

Perception of Simulation as an Educational Technique in Health, Education and Applied Sciences by Health Education Students in Universities

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Abstract: Simulation in education has become an increasingly popular tool in teaching and producing highly qualified professionals in health, education and applied sciences. The study aimed to determine the perception of simulation as an educational technique in health, education and applied sciences by Health Education Students (HES) in universities. This study is important as the understanding of the student's perception would help to establish their readiness to engage in simulation. The descriptive research design was utilized. The sample for the study consisted of 320 HES selected from 72 Universities in Nigeria. The 72 universities constitute 72 clusters (cluster sampling techniques). Simple random technique by balloting was used to select 20 universities out of the 72 universities. A total of 16 HES were selected from each of the 20 universities (clusters) using simple random technique. Overall, a total of 320 HES were used for the study. The instrument used for data collection was questionnaire. The descriptive statistics was used for data analysis. The result showed that the perception of simulation as an educational technique in health, education and applied sciences by HES in universities was positive. The study also indicated significant differences between variables of the respondents regarding the phenomenon. Based on the findings, it was concluded that reinforcing and sustaining simulation in health, education and applied sciences during the student's early phases of academic programme and incorporating same in later phases can promote knowledge development, skill acquisition and self-confidence.

Key words: Perception, simulation, educational technique, variables, HES, applied sciences

INTRODUCTION

Globally, the importance of simulation in health, education and applied sciences cannot be overemphasized. This is because, the popularity of simulation as an educational technique in all spheres of teaching and learning has noticeably grown (Tawalbeh and Tubaishat, 2014). Further research indicates that simulation in education has been in application, since, the time of World War 11 (Sanford, 2010). The above research presents facts that simulation is crucial in education, health and applied sciences. As a teaching technique (Lateef, 2010), simulation uses an artificial environment, trying to recreate a real situation in order to allow the students to practice, learn, evaluate, test or develop an understanding of different human actions (Anonymous, 2010). In health education and other science-related disciplines where human anatomy and physiology as well as disease prevention, health promotion and maintenance form the integral part of the

academic program, the use of simulation has been part of teaching, skill acquisition and professional development. Simulation is considered as an attempt to imitate an ideal situation, so that, at a later moment in a real context, there is a better understanding and management of the situation. As a teaching and learning strategy, it consists of a set of activities that seek to replicate real context (Teixeira and Felix, 2011). The successful application of simulation in health, education and applied sciences has a lot of outstanding benefits to the professional development, skill acquisition and knowledge empowerment of the prospective professionals. These benefits are attainable when the student's perception to simulation is considered legitimate, authentic and realistic.

Leigh (2008) indicated that simulation is very important for teamwork, realism and active learning. Other researchers such as Hawkins *et al.* (2008) noted that simulation is more effective in acquiring knowledge and skills through experience and drawing on practical

problem solving and development of technical skills in a safe and controlled environment. As an educational tool and technique, Lateef (2010) supported that simulation can be used to create guided experience needed in acquiring necessary skills and patient's safety. There is also evidence that simulation is mostly effective in the development of psychomotor skills, critical thinking and reflection on practices (Sanford, 2010; Martins *et al.*, 2012), understanding of disease complex processes and the ability to make positive decisions on health issues. The above scenario is suggestive, highlighting the crucial benefits in applying simulation as an educational technique in health, education and applied sciences.

To be specific, health education emphasizes the acquisition of skills and quality education that will improve knowledge, encourage positive attitude and enhance desirable practices in individual. In this context, simulation was considered very essential techniques and was found to have positive influence on various educational outcomes such as self-efficacy, knowledge acquisition and performance (Kaakinen and Arwood, 2009; Norman, 2012). As a potentially powerful teaching approach in health and applied sciences, simulation engages students and requires them to use critical thinking and reasoning and provides an opportunity for reflective learning and integration of knowledge (Peisachovich *et al.*, 2016). This significant role might have prompted the categorization of simulation into three different levels via. high, moderate and low fidelity simulation (World Health Organization, 2011). In education, health and applied sciences, high-fidelity simulation is increasingly popular (Lasater, 2005; Sanford, 2010). This could be attributed to the fact that students have more active role in the learning process and are more motivated to learn (Leigh, 2008), thus, paving ways for gaining more experiences required for their professional development in general and effective service delivery (Dillard *et al.*, 2009) in particular.

Nonetheless, the World Health Organization (2011) stipulated that simulation is more effective in education because students respond and learn best when the learning environment is safe, supportive, challenging and engaging. Studies further emphasized the increased interest in simulation as an approach to teach important psychomotor and critical thinking skills to students (Leigh, 2008; Norman, 2012). These could be the reason why educational curricula adapted to the changing needs of learners and remain updated with the most current educational strategies (Norman, 2012). Till date, a growing body of researches have focused on simulation from different perspectives (Leonard *et al.*, 2010; Wotton *et al.*, 2010; Ogilvie *et al.*, 2011; Sigalet *et al.*, 2012; Tosterud *et al.*, 2013; Baptista *et al.*, 2016; Gharaibeh *et al.*, 2017).

Despite the overwhelming evidence on the positive impacts and effectiveness of simulation on various aspects of teaching and learning (Cant and Cooper, 2010), especially in health, education and applied sciences, simulation can still be perceived as stressful or frustrating by the learners or prospective young professionals such as the health education students in universities. It could also be perceived as not matching the actual practice, knowledge and skill acquisition, stressful environment and uncomfortable way to learn. Such negative indications may impede the process of learning and influence the student's engagement and the fidelity on simulation particularly in applied sciences. Contextually, perception is the view and understanding of idea, concept, action or behaviour. There is evidence that poor planning, organizing and executing simulation can cause frustration to the students and failure to meet the learning objectives (Peisachovich *et al.*, 2016). This makes the present study more unique and crucial for the purpose of empirical generalizations. To our knowledge, no study from Nigeria has determined the perception of simulation as an educational technique in health, education and applied sciences by the students, thus, making the current study the first descriptive survey of this kind. This study aims to find out the perception of simulation as an educational technique in health, education and applied sciences by health education students in universities. The HES was chosen for the present study due to their training in the diverse fields of health, applied sciences, education, disease prevention, patient's are safety, health promotion, counseling as well as human anatomy and physiology. It is my expectation that the outcome of this study would help to establish the readiness of the HES and other students to engage in simulation and further helps in preparing effective teaching plans for the prospective health educators in particular and other professional in applied sciences in general. In addition, it would provide a deep insight into the HES readiness to perform simulation. This is because perceptions exert a direct and dynamic influence on student's responses, define how they see situation and how they behave toward simulation.

Objective: This study aimed to determine the perception of simulation as an educational technique in health, education and applied sciences by HES in universities. Specifically, the study provided answers to the following research questions and null hypotheses:

- What is the perception of simulation as an educational technique in health, education and applied sciences by HES in universities?

- What is the perception of simulation as an educational technique in health, education and applied sciences by HES in universities based on gender?
- What is the perception of simulation as an educational technique in health, education and applied sciences by HES in universities based on student year level?
- What is the perception of simulation as an educational technique in health, education and applied sciences by HES in universities according to prior simulation experience?
- What is the perception of simulation as an educational technique in health, education and applied sciences by HES in universities based on the university type?
- What is the perception of simulation as an educational technique in health, education and applied sciences by HES in universities based on prior experience in teamwork?
- What is the perception of simulation as an educational technique in health, education and applied sciences by HES in universities based on type of teamwork experience?

Hypothesis: The following null hypothesis guided the study and were tested at 0.05 level of significance. There is no statistically significant difference on the perception of simulation as an educational technique in health, education and applied sciences by HES in universities based on gender. There is no statistically significant difference on the perception of simulation as an educational technique in health, education and applied sciences by HES in universities based on student year level. There is no statistically significant difference on the perception of simulation as an educational technique in health, education and applied sciences by HES in universities according to prior simulation experience. There is no statistically significant difference on the perception of simulation as an educational technique in health, education and applied sciences by HES in universities based on the university type. There is no statistically significant difference on the perception of simulation as an educational technique in health, education and applied sciences by HES in universities based on prior experience in teamwork. There is no statistically significant difference on the perception of simulation as an educational technique in health, education and applied sciences by HES in universities based on type of teamwork experience.

MATERIALS AND METHODS

The study falls within the paradigm of the descriptive research method. The population of the study comprised

Table 1: Demographic characteristics of the respondents (N = 320)

Variables	Frequency	Percentage
Gender		
Male	150	47
Female	170	53
Student year level		
First	76	24
Second	84	26
Third	70	22
Fourth	90	28
Prior simulation experience		
Yes	185	58
No	135	42
University type		
Public	170	53
Private	150	47
Prior experience in teamwork		
Yes	210	66
No	110	34
Type of teamwork experience		
Workshop	55	17
Seminar	60	18
Lecture	120	38
Conference	85	27

of all the health education students currently on academic program in Universities of Nigeria. The sample for the study consisted of 320 HES selected from 72 universities. The 72 universities constitute 72 clusters (cluster sampling techniques). Simple random technique by balloting was used to select 20 universities out of the 72 universities. A total of 16 HES were selected from each of the 20 universities (clusters) using simple random technique. Overall, a total of 320 HES were used for the study (Table 1). The eligibility criteria to participate in this study included students actively enrolled in the regular undergraduate health education program in universities of Nigeria. The students who did not meet the above criteria such as the sandwich students were excluded from the study.

Instrument for data collection: The instrument for the data collection was self-administered questionnaire designed for the study. The questionnaire “Perception of Simulation Questionnaire (PSQ)” which can be completed in approximately 15 min was composed of two parts-A and B. Part A elicited information on demographic characteristics of the respondents while part B generated data on perception of simulation as an educational technique in health, education and applied sciences. These two parts (A and B) were bundled into one study package for the convenience of the respondents. The PSQ was a Likert-type scale with response options that range from 5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree and 1 = strongly disagree. Reliability testing indicated that the questionnaire had a strong internal consistency (Cronbach’s $\alpha = .87$). The questions were designed allowing responses from the respondents without any bias.

Data collection procedure: In addition to the health education background of the five Research Assistants (RAs) who helped in the distribution of the questionnaire, they were also trained in data collection procedure. The RAs approached the students towards the end of their lectures and from different year levels (i.e., 1st-4th). The RAs provided a brief description of the study and invited eligible students to participate. Informed consent of the HES was duly obtained before the questionnaire was administered. Only those who consented to participate in the study were included. The HES who agreed to participate received a questionnaire package which included a cover letter containing a summary of the study, the participant's right and the researcher's contact information. In the cover letter, potential participants were requested to complete the questionnaire and return immediately to the RAS. The ethical approval for the study was obtained from the Faculty of Education Research Grants Committee, University of Nigeria, Nsukka. The study was free from all forms of physical, psychological, social and economic harm or risk because the data collection process primarily relied on a descriptive non-invasive questionnaire.

Statistical techniques: Statistical Package for Social Science (SPSS) Version 21 was used to analyze the data. Descriptive statistics involving Means (M), Standard Deviation (SD), Frequency (F) and Percentages (%) were used to describe the sample characteristics and answer the research questions. The cut-off point for the weighted mean was 3.00 accrued from the 5-point response options, hence, any item that weighed 3.00 and above signifies positive perception while any item <3.00 implies negative perception of simulation as an educational technique in health, education and applied sciences by HES in universities. One-way Analysis of Variance (ANOVA) and t-test statistics were used to test the postulated null hypotheses of no significant differences at 0.05 level of significance. The hypothesis ought to be accepted when the p-value is below 0.05 while when the p-value is 0.05 and above, the hypothesis was rejected.

RESULTS AND DISCUSSION

A total of 320 HES were studied. Table 1 presents the demographic characteristics of the respondents. Of all, 47% were males while 53% were females. Based on student year level, 24% were in their first year level, 26% second year level, 22% third year level and 28% fourth year level. Approximately 58% had prior simulation experience while only 42% never had simulation experience. About 53% were in public (i.e., government-owned) universities

Table 2: Presenting the perception of simulation as an educational technique in health, education and applied sciences by HES in universities (N = 320)

Perception	Mean	SD	Remark
Average mean value	3.16	202	Positive

while only 47% indicated studying in private universities. Over 66% had prior experience in teamwork while only 34% never had prior experience in teamwork. Only 17 and 18% of the respondents indicated workshop and seminar as type of teamwork experience while 38 and 27% indicated lecture and conference as the type of teamwork experiences, respectively (Table 1).

Available data in Table 2, indicated that the average mean value (M = 3.16; SD = 202) is above the cut-off point of 3.0, implying that the perception of simulation as an educational technique in health, education and applied sciences by HES in universities is positive. This finding is quite encouraging and signifies that HES consider simulation as an encouraging tool in health, education and applied sciences (Table 2).

The study indicated that the average mean score of female HES (M = 3.56 > 3.00) is above the cut-off point implying positive perception while their male counterparts (M = 2.77 < 3.00) is below the cut-off point indicating negative perception of simulation as an educational technique in health, education and applied sciences in universities (Table 3). Table 3 further showed that H₀₁ is rejected since the p-value of 0.14 is > 0.05. That is to say that, there is significant difference on the perception of simulation as an educational technique in health, education and applied sciences by HES in university based on gender.

Available data in Table 3 showed the average mean values of HES in first year (M = 2.41 < 3.00), second year (M = 3.37 > 3.00), 3rd year (M = 1.29 < 3.00) and fourth year (M = 3.07 > 3.00), respectively. As contained in Table 3, the average mean values of HES in second and fourth year were above the cut-off point, indicating positive perception while the average mean values of HES in first and third year levels were below the cut-off point implying negative perception of simulation as an educational technique in health, education and applied sciences in universities. Table 3 further showed that H₀₂ is rejected since the p-value of 0.61 is above 0.05. That is to say that, there is statistically significant difference on the perception of simulation as an educational technique in health, education and applied sciences by HES in universities based on student year level.

The result indicated that HES who had prior simulation experience had average mean value (M = 3.52 > 3.00) indicating positive while those who never had prior simulation experience had average mean value

Table 3: Presenting demographic differences on perception of simulation as an educational technique in health, education and applied sciences by HES in universities and significant differences between variables (N = 320)

Variables	F-values	Mean	SD	Status	t-Cal	p-values	Remark	Decision
Gender					0.24	0.14	*	Rejected
Male	150	2.77	0.111	Negative				
Female	170	3.56	0.201	Positive				
Student year level					0.32	0.61	*	Rejected
First	76	2.41	0.001	Negative				
Second	84	3.37	0.210	Positive				
Third	70	1.29	0.101	Negative				
Fourth	90	3.07	0.011	Positive				
Prior simulation experience					0.05	0.03	**	Accepted
Yes	185	3.52	0.051	Positive				
No	135	2.46	0.021	Negative				
University type					0.17	0.04	**	Accepted
Public	170	3.52	0.007	Positive				
Private	150	2.49	0.311	Negative				
Prior experience in teamwork					0.20	0.81	*	Rejected
Yes	210	3.61	0.091	Positive				
No	110	2.32	0.181	Negative				
Type of teamwork experience					0.13	0.62	*	Rejected
Workshop	55	3.18	0.010	Positive				
Seminar	60	2.14	0.061	Negative				
Lecture	120	3.31	0.141	Positive				
Conference	85	3.24	0.081	Positive				

*Significant at 0.05 level, **Not Significant at 0.05 level; F = Frequency; SD = Standard Deviation

(2.46<3.00) signifying negative perception of simulation as an educational technique in health, education and applied sciences in universities (Table 3). Table 3 also showed that H_{03} is accepted since the p-value of $0.03 < 0.05$. That is to say that, statistically, there is no significant difference on the perception of simulation as an educational technique in health, education and applied sciences by HES in universities based on prior simulation experience.

Available data indicated that the average mean value of HES in public universities ($M = 3.52 > 3.00$) is above the cut-off point implying positive while those in private universities ($M = 2.49 < 3.00$) is below signifying negative perception of simulation as an educational technique in health, education and applied sciences in universities based on university type (Table 3). Table 3 further indicated that H_{04} is accepted since the P value of $0.04 < 0.05$. That is to say that, statistically, there is no significant difference on the perception of simulation as an educational technique in health, education and applied sciences in universities based on university type.

Available data indicated that the HES who have prior experience in teamwork had average mean value ($M = 3.61 > 3.00$) indicating positive perception while those who never had prior experience in teamwork had average mean value ($M = 2.32 < 3.00$) signifying negative perception of simulation as an educational technique in health, education and applied sciences in universities (Table 3). Table 3 also showed that H_{05} is rejected since the p-value of $0.81 > 0.05$. That is to say that, statistically, there is significant difference on the perception of

simulation as an educational technique in health, education and applied sciences by HES in universities based on prior experience in teamwork.

The study indicated that the average mean values of HES who had experience in workshop ($M = 3.18 > 3.00$), lecture ($M = 3.31 > 3.00$) and conference ($M = 3.24 > 3.00$) are above the cut-off point implying positive perception while those who had experience in seminar ($M = 2.14 < 3.00$) is below the cut-off point indicating negative perception of simulation as an educational technique in health, education and applied sciences in universities (Table 3). Table 3 further showed that H_{06} is rejected, since, the p-value of 0.62 is above 0.05. That is to say that, there is statistically significant difference on the perception of simulation as an educational technique in health, education and applied sciences by HES in universities based on type of teamwork experience.

This quantitative study in its descriptive nature has established that the perception of simulation as an educational technique in health, education and applied sciences by HES in universities is positive. This encouraging result reflects the fact that HES hold strong passion to their educational potentials and and skill acquisitions. The finding is revealing because it shows the readiness of HES to engage in simulation. This finding may be attributed to the fact that the students have a better understanding of the tedious nature of the expected service delivery in the areas of patient's care safety, disease prevention, health education, promotion, counselling, maintenance as well as anatomy and physiology of human system. Aligning with other studies, the present finding can be linked with Tawalbeh and

Tubaishat (2014) who indicated that simulation has gained increased popularity in educational system. This assertion was not surprising since other scholar had indicated that appropriate application of simulation encourages teamwork, realism and active learning (Leigh, 2008). A convincing similarity existed between this finding and others (Gharaibeh *et al.*, 2017). The implication of the finding is that with positive perception of simulation as a tool, remarkable gains are inevitable such as high-fidelity simulation (Lasater, 2007; Sanford, 2010), quality knowledge (Peisachovich *et al.*, 2016), high self-efficacy, knowledge acquisition and clinical performance (Kaakinen and Arwood, 2009; Norman, 2012). The present study considers the above attributes as indices of positive perception to simulation in health, education and applied sciences that are very essential for the student's professional development, knowledge empowerment, skill acquisition and effective service delivery.

This study showed that differences exist within variables of the respondents in relation to perception of simulation as an educational technique in health, education and applied sciences. The result indicated that female HES, those in second year level, fourth year level, HES who had prior simulation experience, HES in public universities, those who had prior experience in teamwork and HES who had teamwork experience in workshop, lecture and conference had positive perception on simulation as an educational technique in health, education and applied sciences in universities. Available data also showed that the male HES, those in first and third year level, HES who had no prior simulation experience, those in private universities, HES who had no prior experience in teamwork and those who had teamwork experience in seminar had negative perception of simulation as an educational technique. These expected findings aligned with the findings of other researchers that perception of individual on a given phenomenon can be affected by variables (Leonard *et al.*, 2010; Sigalet *et al.*, 2012; Tosterud *et al.*, 2013; Baptista *et al.*, 2016; Gharaibeh *et al.*, 2017). Statistically, the study indicated that significant differences exist on the variables of gender, student year level, prior experience in teamwork and type of teamwork experience while none exists on prior simulation experience and university type.

The strength and weakness of the present study lies on the chosen methodology. This study was restricted to selected variables such as gender, student year level, prior simulation experience, university type, prior experience in teamwork and type of teamwork experience, of the respondents. Studies using other variables such as age, marital status, academic qualifications and lifestyle should be conducted for broader research generalization.

The present study was delimited to health education students in universities. It is important to expand the scope by conducting similar study in other tertiary institutions such as colleges of education where health education and applied sciences are offered as specialized courses. This study was descriptive research design adopting descriptive statistics. A more detailed qualitative in-depth survey should be conducted to provide a deeper understanding and finding regarding perception of simulation in health, education and applied sciences by students.

CONCLUSION

From the literature reviewed and data analysis, this study has convincingly established that the perception of simulation as an educational technique in health, education and applied sciences by HES in universities is positive. Nonetheless, this is a reliable indication that the students are eager to engage in simulation. Secondly, it is also justifiable evidence that students learn more and understand facts and practice when the lesson plans are adjusted for simulation activities. Efforts should be geared towards advancing measures that would encourage and sustain simulation in teaching and learning. This constructive initiative would be attainable by encouraging social settings such as workshops, seminars, lectures and conferences that would bring the students together for effective academic interactions and exchange of valuable knowledge and ideas. In addition, reinforcing and sustaining simulation in health, education and applied sciences during the student's early phases of academic programme and incorporating same in later phases can promote knowledge development, skill acquisition and self-confidence.

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