Online Laboratory Skills Simulation in the Nursing and Allied Health Sciences Programs

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Abstract—Clinical simulation is defined as "an attempt to realistically replicate some or nearly all of the essential aspects of a clinical situation so that the situation can be more readily understood and managed when it occurs in clinical practice" It has been widely used for clinical training by health-care students and professionals, with a focus on its effectiveness in teaching, learning, and evaluating clinical skills. The overall aim of this research was to assess the implementation of the clinical simulation (online laboratory skills simulation) in USLT in terms of their simulation design elements and their educational practices incorporated as well as the nursing and allied health sciences learners' outcomes when it comes to their self-satisfaction and confidence level. A total of 212 students from the second to fourth years of their Bachelor of Science in Nursing, Bachelor of Science in Medical Technology, and Bachelor of Science in Pharmacy programs participated in the study. The Simulation Design Scale, the Educational Practices Questionnaire, and the Student Satisfaction / Self-Confidence in Learning Scale were used in the questionnaire. The result of this study findings show that participants in the BSMT (3.63), BSN (3.88), and BSPh (3.67) assessed the simulation design element were present in the online laboratory skills simulation done. This demonstrates that nursing and allied health sciences students are directed appropriately in acquiring the necessary skills and knowledge in a moderate extent since it is only implemented for a few years. Although, the following features or elements are present it could still be improved more to achieve excellency that could indicate a higher level of learning among nursing and allied health sciences with their online laboratory skills simulation. Furthermore, the students' self-satisfaction and self-confidence are both in very good level in all of the three programs (courses), implying that they were properly learned because they were able to assess themselves that they could do and apply the skills they were taught online. Overall, students regard the USLT's online laboratory skills simulation as a very good technique for learning laboratory skills online in the midst COVID 19 pandemic.

Keywords— Clinical simulation, online laboratory skills simulation, educational practices, self-satisfaction, self-confidence.

I. INTRODUCTION

Clinical simulation is defined as "an attempt to replicate some or nearly all of the essential aspects of a clinical situation realistically so that the situation may be more readily understood and managed when it occurs for real in clinical practice" (Mortan, 1995, p.76). It has been utilized commonly by the health-care students and professionals for their clinical training emphasizing its effectiveness in teaching, learning, and evaluating clinical skills (Mohamed & Mohamed, 2020). Hence, according to the National League for Nursing (NLN) Jeffries simulation theory (2015), there are three essential elements for clinical simulation that are needed for its planning and execution in order to use it effectively, and get a positive outcome. These are the simulation design, educational practices, and learners' outcomes.

In connection, according to the Commission on Higher Education Memorandum Orders, the different health education programs are mandated to conduct laboratory (clinical) skills. A study also states that despite the occurrence of the covid-19 pandemic learners must acquire the bare minimum of laboratory skills as part of their clinical training, which must be supplemented by academic requirements, and simulation has emerged as a promising tool all around the world (Alves Bastos e Castro & Lucchetti, 2020). Given the knowledge that simulation is all about replicating clinical situations with a variety of scenarios including high and medium fidelity, standardized patients, role playing, skills stations, and computer-based critical thinking simulations, depending on the clinical situation, these scenarios can be applied as well to learn the necessary online laboratory skills amidst the pandemic and how vital it is for the students to still experience it (Jefferies, 2012).

In addition, a current study's findings indicated that the presence of design elements and educational practices' features of clinical simulation-based learning are imperative tools for achieving success (Mohamed & Mohamed, 2020). Research suggests the need to examine the effectiveness of a virtual

interprofessional education on both short and long-term learning as well as encouraging clinical instructors to try innovative methods of teaching. In light of the pandemic, there is scope to reconsider the effectiveness of current education and welcome innovative methods of delivering education whilst ensuring quality (Amalendran, Chedid, Hamza, N., & Hamza, Y., Sani, 2020). There have been few studies conducted also during this pandemic as regards the way the nursing and allied health sciences students learn with their online laboratory skills simulation.

Meanwhile, conducting online laboratory skills simulation promotes an increase of confidence for the nursing and allied health sciences students when applying it through clinical experience for it helps the students to make sound clinical decisions to improve patient outcomes and it prepares them well in taking care of patients (Kaddoura, 2010). Several researchers also demonstrated a strong response to online laboratory skills simulation wherein students were satisfied with the experience and felt confident in their performance as they appear to be positive and optimistic about their experiences. (Lubbers & Rossman, 2017; Swenty & Eggleston, 2011; Zapko, Ferranto, Blasiman, & Shelestak, 2018; Magnetico, 2017). However, most of the studies usually focused on nursing students only, there is a lack of studies when it comes to other allied health courses.

Moreover, the occurrence of the pandemic leads to the suspension of face-to-face learning and switching it to online delivery. Laboratory classes are performed in the real laboratory scenarios but it is not practical in this time thus, virtual labs, remote control labs or video-based labs are good choices to teach and learn laboratory skills as it is online (Zhai, Wang, & Liu, 2012 as cited in Gamage et al., 2020). Although laboratory skills are widely perceived as an important component of preparation of students before actual clinical or hospital experience, it is our first time to apply it in full online and we don't really have any concrete guidelines yet on how it should be implemented.

Furthermore, since the University of Saint Louis Tuguegarao (USLT) has been implementing clinical simulation (online laboratory skills simulation) since August 2020, we chose this institution for this study. Patient safety, accurate medication dispensing, basic patient assessment, identification and assessment of drug-related problems, and general communication abilities are typically indicated in the online laboratory skills simulation indicated in the Bachelor of Science in Pharmacy (Kirwin, DiVall, Guerra, & Brown, 2013). Bachelor of Science in Nursing students learn problem-solving and decision-making skills, as well as communication, critical thinking, health assessment, and nursing care interventions (Li, 2016). While studying Clinical Chemistry, Hematology, Microbiology, Immunohematology, and other fields for a Bachelor of Science in Medical Technology (Libres, 2017).

The overall aim of this research was to assess the implementation of the online clinical simulation (online laboratory skills simulation) in all allied health programs of USLT in terms of its simulation design elements that includes objectives/information, support, problem solving, feedback, and fidelity and their educational practices incorporated in terms of active learning, collaboration, diverse ways of learning, and high

expectations as well as the nursing and allied health sciences learners' outcomes when it comes to their self-satisfaction and confidence level.
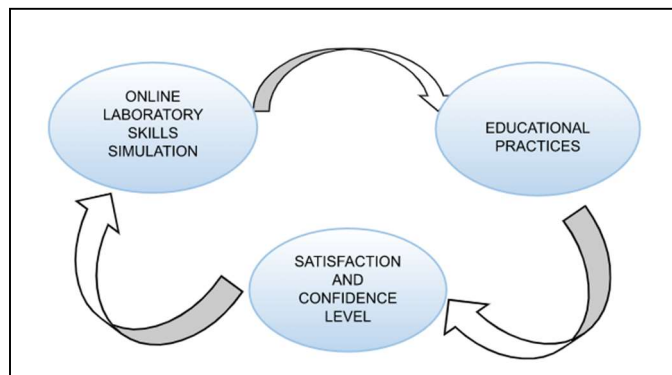

Fig. 3. The implementation of online laboratory skills simulation and educational practices in evaluating the self-satisfaction and confidence level of the students.

The research paradigm illustrates the connection between online laboratory skills simulation and educational practices in evaluating the self-satisfaction and confidence level of nursing and allied health sciences students.

II. METHODS

A. Research Design

The research was conducted in University of Saint Louis Tuguegarao (USL), School of Health and Allied Sciences (SHAS) Department in Tuguegarao City, Cagayan. It is one of the schools who is using online laboratory skills simulation that has four learning modalities namely: blended learning, full online, correspondence learning- printed modules, and correspondence learning- soft copy/e-copy.

B. Locale and Respondents

The research was conducted in the University of Saint Louis Tuguegarao (USL) College Department in Tuguegarao City, Cagayan. It is one of the schools using online laboratory skills simulation.

The researchers utilize stratified random sampling for data collection to achieve common characteristics among participants studying online. The study respondents consist of 2nd to 4th year Bachelor of Science in Nursing, Bachelor of Science in Medical Technology, and Bachelor of Science in Pharmacy students. The participants were enrolled in first semester and second of the school year 2021-2022 and they have been enrolled in a major or professional subject with a laboratory skill wherein they have prior experience in online clinical education. A total of 252 students participated in the study.

TABLE I.   PROFILE OF THE PATIENTS

Variables	Categories	Frequency	Percentage
Gender	Male	42	16.7
	Female	210	83.3
	TOTAL	252	100.0
Age	Bachelor of Science in Medical Technology	86	34.1

Variables	Categories	Frequency	Percentage
	Bachelor of Science in Nursing	113	44.8
	Bachelor of Science in Pharmacy	53	21.1
	TOTAL	252	100.0
Civil Status	Second Year	102	40.5
	Third Year	103	40.8
	Fourth Year	47	18.7
	TOTAL	252	100.0

Table 1 presents the demographic profile of the participants which shows that the majority of the participants are females, Bachelor of Science in Nursing and are in third year level.

C. Instrument

The instrument used in this study was based on Mohamed & Mohamed (2020) and Simulation Design Rating (National League in Nursing, 2006). The tool consisted of four parts. Part I assessed the participants' demographic information, which include their gender, year, and program (course). Part II was based on the student version of the Simulation Design Rating and consisted of a 20-item, five-point scale tool devised to assess the five design elements of the Laerdal study's instructor-developed simulations. The following are the five design elements: 1) objectives/information; 2) support; 3) problem solving; 4) feedback; 5) fidelity. Part III was based on the student version of Educational Practices Survey; and consisted of a 16-item, five-point scale instrument to determine whether four educational practices (active learning, collaboration, diverse ways of learning, and high expectations) are present in the instructor-developed simulation. Lastly, Part IV was a 13-item instrument which is the Student Satisfaction and Self-Confidence in Learning tool that uses a five-point scale, assesses the students' satisfaction with the simulation activity which consists of five items and self-confidence in learning consists of eight items (National League in Nursing, 2006). Some statements in the questions were modified to fit the current educational environment and the laboratory activities of the different allied health programs.

Face validation was done by evaluation of three experts in the fields of nursing, pharmacy and medical technology education and one expert in research and tool development. Minor changes were done related to how the statements were stated.

D. Data Analysis

The data was analyzed using the Statistical Package for the Social Sciences (SPSS) version 20. In this study, descriptive statistics will be used. Furthermore, frequency and percentage to describe the profile of the respondents, mean to describe assessment of simulation design, educational practices and their level of satisfaction and confidence.

The following mean score values were used to determine the assessment for and educational practice elements.

TABLE II. QUALITATIVE INTERPRETATION FOR MEAN SCORE VALUES

Mean Score	Qualitative Description		
	Simulation Design and Educational Practices	*Self-satisfaction*	*Confidence Level*
4.50-5.00	Excellent	Extremely satisfied	Extremely confident
3.50-4.49	Very Good	Very satisfied	Very confident
2.50-3.49	Good	Satisfied	Confident
1.50-2.49	Poor	Slightly Satisfied	Slightly confident
1.00-1.49	Very Poor	Not Satisfied	Not confident

E. Ethical Considerations

Prior to the study, all participants should have given their full consent because it entails researchers providing adequate information and guarantees about participating. They can also choose not to participate in the study. Individuals should fully understand the implications of participating and make an informed, deliberate, and freely provided decision whether or not to participate, free of fear or intimidation. It was emphasized to the participants that the decision to participate or do not affect their current or future relationship with the School of Health and Allied Sciences Department and the University. The respondents were free to refuse any question and to withdraw your consent and discontinue your participation from the study at any time without prejudice. Anonymity of the respondents were ensured by concealing their names and any identifying information.

Furthermore, Ethics Clearance from Region 2 Trauma and Medical Center- Institutional Review Board (R2TMC-IRB) was obtained prior to the implementation of the data collection procedure of this research to ensure that it is carried out in a responsible and ethically accountable manner.

III. RESULTS

The tables presented below show the data which was retrieved from the questionnaires floated by the researchers. Moreover, it answered the following research questions of this study whereas the study aims to determine the acceptance of telemedicine among patients and physicians in Tuguegarao City.

TABLE III. ASSESSMENT OF ONLINE LABROATORY SKILLS SIMULATION ALONG SIMULATION DESIGN

Mean Score	BSMT Students		BSN Students		BSPh Students	
	Mean	*QI*	*Mean*	*QI*	*Mean*	*QI*
Objectives and Information	3.74	Very Good	3.79	Very Good	3.68	Very Good
Support	3.78	Very Good	3.98	Very Good	3.88	Very Good
Problem Solving	3.63	Very Good	3.86	Very Good	3.46	Good
Feedback	3.79	Very Good	3.94	Very Good	3.72	Very Good
Fidelity	3.80	Very Good	3.85	Very Good	3.66	Very Good
Overall Simulation Design	3.74	Very Good	3.88	Very Good	3.67	Very Good

It can be gleaned from the table above that the online clinical laboratory simulation implemented in the BSMT program is very good in terms of simulation design. The strength of the simulation design implemented in the program is it fidelity (mean=3.80) and it can be further improved in terms of problem solving (mean=3.63). Moreover, the online clinical laboratory simulation applied in the BSN program is also assessed as very good in terms of simulation design. The strength of the program's simulation design is its support (mean=3.98), which may be improved further in terms of Objectives and Information (mean=3.79). The table further shows that the BSPh online clinical laboratory simulation program is very good. Support (mean=3.88) is a strength of the simulation design used in the program that can be improved in terms of Problem Solving (mean=3.46)

TABLE IV.   ASSESSMENT OF ONLINE LABROATORY SKILLS SIMULATION ALONG EDUCATIONAL PRACTICES

Mean Score	BSMT Students		BSN Students		BSPh Students	
	Mean	QI	Mean	QI	Mean	QI
Active Learning	3.76	Very Good	3.84	Very Good	3.55	Very Good
Collaboration	3.84	Very Good	3.78	Very Good	3.54	Very Good
Diverse Way of Learning	3.76	Very Good	3.83	Very Good	3.55	Good
High Expectations	3.77	Very Good	3.92	Very Good	3.75	Very Good
Overall Educational Practices	3.77	Very Good	3.84	Very Good	3.57	Very Good

The table above indicates that the online clinical laboratory simulation implemented in the BSMT program is very good in terms of their educational practices. The strength of the educational practices implemented in the program is collaboration (mean=3.84) and it can be further improved in terms of active learning (mean=3.76) and diverse ways of learning (mean=3.76). The table also shows that the BSN online clinical laboratory simulation program is very good in terms of educational practices. High expectations (mean=3.92) are a strength of the educational practices utilized in the program, which can be improved further in terms of collaboration (mean=3.78). Furthermore, the table reveals that the online clinical laboratory simulation used in the BSPh program is very good. The strength of the educational practices implemented in the program is high expectations (mean=3.75) and it can be further improved in terms of collaboration (mean=3.54).

TABLE V.   ASSESSMENT OF ONLINE LABROATORY SKILLS SIMULATION ALONG LEARNER OUTCOMES

Mean Score	BSMT Students		BSN Students		BSPh Students	
	Mean	QI	Mean	QI	Mean	QI
Satisfaction	3.56	Very Satisfied	3.74	Very Satisfied	3.51	Very Satisfied
Self-confidence	3.83	Very confident	3.85	Very confident	3.68	Very confident

The table above shows that the online clinical laboratory simulation used in the BSMT curriculum produces exceptional student outcomes. The program's learner outcomes are very good in terms of self-confidence (mean=3.83) and satisfaction (mean=3.56). This is also true in the BSN and BSph programs. This implies that the online laboratory skills simulation activities implemented in the different programs were helpful in the learning of needed skills of the students and preparing them for clinical placement.

IV.   DISCUSSION

In the Philippines, the effects of the Covid-19 outbreak are still being felt. The virus spreads faster as it mutates into new forms. Face-to-face classes are frequently canceled due to the increasing number of patients tested positive for COVID-19 in the country. These motivated clinical instructors at the University of Saint Louis Tuguegarao (USLT) to use novel and unconventional methods to teach nursing and allied health sciences students the required knowledge and skills. They go above and beyond to ensure the students' health and safety by instructing them as if they were learning personally and utilizing technology to keep them on track for completion. Students are practicing their laboratory skills with the help of an online simulation. As a result, the overall goal of this study is to evaluate implementation the clinical simulation (online laboratory skills simulation) in USLT in terms of their objectives/information, support, problem solving, feedback, and fidelity, as well as their educational practices in terms of active learning, collaboration, diverse ways of learning, and high expectations, as well as the nursing and allied health sciences students' self-satisfaction and confidence level.

The results revealed that all courses agreed that all simulation design elements are present as the majority of the participants rated it as very good. The health and allied sciences students were able to appreciate all the elements in the simulation design of the University of Saint Louis Tuguegarao (USLT) even if it's online. This might be the integration made by their clinical instructors on its implementation. This result is in connection with the studies that also agreed to the presence of simulation design which means that they have perceived the different elements in a moderate extent (Chua et al., 2021; Kardong-Edgren, Starkweather, & Ward, 2008). Also, according to Chua et al., (2021) it emphasizes students' perceptions of simulation design features were significant predictors of their learning outcomes. That is why it is a good start to know that the health and allied sciences students accepted the simulation design positively. Nonetheless, there is still a need to achieve excellent to attain a high-level extent which is more beneficial for students learning.

Specifically, participants in the Bachelor of Science in Medical Technology course have an overall mean of 3.78 wherein they perceived that all of their simulation design is rated as very good. Fidelity has the highest means core 3.80 which means that the students view their online laboratory skills simulation that imitates real life situation in the laboratory setting. This finding reveals that the students were properly learning and applying their laboratory skills that they have to perform. However, problem solving has the lowest mean score of 3.63. This requires a comprehension of the underlying

principle used in medical technology, as well as it's solution must be reviewed and performed but it will be hard for them to do so since there is the presence of the Covid-19 that prohibits them in interacting with their patients and clinical instructors (Groenier, Pieters, & Miedema, 2017).

The Bachelor of Science in Nursing has a total mean of 3.88 entailing that the simulation design of USLT is very good. The highest mean in this course would be support, which is 3.98. This study's finding can be linked to their clinical instructors' attempts for the students to use online to communicate and be aided by asking questions, receiving immediate feedback, explanations, and further details throughout the support stage of their online clinical simulation design (Mohamed & Mohamed, 2020; Beuk, 2014). While objective and information have the lowest mean score, 3.79 suggesting that the students are unaware of the purpose and goals of their simulation design because this is just recently employed. According to one study, it is critical to share the objective and information and ensure that it is attainable (Lioce et al., 2015). Another study result state that simulation design is effective in describing its objective and information but not always supported in this element, (Kable et al., 2012). In addition, objectives and information and support contributes to determining the effectiveness of the simulation design, (Zhu, & Wu, 2016). Therefore, improvement in objective and information should be done in order to facilitate their online laboratory skills simulation effectively.

For the Bachelor of Science in Pharmacy, their simulation design elements in overall aspect are rated as very good with a mean score of 3.67. It was the support category as an element ranked as the highest with a mean score of 3.88. This entails that they were given help whenever they needed it by their clinical instructors through communication during their learning process to gain the specific laboratory skills they need. According to Andrews, Cardinale, & Dixit, (2020), the factors that are important in a successful implementation of simulation into a pharmacy curriculum was support in procedures, collaboration, and value perception, hence the result shows that the students were properly guided and given help in their online laboratory skills. The problem-solving category has the lowest mean score of 3.46, which is classified as good, which could be due to the COVID-19's lack of communication with patients; consequently, encouraged self-awareness should be used, considering that this course involves medication administration (Eukel et al., 2021). Therefore, this is a call to action to their clinical instructors needs to work on problem solving as an aspect of their simulation design through establishing proper communication with their students about their queries and teaching them how to interact with clients.

On the other hand, when it comes to the educational practices the three programs answered that all of the elements were present. This implies that the level of performance of educational practices, as supported by the effort of their clinical instructors in teaching online laboratory skills, is moderate enough to fulfill the learning needs of nursing and allied health students. In a more detailed view these are the elements of the educational practices that are perceived from highest to lowest mean among the three programs. The BSMT, overall mean score was 3.77, collaboration has the highest mean score of 3.84 implying that they were given the opportunity to collaborate

with others, even if it was only online, which is critical in their course, that is primarily team-based. While active learning and a diverse ways of learning style have the lowest mean score of 3.76 since students are studying online, they are limited in their ability to explore, engage effectively in class, and assess their performance following the implementation of an online laboratory skills simulation. The BSN has an overall mean score of 3.84 rating their educational practices as very good. The highest mean score was high expectations with a mean score of 3.92. This is consistent with a study that discovered that nursing students had high expectations of activities involving simulations in health-care education, as well as of their clinical instructors, expecting them to be competent and well-prepared in teaching laboratory skills online (Keskitalo, 2012). While, collaboration ranked as the lowest mean score of 3.78 this might be because of less communication with their clinical instructors and lack of interaction with their classmates during their online laboratory skills simulation. A study finding highlighted that in collaboration there is a need for trustworthy relationship, a role model, practical experience, and sense of mentoring that the clinical instructors should utilize as a strategy to help the students in obtaining knowledge, develop critical thinking, and confidence during their learning, (Niederriter, Eyth, & Thoman, 2017). Thus, this study suggests that the clinical instructors might use or develop strategy in order to appreciate collaboration in during their online clinical education. On the other hand, the BSPH rated their educational practices features to be very good with a mean score of 3.57. It is the same result with the BSN wherein high expectations has the highest mean score of 3.75 that is also connected to the way they expect their clinical instructors would teach them their laboratory skills through online effectively. It was collaboration that has the lowest mean score of 3.54 that entails the clinical instructors and students needs to work more together and establish their relationships because they are both responsible in rethinking how laboratory abilities should be taught and evaluated. Prioritizing and categorizing skills to be taught online is critical for preparing student pharmacists for future practicums, (Anksorus et al., 2021).

Meanwhile, self-satisfaction and confidence level, are two components linked to the learner's outcome. The students' satisfaction level with the practice in a simulated context is high, which stimulates the University of St. Louis, Tuguegarao, to invest in this teaching strategy, always looking for the best results. This is the same with a study finding wherein nursing and allied health students were satisfied with their education, and the online laboratory skills simulation increased their self-confidence. In this regard, a study discovered that simulation increases pleasure and confidence. It simply means that the students have a high level of self-satisfaction and confidence in their online laboratory skills simulation (Swenty & Eggleston 2011). Students in nursing and allied health professions showed high levels of satisfaction because they thought their teachers' teaching methods were effective and that they were given a variety of learning tools to help them learn. The students were pleased with how their clinical instructor taught clinical simulation and communicated with them about their expectations.

The Bachelor of Science in Medical Technology (BSMT) students with a total mean score of 3.72, felt very satisfied (3.56) and very confident (3.83) about learning the activities presented to them by the instructors, developing the skills needed to perform necessary tasks in the clinical setting, and knowing how to seek help when they did not understand the concepts covered in the online laboratory skills simulation. Students indicted that learning by simulation enables them to improve and retain their knowledge.

In addition, Bachelor of Science in Nursing (BSN) with a total mean score of 3.80 also expressed a very satisfied (3.74) and very confident (3.85) rating because the methods used in simulation were effective and it gave them clear ideas of what is expected when it comes to dealing with patients. Recent research indicates that simulation improves nursing knowledge, clinical practice, communication skills, self-confidence and satisfaction, and clinical decision-making (Ahmed, Hassan & Mehany 2019). The result of this study indicated that there is high learner satisfaction with learning by the clinical simulation and that learner's increase confidence in their skills (Omer, 2016; Mohamed & Mohamed, 2020).

On the other hand, the Bachelor of Science in Pharmacy (BSPH) with a total mean score of 3.61 shows that students were very satisfied with the experience (3.51) and felt very confident (3.68) in their performance. They felt that their simulations were based on sound educational practices and were important for learning. Studies support the result of this study wherein there is an increase in pharmacy student's satisfaction and confidence level when it comes to the application of clinical simulation (online laboratory skills simulation), (Karayem & Alboghdadly, (2020); ElGeed et al., 2021).

Hence, several studies indicated that students had high levels of satisfaction and confidence because they were guided and supported by their clinical teachers (Omer, 2016; Cant & Cooper (2017) findings). Students' high self-esteem and satisfaction with their abilities enable them to make sound decisions and interventions, admit mistakes, and collaborate effectively (Hart, Spira & Moreno, 2014). In the current health environment, students' positive acceptance of online laboratory skills simulation leads to a high level of satisfaction and confidence in their online laboratory skills simulation activity.

V. CONCLUSION

In conclusion, the current study found that the simulation design elements and educational practices features of USLT's online laboratory skills simulation are present, as the majority of participants rated it as very good. This demonstrates that nursing and allied health sciences students are directed appropriately in acquiring the necessary skills and knowledge in a moderate extent since it is only implemented for a few years. Given the lowest mean score, there is a need for BSMT to enhance their problem-solving skills for simulation design, BSN to work on their Objective information and BSPH to level up their problem solving. For the educational practices features there's a need to develop more active learning and diverse ways of learning in BSMT and collaboration for BSN and BSPH. Although, the following features or elements are present it could still be improved more to achieve excellency that could indicate a higher level of learning among nursing and allied health sciences

with their online laboratory skills simulation. Furthermore, the students' self-satisfaction and self-confidence are both in very good level in all of the three programs (courses), implying that they were properly learned because they were able to assess themselves that they could do and apply the skills they were taught online. It can be concluded that students were satisfied and confident with the skills they learned in their online laboratory skills simulation. Overall, students regard the USLT's online laboratory skills simulation as a very good technique for learning laboratory skills online in the midst COVID 19 pandemic.

VI. RECCOMENDATIONS

Given the fact that Covid-19 has already become part of our lives and it will always be a threat to our health therefore it limits us in having a face-to-face interaction in which it greatly affects education sector. Hence, conducting laboratory skills simulation through online is expected to be still applied. The findings of this study can be served as the basis for the dean, program chairs, and clinical instructors of USLT in the three programs BSMT, BSN, and BSPH to strategize an excellent online laboratory skills simulation in the next school years to come. This study specifically revealed the element or features that they have to improve in their online laboratory skills simulation. Also, the study shows that there is a need to improve clinical instructors and nursing and allied health sciences relationships when it comes to communicating with each other about the laboratory skills they have learned (collaboration) and the students need to feel more their presence whenever they have questions and clarifications about the lesson (problem solving). In addition, this study encourages dean, program chairs, and clinical instructors should be flexible and available always to facilitate the students' education online and develop online teaching strategies that is close to classroom or laboratory setting in a face-to-face manner.

Finally, more in-depth research on this topic is recommended such as determining the relationships between nursing and allied health sciences students' satisfaction/confidence with simulation design/educational practice and conduct the same research study wherein the clinical instructors will be the participant in order to gain a deeper reason about their experience in implementing online laboratory skills simulation.

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