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Effectiveness of Innovative use of Technology in Classroom Teaching on Academic Achievements and Overall Satisfaction of Nursing Students

Mrs. Ida SweetlinPriyadarsiniA.R M.Sc (N)., M.B.A (Hosp Admin)
Lecturer,Department of Continuing Nursing Education and Research,College of Nursing, CMC, Vellore

Dr. VinithaRavindranM.Sc (N)., Ph. D
Professor & Head,Department of Continuing Nursing Education and Research,College of Nursing, CMC, Vellore

Dr. VathsalaSadanM.Sc (N)., Ph. D
Professor & Dean,College of Nursing, CMC, Vellore

Mrs. RumaNayakM.Sc (N)
Professor & Head,Department of Pediatric Nursing,College of Nursing, CMC, Vellore

Mr. VimalChanderM.Tech (Information Technology)
Senior Research Fellow,Department of PMR,CMC, Vellore

Mr. Dinesh Kumar M.Sc (N).,
Lecturer,Department of Continuing Nursing Education and Research,College of Nursing, CMC, Vellore

Dr. AntonisamyBelavendra Ph. D (Bio-Statistics)
Professor,Department of Bio-StatisticsCMC, Vellore

Abstract
The recent rapid changes in technology around the globe has facilitated fast and easy information and communication processes. Using technology in promoting teaching has become a trend in education and poses a promising alternative to traditional teaching and learning. This study aimed to assess the effectiveness of inclusion of two methods of technology (clickers& games) in classroom teaching of nursing students on their academic outcomes. Quantitative approachwas employed and an experimental design was used to test the two methods and their effect on student learning. Onehundred students in second year of General Nursing and Midwifery programme were randomly allocated to three groups. The first group used clickers, secondgrouphadgames and the third groupwas the control groupand had standard teaching method. Data collection was done over a period of threeweeks. The intervention was provided by the principal investigator in different classrooms and at different time periods on the same day on the same topic. The instruments included a written objective type tests and a student satisfaction scale. Results showed that the overall satisfaction of the students was highest in games i.e 61.8% who were highly satisfied when compared to clickers group (56.3 %)and in the control group the satisfaction level was 61.3%. The academic achievement scores revealed that group which had games as the intervention had the highest mean score of 19.05±2.38 , clickers group with 18.28 ±3.35 and the control group had the lowest level of academic achievement among the groups with a mean score of 17.29±2.91. In all the three groups there was a positive correlation between academic achievement and satisfaction of the students. There was a significant association between the students who played the games and the overall satisfaction level (p<0.05).

Keywords:*Technology, clickers, gaming, nursing students, teaching method*

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I. Introduction

Advances in technology has created room for the development of innovative methods in the teaching and learning setting also (Simelane, 2008). Classroom-based instruction is being replaced with computer based learning in higher education (Katz, 1999). Nursing faculty have been using Power point slides (PPTS) to support their in-class teaching and discussions for the past two decades. Although PPTS were once a welcomed addition to classroom lectures, the use of PPTS have become monotonous in the recent years. Students are also often dissatisfied with the routine usage of PPTs which do not encourage involvement or participation of students in classroom learning. Nurse educators have been slow to adopt new teaching methods, with the most widely used teaching method in nursing still being the traditional lecture (Lee et al., 2019). Recent interest in use of technology in classroom has paved way to including innovative teaching learning methods which encourage attention and motivate students to participate in classroom learning. Access to internet has made possible the use of online resources and modes in teaching.In recent years, digital or web-based games have increasingly supported learning (Vlachopoulos, &Makri, 2017). Similarly computer assisted technology has improved the possibility of involving students actively in responding to questions using devices like 'clickers" which assist in getting instant feedback to student learning. Clickers represent instructional technology tools used by lecturers to gather and analyze students' responses to questions during class rapidly (Bruff, 2007). Clickers are reported to change passive lecture rooms into vibrant interactive learning spaces (Caldwell, 2005; Duncan, 2007). Research suggests that teachers should use clickers regularly to promote active learning (Duncan, 2007). Beatty (2004) has stated that the use of clickers could promote deep learning. Benefit of using clickers as a teaching strategy is that it facilitates peer collaboration in learning (Caldwell, 2005). Formative feedback during the learning process helps students to improve understanding, gain clarity, to identify gaps in knowledge, and flaws in logic (Beatty, 2004). Clickers combined with collaborative peer-aided learning have shown positive results with large effect sizes (Liu et al., 2017).

Another mode of learning which is gaining momentum is gaming. The introduction of different types of games especially online games and games which facilitate the use of the electronic gadgets that the students are familiar with, have been found to improve students' involvement in learning and retention of concepts learned. Gaming has been shown to be highly effective for understanding affective as well as cognitive content, including developing value structures along with the tolerance and understanding toward peers. Gaming is more time consuming than traditional lecturing. However, research has shown that knowledge and attitudes gained through gaming are long lasting. As gaming is used for reinforcement, rather than for introduction of new knowledge, it is difficult to compare its time needs with those of lecture (Bekebrede, Warmelink, & Mayer, 2011). The most difficult part of gaming in education is to see that it helps to achieve the educational objective. Gaming as a teaching strategy has proven to be an effective and powerful method of conveying and reinforcing information in a stimulating and appealing manner.Integrating educational games into the curriculum helps to promote understanding of learners. Game-based learning is a creative platform that allows nursing teachers to use technology and gaming in appropriate way to enhance interest of students (Murad, 2017).

Games can be an enjoyable, motivating and persuading method for learning pediatric content, enhanced by group interactions, and competition. Electronic, Web-based tools encourage and facilitate teaching (Sward, Richardson, Kendrick, & Maloney, 2008). Use of technology based teaching methods like Clickers and games play an important role in facilitating learning. It provides the opportunity of receiving immediate feedback and assessment, making learning appear comparatively more achievable than it would without instant feedback which in turn helps both the teacher and the students (Al-Hariri & Al-Hattami, 2017). Therefore this study aimed to assess the effect of technology based teaching methods like clickers and games in addition to the standard methods of teaching on the academic achievement of students. The study also analysed the satisfaction of students related to the learning methods.

The objectives of the study were to

- assess the effectiveness of the innovative use of technology (clickers & games) on academic achievements and overall satisfaction of nursing students
- determine the relationship between academic achievements and overall satisfaction of nursing students
- determine the association of academic achievements and satisfaction of nursing students with selected demographic variables of nursing students

II. Methods

A Quantitative method was employed and an experimental design was used to test the two methods and their effect on student learning. All nursing Students in the II year G.N.M class of aNursing College in India were included in the study. Hundred students who participated in the study were randomly allocated to three groups.The instruments used in this study included an academic achievement test and a satisfaction questionnaire. Academic Achievement Test was prepared by the investigator to test the knowledge based on domains such knowledge, comprehension, application, analysis, synthesis and evaluation. A total of 25 multiple

response questions were included with scores ranging from a minimum of 0 to a maximum score of 25. The content validity was given by subject experts. The content validity index was 1. Research prepared Satisfaction Questionnaire had Likert scale to assess the overall satisfaction of students with a total of 14 questions and 2 open ended questions, the scores ranged from 1 to5. The items included in the questionnaire were the class encouraged the students to be active, ability to interact with the teacher and classmates, ability to be attentive in the class, clarity of the content, usage of appropriate Audio Visual aids, encouragement provided both academically and socially, improvement in self-esteem, motivation and communication.The content validity was given by subject experts. The content validity index was 1.The social and demographic variables proforma included details such as age, gender, no. of hours spent in learning on a particular day, method used for learning, use of internet as a learning medium and interest in playing games on the phone or laptop.

The intervention was delivered by the Principal Investigatorfollowing which data collection took place for all three groups. Two units from child health nursing subject were included for the study purpose and each unit was taken for all three groups on the same day one after the other on two consecutive days. Each class was planned for two hours.

The clicker group was given individual clickers and were asked to respond with clickers when questions were asked during the class. Clickers were used three times during each topic session; and were linked to four-item multiple-choice questions. After the students gave in their responses, the correct answer was displayed with the histograms. The games group was provided with games as part of classroom activity. Individual games such as puzzles, and group games such guess it, mix and match and jeopardy were used for the games group. The games were either PPT based or online or paper and pencil based.Both the clicker and the games group had also the lecture with PPT. The control group had only the standard lecture with the ppt. In all three groups the subjectshad taken an academic achievement test at the end of the session on the unit taught. The same test was given after two weeks to assess the retention. Self-reported satisfaction questionnaire was administered to all the subjects on the day of intervention.

Ethical approval was obtained from the Institutional Review Board. Written informed consent was obtained from the study participants. Confidentiality with the information was achieved by maintaining anonymity of the participants. Analysis of the collected data weredone using the SPSS software 17.0 and descriptive and inferential statistics were used.

III. Results

Majority of the participants were females (90.7 %) and predominantly 43 % used visual method as a method of learning. Almost half of the study participants (49 %) did not use internet as a learning medium (see Table 1).

Table 1
Distribution of subjects based on demographic variables

Demographic variables	Frequency (n)	Percentage (%)
Gender		
Male	9	9.3
Female	88	90.7
No of hours spent for learning		
1 hour	24	24.7
2 hours	42	43.3
3hours	24	24.7
>3 hours	5	5.2
Method of Learning		
Visual	43	44.3
Auditory	9	9.3
Reading	26	26.8
Writing	26	26.8
Kinesthetic	7	7.4
Usage of internet as a learning medium		
Yes	48	49.5
No	49	50.5
Games		
Yes	62	63.9
No	35	36.1

Figure 1. Distribution of subjects according to overall satisfaction of teaching methods

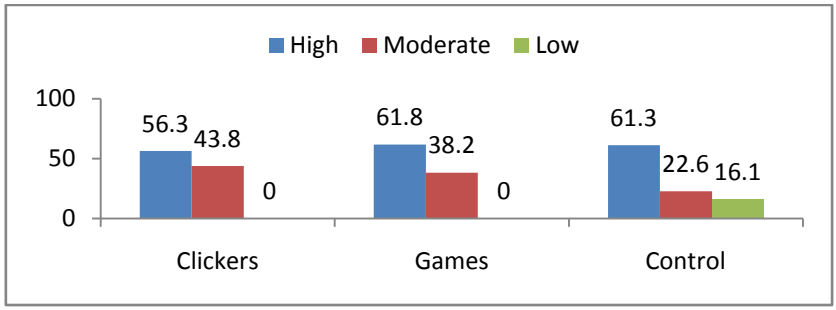


Figure 1 illustrates the overall satisfaction of the subjects was highest in games (61.8%), and clickers group had 56.3 % who were highly satisfied and 43.8% who were moderately satisfied. The control group had 61.3% who were highly satisfied and 16.1 % who had low satisfaction.

Table 2
Effectiveness of Innovative teaching strategies on Academic achievements

	Mean ± SD	Statistical Value	p value
Clickers	18.28 ±3.35	3.020	0.054
Games	19.05±2.38		
Control	17.29±2.91		

The academic achievement scores revealed that group which had games as the intervention had the highest mean score of 19.05±2.38 and the control group had the lowest level of academic achievement among the groups with a mean score of 17.29±2.91 (Table 2). Though the difference is existing among the groups, it was not statistically significant. But the groups who received games and clickers as teaching methods showed improved academic achievement.

Table 3
Effectiveness of Innovative teaching strategies on overall satisfaction

	Mean± SD	Statistical Value	p value
Clicker	62.00±5.74	14.04	p<0.01
Games	63.08±5.56		
Control	53.16±11.91		

Table 3 shows that the overall satisfaction was highest in the group who had games as the intervention. The control group had the lowest level of satisfaction with the mean score of 53.16±11.91. Subjects who received the instruction using games and clickers were found to be highly satisfied compared with that of control group and a statistically significant difference isnoted (p<0.01)

Table 4

Distribution of subjects based on overall satisfaction

S. NO	ITEMS	Strongly Agree			Agree			Neutral			Disagree			Strongly Disagree		
		Clicker	Games	Control	C (%)	G(%)	Co(%)	C(%)	G(%)	Co(%)	C(%)	G(%)	Co(%)	C(%)	G(%)	Co(%)
1	The class encouraged me to be active	75	52.9	22.6	25	38.2	54.8	0	8.8	16.1	0	0	6.5	0	0	0
2	I was able to interact with the teacher	34.4	32.4	25.8	43.8	41.2	29	21.9	23.5	38.7	0	2.9	6.5	0	0	0
3	I was able to interact with my classmates	37.5	58.8	25.8	40.6	29.4	29	18.8	11.8	22.6	3.1	0	12.9	0	0	9.7
4	The class was interesting	90.6	73.5	38.7	6.3	26.5	25.8	3.1	0	25.8	0	0	3.2	0	0	6.5
5	The objective of the course were met in the class	50	58.8	29	31.3	23.5	41.9	18.8	14.7	19.4	0	2.9	6.5	0	0	3.2
6	I was able to remain attentive in the class	68.8	55.9	38.7	28.1	41.2	22.6	3.1	2.9	32.3	0	0	6.5	0	0	0
7	The content taught was clearly presented	56.3	64.7	38.7	28.1	26.5	22.6	15.6	8.8	25.8	0	0	9.7	0	0	3.2
8	I was able to understand the content	68.8	73.5	45.2	28.1	26.5	25.8	3.1	0	22.6	0	0	3.2	0	0	3.2
9	I am able recall/remember the class content	56.3	70.6	19.4	37.5	23.5	58.1	6.3	5.9	12.9	0	0	9.7	0	0	0
10	The classes encouraged interaction in terms of both academically and socially	40.6	38.2	19.4	43.8	52.9	41.9	15.6	5.9	19.4	0	2.9	16.1	0	0	3.2
11	My self-esteem had improved as a result of interaction and participation in the class	43.8	55.9	22.6	46.9	44.1	32.3	9.4	0	29	0	0	12.9	0	0	3.2
12	The class motivated me to study well	65.6	55.9	35.5	15.6	41.2	35.5	18.8	2.9	19.4	0	0	3.2	0	0	6.5
13	My Communication skills were enhanced	31.3	52.9	19.4	46.9	41.2	41.9	18.8	5.9	22.6	3.1	0	9.7	0	0	6.5
14	The teaching aids used were	68.8	73.5	35.5	12.5	26.5	32.3	18.8	0	22.6	0	0	6.5	0	0	3.2

Table 4 depicts the overall satisfaction of the subjects in various items. Majority 75 % in the clickers group felt that the class encouraged them to be active, 90.6 % felt that the class was interesting, 68.8% felt that they were able to remain attentive in the class and 65.6 % felt that the class motivated them to study well.

Table 5

Difference in academic achievements between I& II test in all three groups

Arm	Test I Mean ±SD	Test II Mean ±SD	Statistical Value	p value
Clickers	18.28 ±3.35	17.59 ±4.11	.751	.458
Games	19.05±2.38	16.55±3.40	5.46	<.001
Control	17.29±2.91	16.61±3.43	1.064	0.296

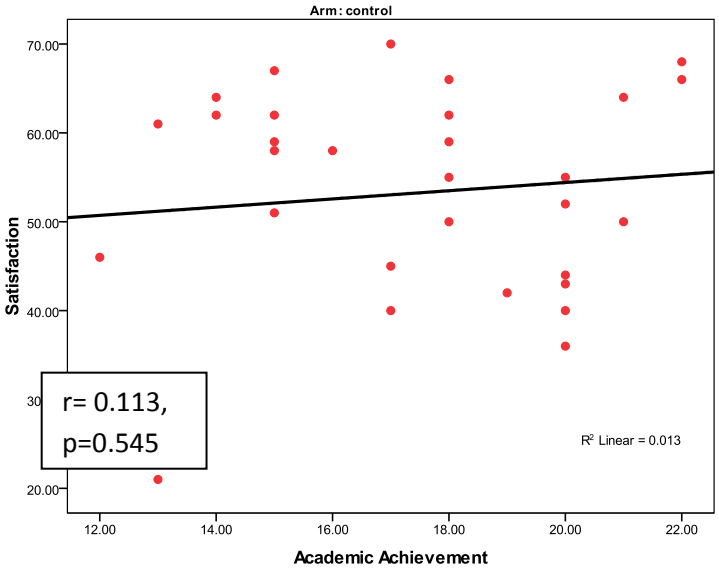
Figure 2. Correlation between academic achievement and satisfaction in the control group

Table 5 shows that the intervention group who had clickers had a mean score of18.28 ±3.35 in the first test but the second test conducted to assess the retention level in students showed a decrease in the mean score 17.59 ±4.11 ($p = 0.458$).

The intervention group who had games had a mean score of 19.05±2.38 in the first test but the second test conducted to assess the retention level showed a decrease in the mean score 16.55±3.40 ($p < 0.001$) (Table 4). A statistically significant difference is shown between the first test and the second test among the subjects received instruction through games ($p<0.001$).

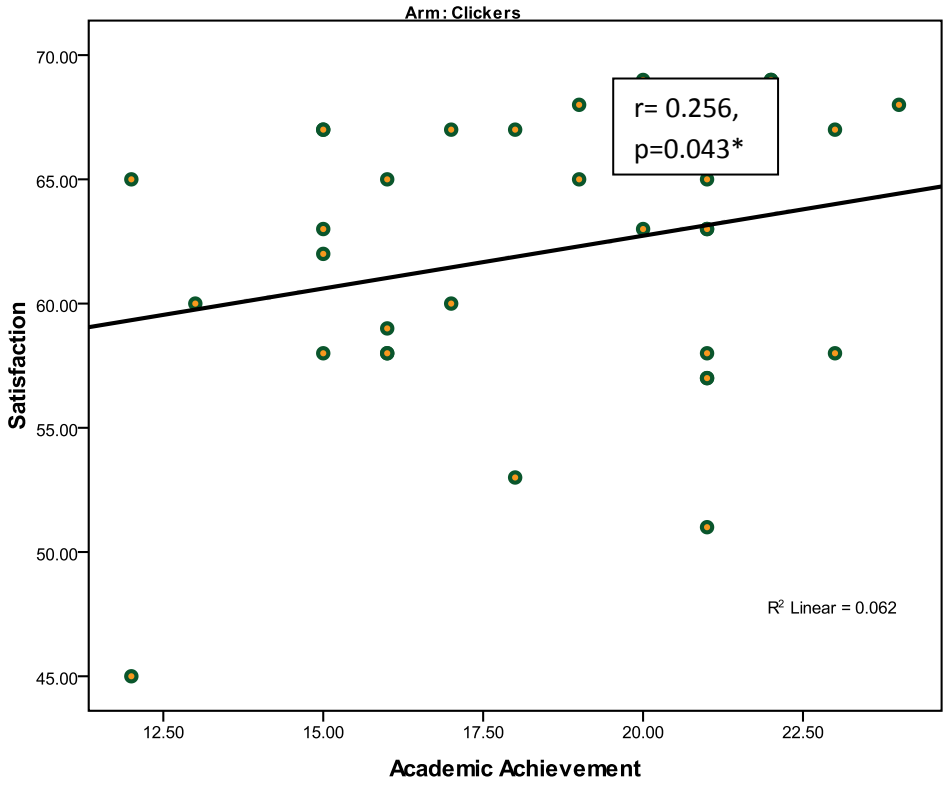
The control group had a mean score of 17.29±2.91 in the first test and in the second test a mean score of 16.61±3.43. Even in the control group it was observed that the subjects had less score in the second test compared to the initial test score.

Figure 2. Correlation between academic achievement and satisfaction in the control group



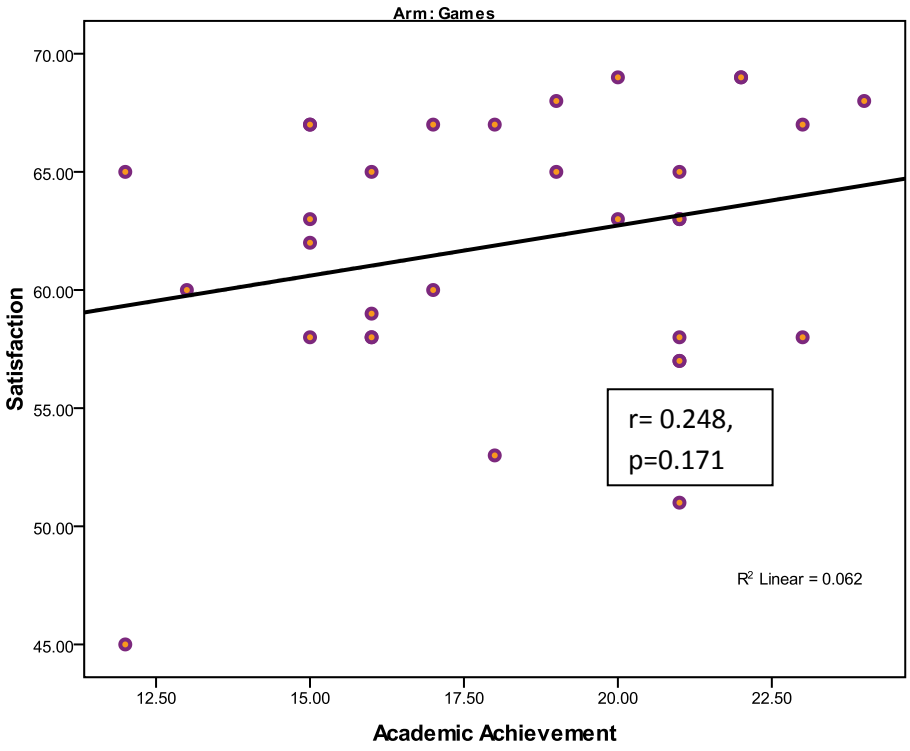
A weak positive correlation was found between academic achievement and satisfaction among subjects in control group (r=0.113).

Figure 3. Correlation between academic achievement and satisfaction in the games group



A statistically significant weak positive correlation was found between academic achievement and satisfaction among subjects who received instruction through games (r=0.256, p=0.043). As the academic performance increases, satisfaction also improves.

Figure 4. Correlation between academic achievement and satisfaction in the clickers group



Among the subjects who received instruction through clickers, an insignificant weak positive correlation was found between academic achievement and satisfaction.

Figure 5. Overall rating of the class

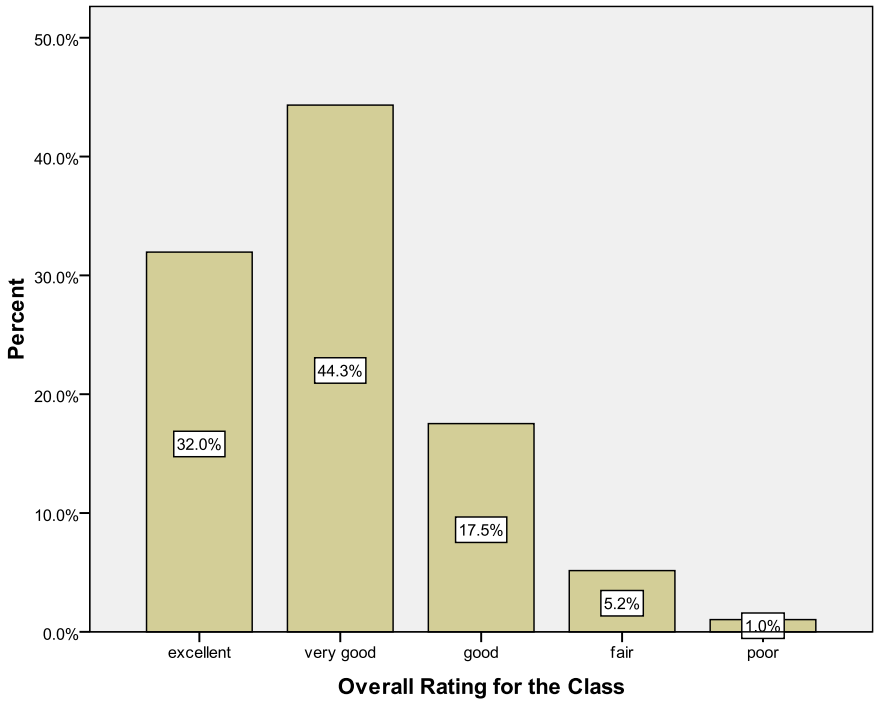


Figure 5 illustrates the overall rating of the class. Majority of the subjects rated the class as very good (44.3%).

Figure 6. Overall satisfaction of the class

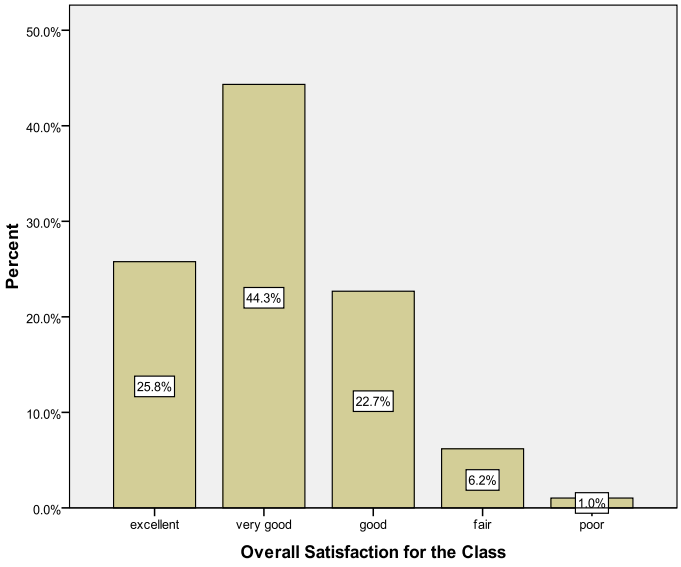


Figure 6 illustrates the overall satisfaction of the class. Majority of the students 44.3% rated the class to be very good and 25.8% felt that the class was excellent.

IV. Discussion

Majority of the subjects in the current study were females (90.7 %) and predominantly 43% used visual method as a method of learning. Almost half of the study participants (48 %) used internet as a learning medium and 63.9 % were interested in using games as mode of leisure. This is could attributed to the fact that the usage of internet as a learning medium has increased in the recent and students depend on digital media for learning resources.

In the recent years, video gaming had become part of contemporary popular culture.Existing evidence based literature suggests that e-learning and digital gaming technology can support students in their learning. It is imperative for educationists and teachers to develop learning and teaching approaches that support students of all disciplines, while embracing the latest technology (Skiba 2008a). Games provide context-rich, well-designed educational experiences that help nursing students achieve the intended learning outcomes and move one step closer to competent clinical practice (Reed, 2020). Advances in technology, including virtual learning environments, are moving at a significant pace in transforming education (Brander 2010). Nadolski et al. (2008) suggested that gaming can be useful for higher education to develop and deploy, to enhance the student experience. Tashiro (2009) also highlighted that there are opportunities to use serious gaming and simulation in healthcare education to support knowledge and skill development in a safe environment.Using games in nurse education programmes can be a good strategy to support student learning, confidence and competency, but the gaming activities need to be well planned, designed and integrated into curricula carefully (Peddle, 2011). A well-designed/constructed game and appropriate use gaming technology has the potential to enhance the learning outcomes of students in higher education (Johnston, Boyle, MacArthur, & Fernandez Manion, 2013). There are numerous factors which influence the effect of serious game assisted learning. They might include the perceived usefulness of the game and the interaction among the students (Zhonggen, 2019).

In this study, both gaming and clickers produced significantly better academic achievement scores, but the improvement did not differ significantly, although gaming had the highest mean score of 19.05±2.38 compared to clickers (18.28 ±3.35) and control group (17.29±2.91).This could be attributed to the fact that gaming allows learners to be active participants, improves peer collaboration to a great extent and also group games facilitate learning from peers which in turn helps the weaker students in the class.Also gaming creates a competitive environment and helps in stimulating and motivating the students. Gaming immersed learning could facilitate learners' holistic understanding of scientific conceptions due to the improved performances on science and the prolonged retention of science knowledge (M.-T. Cheng, W. Lin, She, &Kuo, 2017).Abdulmajed et al. (2015) performed a systematic review of educational games for the health professions and found Positive outcomes were noted overall for improving students' knowledge, awareness, and satisfaction.

In a similar study by Frazer (2007)titled The Effect of Gaming as an Instructional Strategy on Baccalaureate Nursing Students Immediate Knowledge and Knowledge Retention on comparison in combining lecture with discussion versus lecture with a game it was found that gaming improved knowledge and knowledge retention.Clickershave been used to actively engage students during the class and to give immediate

feedback to students regarding understanding of lecture material. Clickers can also effectively used for small-group discussions and problem solving. Research has supported that clickers create an atmosphere of student interaction that enhances critical thinking and the ability to utilize knowledge in the safety of the classroom environment (Berry, 2009). In a studytitled "Use of remote response devices: an effective interactive method in the long- term learning" the average number of correct answers in the interactiveteaching (clickers) group was 63.6 %, compared with thepassive education group where it was 53.2 % ($p<0.05$). Thedifference was an average of 10.4 % more in the clickersgroup (Millor et al., 2015).

The overall satisfaction of students with the Innovative use of Technology in classroom teaching showed that games had a mean score of 63.08±5.56, clickers 62.00±5.74 and control 53.16±11.91. Students in the current study gave positive feedback stating the innovative use of technology broke the monotony of the classroom.The students also stated that the class using games helped them to be motivated, active and also fostered cooperation among students. The students for whom clickers was used as the intervention expressed that it helped them to be attentive and also provided reinforcement and immediate feedback to them about their understanding of the topic.

In a similar study byDeBourgh (2008)using clickers students were highly satisfied with both operational aspects and instructional effectiveness of using the technology in the classroom, with 75.8% (n =47) and recommended continued use of clickers. Majority of the students in the study (66%) reported that use of clickers helped them to ''do better'' on quizzes and exams,specially application-style questions requiring students to synthesize knowledge and to determine priorities of patient care management were used in class. Clickers were used to provide feedback to students about the accuracy of their thinking and decision-making in case studies, 72% (n = 52) of students found this immediate feedback as very or somewhat useful.Akbaba (2009) identified similar results in his dissertation named "The Effect of Multimedia Use on Academic Achievement and Attitude in Ataturk's Principles and Reforms Course" and identified that the academic success level of the classroom using multimedia was higher than the classroom which did not use multimedia. In a study by Hung (2017) the results indicated that the gamified use of clickers had positive influences on student learning, with regard to their performance, perceptions, and preferences.

The current study showed that the scores in the second test had considerably decreased showing that retention of knowledge was poor among all the groups. This could be explained by the fact that initial understanding using the intervention (both clickers and games)was highly effective in improving the test scores but assimilation was not very good.In contrary to these findings Millor (2015) identified that results of the examination performed 3 months after the classes, from the topics explained with clickers were better assimilated than the topics explained with classical passive teaching methods. The percentage of correct answers was significantly higher (10.4 % difference, $p<0.001$), showing that the level of knowledge of the topics explained with clickers was significantly higher than in the passive teaching group.

In the current study it was revealed that in all the three groups there was a positive correlation between academic achievement and satisfaction. There was a significant association between the students who played games and the overall satisfaction level ($p<0.05$). Also there was a positive association between the academic achievement and students who used internet as a learning medium. Satisfaction is also an important requirement for successful learning (Sinclaire, 2014).The overall satisfaction of the class for students which is influenced by factors such as being able to be attentive, interactive nature of the class, motivation and self-esteemis instrumental in improving the test scores and therefore academic achievement.

V. Conclusion

The recent advancements in technology has paved way for newer teaching and learning strategies inorder to engage learners, and help them to develop professional skills. The use of clickers in the classroom facilitates immediate feedback both to the learners and the teacher and helps to modify the class. Similarly the use of games helps the nursing teacher to accommodate newer methods to train nursing students in various skills. Both use of clickers and gaming helps the teacher provokes interest in the learners, motivates the learners, facilitates peer collaboration and also promotes self-confidence and self-esteem. Appropriate use of clickers and gaming in the classroom helps to achieve better academic scores and improves the student satisfaction.

References

[1]. Abdulmajed H., Park Y.S., Tekian A. (2015). Assessment of educational games for health professions:Asystematic review of trends and outcomes. Medical Teacher, 37(Suppl. 1), S27–S32.
[2]. Akbaba B (2009) .The Effect of Multimedia Use on Academic Achievement and Attitude in Ataturk"s Principles and Reforms Course. Doctoral thesis from Gazi University
[3]. Al-Hariri, M. T., & Al-Hattami, A. A. (2017).Impact of students' use of technology on their learning achievements in physiology courses at the University of Dammam. *Journal of Taibah University Medical Sciences*, *12*(1), 82-85.
[4]. Beatty, I. D. (2005).Transforming student learning with classroom communication systems. *arXiv preprint physics/0508129*.
[5]. Bekebrede, G., Warmelink, H. J. G., & Mayer, I. S. (2011).Reviewing the need for gaming in education to accommodate the net generation. *Computers & Education*, *57*(2), 1521-1529

[6]. Berry, J. (2009). Technology support in nursing education: Clickers in the classroom. *Nursing education perspectives*, *30*(5), 295-298.
[7]. Brander S (2010) Education technology.Nursing Standard.25, 4, 71.
[8]. Bruff, D. (2007). *Clickers and classroom dynamics: Classroom response systems create opportunities for managing student discussion and assessing student learning*. Retrieved from http://www2.nea.org/he/advo07/advo1007/index.html
[9]. C.Frazer. (2007). The effect of gaming as an instructional strategy on baccalaureate nursing students' immediate knowledge and knowledge retention. Unpublished doctoral dissertation, Widner University
[10]. Caldwell, J. E. (2005). Clickers in the large classroom: Current research and best-practice tips. *CBE Life Sciences Education*, *6*(1), 9-20.
[11]. DeBourgh, G. A. (2008). Use of classroom "clickers" to promote acquisition of advanced reasoning skills. *Nurse Education in Practice*, *8*(2), 76-87.
[12]. Duncan, D. (2007). Clickers: A new teaching aid with exceptional promise. The Astronomy Education Review, 5(1), 70-88.
[13]. Hung, H. T. (2017). Clickers in the flipped classroom: Bring your own device (BYOD) to promote student learning. *Interactive Learning Environments*, *25*(8), 983-995.
[14]. Johnston, B., Boyle, L., MacArthur, E., & Fernandez Manion, B. (2013).The role of technology and digital gaming in nurse education. *Nursing standard*, *27*(28).
[15]. Katz, R. N. (1999). Dancing with the devil: Information technology and the new competition in higher education (1st ed.). San Francisco: JosseyBass.
[16]. Lee H.-L., Liu P.-C., Hsieh M.-C., Chao A.-S., Chiu Y.-W., Weng Y.-H. (2019). Comparison of high-fidelity simulation and lecture to improve the management of fetal heart rate monitoring. The Journal of Continuing Education in Nursing, 50(12), 557–562 10.3928/00220124-20191115-07
[17]. Liu, C., Chen, S., Chi, C., Chien, K. P., Liu, Y., & Chou, T. L. (2017). The effects of clickers with different teaching strategies. *Journal of Educational Computing Research*, *55*(5), 603-628.
[18]. M.-T. Cheng, Y.-W.Lin, H.-C.She, and P.-C. Kuo, "Is immersion of any value? Whether, and to what extent, game immersion experience during serious gaming affects science learning," *British Journal of Educational Technology*, vol. 48, no. 2, pp. 246–263, 2017.
[19]. Millor, M., Etxano, J., Slon, P., García-Barquín, P., Villanueva, A., Bastarrika, G., &Pueyo, J. C. (2015). Use of remote response devices: an effective interactive method in the long-term learning. *European radiology*, *25*(3), 894-900.
[20]. Murad, S. S. (2017). Brain involvement in the use of games in nursing education. *Journal of Nursing Education and Practice*, *7*(6), 90.
[21]. Nadolski RJ, Hummel HGK, van den Brink HJ et al (2008) EMERGO: a methodology and toolkit for developing serious games in higher education.Simulation& Gaming. 39, 3, 338-352.
[22]. Peddle M (2011) Simulation gaming in nurse education; entertainment or learning? Nurse Education Today. 31, 7, 647-649.
[23]. Reed, J. M. (2020). Gaming in Nursing Education: Recent Trends and Future Paths. *Journal of Nursing Education*, *59*(7), 375-381.
[24]. Simelane, S., &Skhosana, P. M. (2012).Impact of clicker technology in a mathematics course. *Knowledge Management & E-Learning: An International Journal*, *4*(3), 279-292.
[25]. Sinclaire, J. K. (2014). An empirical investigation of student satisfaction with college courses. *Res. High. Educ. J.* 22, 1–21.
[26]. Skiba DJ (2008a) Nursing education 2.0: games as pedagogical platforms. Nursing Education Perspectives. 29, 3, 174-175.
[27]. Sward, K. A., Richardson, S., Kendrick, J., & Maloney, C. (2008).Use of a web-based game to teach pediatric content to medical students. *Ambulatory Pediatrics*, *8*(6), 354-359.
[28]. Tashiro J (2009) What Really Works in Serious Games for Healthcare Education.portal.acm.org/citation.cfm?id=1639604 (Last accessed: February 19 2013.)
[29]. Vlachopoulos, D., &Makri, A. (2017). The effect of games and simulations on higher education: a systematic literature review. *International Journal of Educational Technology in Higher Education*, *14*(1), 22.
[30]. Zhonggen, Y. (2019). A meta-analysis of use of serious games in education over a decade. *International Journal of Computer Games Technology*, *2019*.

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