Kuwait Chapter of Arabian Journal of Business and Management Review, 11(3)2022, 124-130
An Open Access Journal
ISSN: 2617-3018

Arabian Journal of Business and Management Review (Kuwait Chapter)

Research Article | Homepage: www.arabianjbmr.com | AGJ

PERCEPTION OF MEDICAL UNDERGRADUATES ON ASPECTS OF KNOWLEDGE, SKILLS, AND ATTITUDE TOWARDS BASIC SIMULATION LABORATORY UKM

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A B S T R A C T
Basic Simulation Laboratory (BSL) at Faculty of Medicine Universiti Kebangsaan Malaysia (UKM) was inaugurated in October 2019 in collaboration with UKM Medical Education Department and SIM@UKM Committee under the SIM@UKM Programme: Learning Transformation in the Education 4.0 Era. Accordingly, a cross-sectional study using purposive sampling method was conducted on third year medical undergraduates to obtain information on students' perceptions on knowledge, skills and attitude gain following the usage of BSL. A total of 118 students participated in this study by answering a questionnaire adapted from previous study. Descriptive data showed that students agreed that aspects of knowledge, skills and attitudes can be improved, with a consistent and high average value of more than 3.0 despite the 2.24 low mean usage of BSL. Furthermore, the study indicated that there was a strong linear relationship between aspects of knowledge, skills and attitudes with BSL usage. Overall, third year undergraduates had a very positive perception on BSL. The use of BSL should therefore be intensified as it provides useful benefits to students.

Keywords:
simulation, knowledge, skills, attitude, perception

Article History:
Received: 01 Jul 2022
Accepted: 24 Aug 2022
Available Online: 15 Sep 2022

1. INTRODUCTION

Simulation is an act that is based on or uses something designed or fabricated similar to the real thing (Pustaka 2015). Simulated learning has a positive and safe impact on students and patients. It is seen as a teaching technique capable of improving healthcare systems by assisting users in diagnosing and testing new approaches in clinical practice prior to usage (Ahmed et al. 2016). Patient safety is an important aspect of the healthcare industry that needs a dynamic environment due to its complexity (Makary & Daniel 2016). Safe and quality depends on smooth functioning of each component involved in patient care as well as the team members responsible. Yet, the reality is that patient safety issues remain a major issue where an estimated 250,000 deaths due to medical accidents occur each year (Paige et al. 2018). These incidents should be avoided if the treating physician is knowledgeable and competent. Accordingly, in an effort to produce skilled and knowledgeable doctors, simulation laboratories can be used as one of the learning tools. The effectiveness of simulation-based learning is undeniable and has been widely practiced in medical education. Previous studies have shown the importance of simulation laboratories as an educational tool in teaching medical students (Ahmed et al. 2016). However, results related to the outcomes of simulation-based medical education are still inconsistent (Ohn et al. 2017). The continuous use of simulated laboratories can improve the quality of healthcare and patient safety (Lamé & Dixon-Woods 2020, Paige et al. 2018, Schmidt et al. 2013).

Basic Simulation Laboratory (BSL) at Faculty of Medicine Universiti Kebangsaan Malaysia (UKM) was inaugurated in October 2019 in collaboration with UKM Medical Education Department and SIM@UKM Committee under the SIM@UKM Programme: Learning Transformation in Education 4.0 Era. The purpose of establishing this simulation laboratory was to facilitate small group teaching sessions, supervised training sessions as well as self-directed learning through the provided modules and videos. In addition, BSL is used to strengthen knowledge, skills and attitude of medical undergraduates in particular. There are 35 procedures at BSL ranging from complex resuscitation as well as simple clinical examinations. The equipment and furniture layouts reflects clinical concepts each with additional computers. Medical Laboratory Technologists were deployed to handle the lab. Users book via online platform according to suitability. Records and usage statistics are gathered. Study of feedback from simulation laboratory users is important in order to find out the users' perceptions. The main objective of this study was to assess the perceptions of third year medical undergraduates on BSL usage in terms of several aspects including knowledge, skills and attitudes. Accordingly, as a major simulation laboratory used by students at the Faculty of Medicine UKM, this perception study was conducted to ensure usage optimization.

2. METHODOLOGY

This study was a cross-sectional survey with respondents consisting of UKM third year medical undergraduates which was selected because they were found to be the most frequent users based on laboratory statistics. Sample size was determined based on the method used by Krejcie & Morgan (1970), in which purposive sampling technique was used. A total of 118 respondents were needed based on the value of the chi-square table for 1 degree of freedom at the desired confidence level of 3.841 and accuracy level of 0.05 expressed as a rating. The instrument was adapted from previous study by Ismail et al (2020) with written permission. The study comprised of four parts namely demographics, knowledge, skills and attitude. The demographic data included gender, race and cumulative grade point average (CGPA). The knowledge item included new knowledge impartment, knowledge increment, benefits gained, and clinical preparation assistance. The skills aspect included relevant skills impartment, learning enhancement, thinking skills improvement, and psychomotor skills improvement. The attitude component included mind development, making oneself more sensitive and productive, more efficient working encouragement, as well as self-confidence increment. Additions made include BSL usage aspects covering usage of laboratory frequency, facilities, laboratory atmosphere suitability and safety. Four-point Likert scales namely strongly disagree, disagree, agree and strongly agree were used. A pilot correlation study based on 10 percent of the sample population was conducted to determine the level of accuracy of the content and construct of each item of the instrument to see the stability of the Cronbach Alpha values obtained. The values of reliability coefficients obtained from the results of the pilot study and the actual study were compared with the Table of Reliability Values (Feng et al. 2019) to identify items that needed improvement, modification or removal from the constructed study instruments. All items in the pilot study were found to have level of Cronbach Alpha reliability of 0.929.

Online Google Form questionnaire was distributed. Statistical descriptive methods were used to obtain the number, percentage and average of respondents who answered the research questions. In addition, inference test was used to see the relationship between the components of knowledge, skills and attitude of students with BSL usage depending on normal data distribution. Moreover, the average mean value of the descriptive statistical data findings was obtained from the 4-point Likert scale. The mean score obtained were interpreted and guided from the values found in previous studies (Budiaji 2013) in which mean score 1.00-1.50 (very low), 1.51-2.50 (low), 2.51-3.50 (medium), and 3.51-4.00 (high). In addition, all aspects of FF-2021-188 research ethical approval were adhered to including obtaining written consents, privacy and respondents' confidentiality. A description of the study and questionnaire was also given to ensure proper understanding of respondents.

3. RESULTS

The study focused on two aspects, namely data display and data interpretation. All the 118 respondents had given complete responses. The values observed for demographic data were the frequency and total mean in the findings obtained. A total of 72.9% (n=86) were females compared to 27.1% (n=32) males. From the racial perspective, the Malays contributed to a total of 54.2% (n=64), followed by Indians 20.3% (n=24), Chinese 15.3% (n=18), and others 10.2% (n=12). Another important demographic data gathered was the CGPA in which 61% (n=72) had CGPA 3.00-3.49, 22% (n=25) had CGPA 2.50-2.99, 16.9% (n=20) had CGPA 3.50-4.00 respectively. Only one respondent had CGPA 2.00-2.49.

Table 1: Participants feedback

Items	Participants feedback	N (%)	Mean	Standard dev
BSL usage	High BSL usage	34 (28.8)	2.2449	.40448
	Low BSL usage	84 (71.2)		
Knowledge	Improved knowledge	103 (87.2)	3.3962	.49644
	Less improved knowledge	15 (12.7)		
Skills	Improved skills	114 (96.6)	3.4407	.51581
	Less improved skills	4 (3.38)		
Attitude	Positive attitude change	109 (92.4)	3.4025	.51404
	Less attitude change	9 (7.6)		

Although the respondents gave less encouraging feedback on the aspects of BSL usage, overall participants gave very positive feedback on the aspects of knowledge, skills and attitudes. A total of 28% (n = 34) students had a high BSL usage with a mean value of 2.24. Meanwhile, 71.2% (n = 84) of the students agreed that the BSL usage was low. Based on the data, the mean was highest (3.44) in the aspect of perception of skills with almost 97% agreed that education through simulation improved their skills. This was followed by positive attitude change in 92.4% following simulation. Nevertheless, improvement of knowledge showed 87% agreement among the students.

Table 2: BSL usage

Items	Participants feedback	Mean	Standard dev
1	I always use the lab	1.56	.578
2	The equipment facilities in this lab assists in learning	3.26	.672
3	The atmosphere in this lab is conducive to learning	3.40	.615
4	The simulation lab is safe to practice performing procedures	3.56	.515

The BSL usage data clearly showed that the simulation lab is safe to practice performing procedures with a mean of 3.56. However, the BSL usage was lowest despite all the other three positive perceptions.

Table 3: Perception of knowledge

Items	Participants feedback	Mean	Standard dev
1	Simulations in this lab provide new knowledge	3.42	.544
2	Simulations in this lab increase knowledge	3.47	.534
3	Simulations in this lab are beneficial to increase knowledge	3.48	.502
4	Simulations in the lab aid in clinical preparation	3.40	.572

Overall, each item had a consistent and similar range of mean value in the knowledge perception although the highest was knowledge increment with mean value of 3.48.

Table 4: Perception of skills

Items	Participants feedback	Mean	Standard dev
1	Simulations in this lab provide relevant skills	3.44	.563
2	Simulations in this lab enhance learning skills	3.48	.535
3	Simulations in this lab improve thinking skills	3.33	.614
4	Simulations in the lab improve psychomotor skills	3.36	.592

It was found that each item had a consistent and similar range of mean value in the perception of skills towards simulation activities.

Table 5: Perception of attitude

Items	Participants feedback	Mean	Standard dev
1	Simulations in this lab develop the mind	3.38	.553
2	Simulations in this lab make oneself more sensitive and productive	3.41	.573
3	Simulations in this lab encourage oneself to work more efficiently	3.38	.584
4	Simulations in the lab increase self-confidence	3.42	.575

Overall, each item had a consistent and similar range of mean value in the perception of attitude following simulation activities.

3.1 Statistical Findings of the Relationship between the Variables in the Study

An inference test was performed on these data in order to obtain the relationship between the BSL usage with each of knowledge, skills and attitude. However, before tests were conducted on the aspects, there were some conditions or assumptions that needed to be complied with in order to see the relationship between the aspects to be tested. In this study, the value of Pearson correlation coefficient *r* was used to interpret the relationship between the aspects. According to Davies (2020), among the assumptions that had to be followed include the variables involved should be measured in an interval scale or a ratio scale, the data are normally distributed, data are in pairs, linear relationships in variables as well as no outliers. Assumptive testing was performed to see if the data were normally distributed. Assumption testing was performed using Kolmogorov-Smirnov analysis by looking at significant values> α (p = 0.001). Normality test showed that all samples were normally distributed.

3.2 Scatter Plots Between Aspects of Variables

Figure 1: Normal Q-Q Plot of BSL Usage

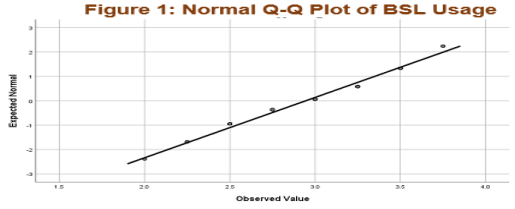


Figure 2: Normal Q-Q Plot of Knowledge

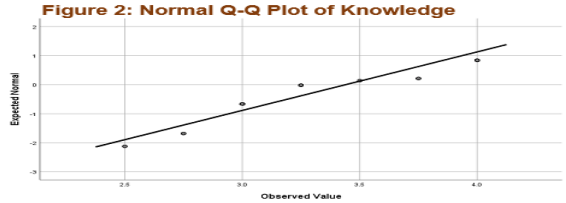


Figure 3: Normal Q-Q Plot of Skills

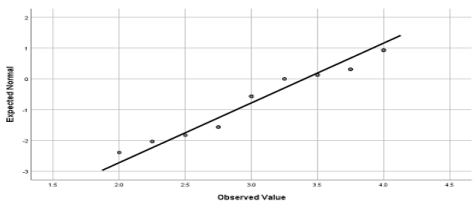
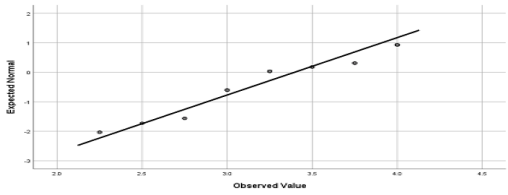


Figure 4: Normal Q-Q Plot of Attitude



Based on the scatter plots of the four variables namely BSL usage, knowledge, skills and attitude, all have linear relationships in the variables and data were analyzed in pairs. Moreover, there was no outliers noted. This indicates that the assumptions in

conducting the Pearson *r* correlation had been observed to conduct the correlation study on the data obtained. Next, this study aimed to determine whether there was a significant correlation between knowledge, skills and attitude with BSL usage. To see the relationship between the two variables, the correlation analysis used was based on the value of the correlation coefficient (*r*) based on translation according to Carroll & Guilford (1968). The robustness of the relationship between the variables was determined by using the index of the value of the correlation coefficient ®. As a coefficient index, the coefficient has a value between a negative and a positive value (-1 <*r* <+1). The value of zero has no relationship between the variables. Whereas, if *r* is close to the value of -1 or +1 it means that the relationship between the variables is very strong. Positive values mean having the same directional relationship while negative values mean opposite directions (Majid & McCaffer 1998). To facilitate data analysis, we have mapped the suitability of data analysis using SPSS.

Table 6: Relationship of BSL Usage with Knowledge

Items	Participants feedback	BSL Usage	Knowledge
BSL Usage	Pearson Correlation	1	.766**
	Sig. (2-tailed)		.000
Knowledge	Pearson Correlation	.766**	1
	Sig. (2-tailed)	.000	

*Note: **. Correlation is significant at the 0.01 level (2-tailed).*

The study found that there was a Pearson correlation coefficient which indicated the existence of a strong positive linear relationship between the BSL Usage with Knowledge where the value of r = 0.76 was greater than the value of critical r = 0.17. So, [r (125) = 0.76, p <0.05]. Therefore, there was relationship between the perceptions of third-year undergraduates in aspects of knowledge with BSL usage.

Table 7: Relationship of BSL Usage with Skills

Items	Participants feedback	BSL Usage	Knowledge
BSL Usage	Pearson Correlation	1	.760**
	Sig. (2-tailed)		.000
Skills	Pearson Correlation	.760**	1
	Sig. (2-tailed)	.000	

*Note: **. Correlation is significant at the 0.01 level (2-tailed).*

The study found that there was a Pearson correlation coefficient which indicated the existence of a strong positive linear relationship between the BSL usage with skills where the value of r = 0.76 was greater than the value of critical r = 0.17. So, [r (125) = 0.76, p <0.05]. Therefore, there was relationship between the perceptions of third-year undergraduates in aspects of skills with BSL usage.

Table 8: Relationship of BSL Usage with Attitude

Items	Participants feedback	BSL Usage	Knowledge
BSL Usage	Pearson Correlation	1	.663**
	Sig. (2-tailed)		.000
Skills	Pearson Correlation	.663**	1
	Sig. (2-tailed)	.000	

*Note: **. Correlation is significant at the 0.01 level (2-tailed).*

The study found that there was a Pearson correlation coefficient which indicated the existence of a strong positive linear relationship between the BSL usage with attitude where the value of r = 0.66 was greater than the value of critical r = 0.17. So, [r (125) = 0.66, p <0.05]. Therefore, there was relationship between the perceptions of third-year undergraduates in aspects of attitude with BSL usage.

4. DISCUSSION AND CONCLUSION

4.1 Discussion

The purposeful sampling method was used to select the respondents consisted of third year UKM medical undergraduates. The results showed that female answered the questionnaire more possibly due to higher proportion of female students entering university to study the field of medicine (Ochsmann et al. 2011). Furthermore, the Malay was the most numerous to answer the questionnaire. According to Mohd Suhaimi Mohamad & Rozita Ibrahim (2018) most people that entered the Medical Doctor Program at UKM were Malays. Therefore, the findings were in line with previous studies. The study showed that the third year medical undergraduates had given a positive perception towards knowledge, skills and attitude despite negative perceptions on BSL usage. The main contributing factor to the low usage was perhaps due to tight schedule constraints, in line with previous studies, (Ismail et al. 2013) that stated among the forms of barriers to medical students' learning were schedule, place and staff.

In addition, the Covid-19 pandemic also contributed to the decline BSL usage by students due to Movement Controlled Order imposed by the government causing them not being able to use the BSL at the maximum rate. This was in line with an article from a local newspaper which stated that the higher education sector as well as the medical sector are among those affected (Mohd Zaky Zainuddin 2020). The closure of higher education institutions due to the COVID-19 pandemic has affected the structure of teaching and learning from face-to-face to fully online (Salleh 2020). In addition, some third year undergraduates had to be quarantined due to Covid-19 positivity and close contacts which further reduce their BSL usage rate. Critical thinking skills are one of the important aspects during simulation learning. This is in contrast to the traditional one-way lecture learning that appears drudging for students. Simulated learning is a student-centered learning that involves students learning actively in process. In addition, simulation -based teaching is conducted by creating scenarios that are appropriate to the predetermined learning outcomes. In line with Park et al. (2013), student -centered learning including simulation is capable of improving critical and problem -solving skills.

Moreover, communication skills are among the important components in the skills aspect (Ismail et al. 2013). Communication or speaking techniques exert a great influence in preventing communication errors between teams from occurring during the simulation learning process. These could lead to real world treatment errors involving patient's life. In the study of Lamé & Dixon-Woods (2020), participants in the simulation were less vocal. This was because the participants were unsure about the problem that has been assigned to them. In addition, simulations are also used for assessment of students in the learning process. Participants may feel nervous or anxious (Minha et al. 2016) during the assessment. Moreover, team members are more likely to remember information given after simulation sessions (Lamé & Dixon-Woods 2020). With this, communication skills can be improved during simulation-based learning (Upadhayay 2017). Through simulation as well, students' self-confidence increases and this really helps them to better prepare for future clinical encounters. The findings of this study were also similar to those conducted by Zinan et al. (2015) and Kaplan et al. (2012) who found that students involved with the simulation had given positive feedback on their learning especially in terms of self-confidence. This clearly shows that simulated learning is well received by students because it has positive impacts on knowledge, skills and attitudes.

Previous studies found that the mean value for the study was 3.8 in all three aspects compared to the mean value of our study, However, the number of samples used by Ismail et al (2020) was 110 people which was lower than ours. According to Love et al. (2019) the average value will increase if the number of samples decreases. Furthermore, mean values are also influenced by "extreme" data (Love et al. 2019) following data scattering and inconsistencies. In this study, the average value for BSL usage was the lowest due to the presence of these "extreme" data that had influenced the average mean to be lowered. Overall, the third year medical undergraduates agreed that knowledge, skills and attitude could be elevated with simulation-based learning similar to previously published studies. Our results showed a significant relationship between students' perceptions in knowledge through BSL usage. There is a possibility that students' perceptions in knowledge had increased following better BSL usage. This is simply translated to the importance of simulation laboratory in knowledge increment. In line with Hegland et al. (2017) and Hall et al. (2016), in addition to being able to increase knowledge and provide benefits, learning through simulation also helps to prepare in future clinic (Ismail et al. 2020). Simulation-based learning can provide effective assessment (Ahmed et al. 2016) in assessing the level of learning of medical students based on learning outcomes.

In addition, there was a positive and strong relationship between students' perceptions of skills with the BSL usage in which the use improved new skills, relevance, thinking skills and psychomotor skills. It is possible that the procedures offered in BSL resembles the real clinical situation. At BSL, there are procedures together with atmospheres that help shape students 'skills and ways of thinking so that they are better prepared before they are placed in future clinical practice in line with simulation-based learning as an active learning process that involves the use of skills and procedural performance (Upadhayay 2017) rather than observation. It further produces positive effects in terms of students 'self-confidence and productivity and improves learning skills (Minha et al. 2016). The BSL capability is seen as important because it is able to reproduce several clinical practice conditions and allows students to practice in a safe environment where the simulation laboratory's tools, devices, and environment mimics that of actual clinical care (Lamé & Dixon-Woods 2020). It can also engage students in activities that mimic real life situations without taking risks of real situations especially patient safety (Ahmed et al. 2016).

A positive relationship between the BSL usage with students' attitudes is translated through increment of self-confidence and helps prepare them to implement clinical practice later as well as encouraging them to work more efficiently, sensitively and productively. According to Xia et al. (2016) medical students who lack confidence can affect patients' trust in the treatment given. According to Kowitlawkul et al. (2019) and Agha (2019), simulations can help overcome student confidence problems. By doing effective practice, it can prevent or reduce future mistakes when giving treatment leading to more efficient work process (Lamé & Dixon-Woods 2020). In other words, learning through BSL has its own distinct benefits where it can improve the quality of health care (Lamé & Dixon-Woods 2020); Paige et al. 2018) and patient safety (Schmidt et al. 2013). Joseph et al. (2015) and Motola et al. (2013) via Ismail et al (2020) stated that the use of simulation in medical teaching can reduce the gap between theory and practice which is the major issue in the medical curriculum implementation. Jarvill et al. (2018) stated that simulation can replace real patients through the use of mannequins where it allows practical without putting risk on patients.

Improvements in aspects of students 'knowledge, skills and attitudes are closely related to the frequency of BSL use. This is not only proven from our study but also the findings and evidence from previous studies that showed simulation laboratory as a tool that helps in the world of medical education. Therefore, the simulation laboratory should be preserved so that the knowledge, skills and attitudes of medical undergraduates can be improved in preparation of future doctors.

4.2 Limitations and recommendations for future studies

The sample that was used in this study was narrowed down to the third year medical undergraduates. Perhaps a larger study that include all levels of training is needed to provide better reflection of the situation. In addition, views from the instructors will be important to compare both parties' perceptions. According to Miczek et al. (2008) although quantitative data can produce statistical views, this method cannot show other types of views as the reason for the statistics generated. Therefore, qualitative methods need to be made to get a more holistic view. Furthermore, other studies need to be conducted to measure the competency outcomes and learning outcomes of third-year medical students before and after the program in

accordance to Kirkpatrick et al. (2018) that stated learning level implementation guideline is used to assess skills and attitudes before as well as after training.

4.3 Conclusion

The results of the study showed that third year medical undergraduates had a very positive perception on knowledge, skills and attitude following the use of BSL. Simulations provide new knowledge, increase knowledge, and are beneficial as an aid in clinical preparation. It provides relevant skills, enhances learning skills, improves thinking skills as well as psychomotor skills. From attitude perspective, simulations develop the mind, make oneself more sensitive and productive, encourage oneself to work more efficiently, and increase self–confidence. The relationship between all the three aspects of perception relates to the usage of the simulation laboratory. Therefore, the use of BSL should be further encouraged to provide useful benefits to students.

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