1)	13 (7)	106 (57)	50 (26.9)	3.01±0.873
This mode of subject evaluation saves time and resources	2 (1.1)	8 (4.3)	15 (8.1)	85 (45.7)	76 (40.9)	3.21±0.847
Logistics for conducting this activity were appropriate	5 (2.7)	18 (9.7)	25 (13.4)	98 (52.7)	40 (21.5)	2.81±0.973
Feedback on assessment was timely and appropriate	2 (1.1)	2 (1.1)	17 (9.1)	91 (48.9)	74 (39.8)	3.25±0.754
This e-assessment method is better than conventional assessment method	11 (5.9)	18 (9.7)	40 (21.5)	63 (33.9)	54 (29)	2.7±1.16
All conventional assessments should be replaced by e-assessments	20 (10.8)	40 (21.5)	43 (23.1)	37 (19.9)	46 (24.7)	2.26±1.332

Figure-1: Results of the students' survey questions to assess the acceptance of Socrative as an assessment tool

Fifty percent of the students preferred a computer based examination, while 37.1% reported preference for paper-based examination, and 75.8% agreed that they would like to have such assessments in future. About a quarter (25.3%) of the students rated their overall experience of this mode of examination as excellent while 51.1% rated it as good.

Table-3 shows the comparison of the perceptions of the Socrative tool between first year and second year students. The results of only those questions are mentioned in the table for which the difference in the opinions between first year and second year students were statistically significant.

The results are suggestive of the finding that there was an overall greater degree of satisfaction and a higher rate of acceptance for the Socrative tool among the second year students.

Table-3: Comparison of the perceptions of Socrative between first year and second year students

Questions	Class	Mean±SD	p
In this computer based exam I was able to concentrate well	1st Year	2.64±1.001	<0.001
	2nd Year	3.36±0.841	
In paper based exam I am able to work in a structured manner	1st Year	2.98±0.902	<0.001
	2nd Year	2.64±0.914	
I found this activity intriguing	1st Year	2.98±0.838	0.046
	2nd Year	3.23±0.897	
Feedback on assessment was timely and appropriate	1st Year	3.42±0.579	0.002
	2nd Year	3.09±0.863	
This e-assessment method is better than the conventional assessment method	1st Year	2.41±1.131	0.001
	2nd Year	2.99±1.122	
All conventional assessments should be replaced by e-assessments	1st Year	1.95±1.354	0.001
	2nd Year	2.57±1.240	
I prefer a No preference (0) Paper based exam (1) Computer based exam (2)	1st Year	1.24±0.685	0.011
	2nd Year	1.50±0.699	

*(Likert scale (with 0 being strongly disagree and 4 being strongly agree) for scoring all questions except the last question where the scoring theme is mentioned in the table

DISCUSSION

The importance of formative assessments in strengthening the students' capacity to monitor and improve their own performance is evident from the literature. Different methods have been used in the past for formative assessment which include traditional paper and pencil based tests and technology based online quizzes. As millennials continue to exhibit preference for use of technology in the classroom, the strengths and weaknesses of various methods must be considered before implementation. The purpose of the current study was to determine the effectiveness of using a technology based, online audience response system, Socrative as a tool for formative assessment. Socrative was introduced for the first time as a mode of formative assessment to the first and second year students studying at Shifa College of Medicine. In

general students displayed a positive attitude towards the Socrative.

In the current study the students showed an overall preference for Socrative based exam over traditional paper based exam. This is in concordance with another study conducted by Guarascio et al[8], in 2016 in the United States where the students reported higher rates of preference for Socrative application compared to traditional student response systems in various categories which included active participation in the class, ease of use and general format enjoyment.

In the present study, students reported that they found the activity intriguing and rated Socrative based assessment to be reasonable and user-friendly which provides timely and appropriate feedback also. A study conducted by Balta et al[9], in 2015 in Turkey showed similar results where most of the students reported that taking exams/quizzes with Socrative is more enjoyable, comfortable, interesting, easy and more functional. Students were also of the view that Socrative enables immediate feedback and results of exams/quizzes can be seen in real time. As mentioned by Molloy and Boud (2014), 'feedback is widely viewed as an intervention to improve learner performance and feedback is most effective when delivered immediately post task engagement'.[10]

Regarding the acceptance of Socrative as an assessment tool, a vast majority (76.4%) of students in our study rated their experience to be good or excellent and 75.8% reported that they would like to have such assessments in future. These findings are similar to another study conducted by Lim WN in Malaysia in 2016 where the majority of the students were satisfied with the use of Socrative in classroom. They reported that their learning experience with Socrative was good and they recommended that other lecturers should also use this tool.[7] In their study a good number of students agreed or strongly agreed that Socrative should be used in all subjects and that they would like Socrative to be used permanently. Another study conducted by Wash et al also revealed similar results where majority of the students were of the view that Socrative helps provide instant feedback and it should be used more often in the university classes.[11] Results of a study conducted by Dervan et al in Dublin in 2013 are also very promising where 96% of the students reported that Socrative is easy or very easy to use, 92% agreed or strongly agreed that Socrative improved their engagement while 76% suggested using Socrative more or significantly more in the next semesters.[12] Liu et al[13] and Piatek et al[14] also found Socrative to be helpful and useful for their students' engagement, understanding and learning. These findings can be explained by the fact that students entering their professional education (medical in our case) come from different social and academic backgrounds. It

requires time for the students to accommodate to the prevailing teaching and assessment methodologies in a particular institution. Since the use of latest technology based tools is always encouraged and practiced in the Shifa College of Medicine, the second year students are better accustomed to the prevailing practices and therefore reported higher rate of satisfaction and acceptance of the modern tool as an assessment methodology.

CONCLUSION

Using Socrative as a tool for formative assessment helps in providing timely and effective feedback, thereby enabling the students to reflect on their performance and focus on important concepts. The ease of use and interactive features of the tool help in improving the engagement of students at the same time. The platform can be considered promising for implementation of active teaching and learning strategies in the classroom particularly facilitating formative assessment.

LIMITATIONS

This qualitative study was carried out in a single institute; therefore, the results cannot be extended to other populations.

FUTURE SUGGESTIONS

Further studies are needed to determine the effects of conducting Socrative based formative assessments on the academic performance of the students.

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