

Evaluation of a Filipinized My Dispense®: Impact on Students' Dispensing Knowledge and Performance

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Abstract:- MyDispense, an online virtual dispensing simulator, has been widely used by pharmacy students worldwide and was critical to the pharmacy undergraduate practice when the pandemic impacted standard medical education and training methods. Since the simulation does not accurately represent the pharmacy practice in the Philippines, this study aims to develop a Filipinized version of MyDispense® and assess its impact on students' knowledge gained, perception, competency skills, and confidence in drug dispensing, pre-intervention, and post-intervention. This study adopted a pretest-posttest randomized experimental research design with stratified random sampling and gathered eighty (80) second-year and third-year pharmacy undergraduates from Luzon, Visayas, and Mindanao, who were then randomly assigned to one of two groups: control or experimental. The control group answered the English MyDispense questionnaire to serve as the basis to be compared to the experimental group, which answered the Pretest and Posttest questionnaires before and after performing the Filipinized MyDispense cases. Furthermore, based on the statistical analysis of the mean and significant difference of the variables, the Filipinized MyDispense showed an increase in all aspects of performance (knowledge gained, perception, competency skills, confidence in drug dispensing). Despite the increase, however, only the perception and confidence in dispensing are deemed statistically significant. Thus, the hypothesis that the Filipinized MyDispense is more effective in comparison to the Standard MyDispense is only valid based on the respondents' perception and confidence in drug dispensing.

Keywords:- My Dispense, Filipinized My Dispense, Localization, Pharmacy Simulation, Philippine Community Pharmacy Practice.

I. INTRODUCTION

When the pandemic forced conventional methods of medical education to stop, virtual simulations and other online modalities kept institutions afloat [1]. In terms of the study of pharmacy, virtual simulators have shown to be especially useful in supplementing the students with the critical skills they require [2] as well as positively affecting their exam scores and self-study periods [3].

MyDispense®, an online virtual dispensing simulator, has been in ongoing use and development since the project's commencement in 2010 and has established itself as an effective case study for the open utilization of resources. Over 25,000 students worldwide have used MyDispense® in 186 pharmacy schools in 34 countries - completing more than 963,000 activities in 2021 [4]; even localizing the base software to more accurately represent the pharmacy practice within countries like the United States [5]. Within the development and evaluation of the US MyDispense®, they noted that their pharmacy students heavily benefited from the US version as it accurately represented their pharmacies as well as having US-specific features such as medication therapy management, immunization delivery, electronic prescribing, and over-the-counter therapeutics [5].

In line with this, in the year 2020 several universities in the Philippines, including San Pedro College, University of the Immaculate Conception, Lyceum of the Philippines University, University of San Carlos, University of the Philippines, and Adamson University, also partnered with Monash University [6] to utilize MyDispense® for their pharmacy programs following the cancellation of face-to-face classes due to the pandemic. However, there is a significant lack of studies regarding the utilization of MyDispense® within the Philippines, especially on a local level. And despite the significant increase in Filipino MyDispense® users [7], a localized version of MyDispense® has not yet been developed [8].

With this, the researchers believe that Filipino Pharmacy students may also greatly benefit should a localized version of MyDispense® - one that is centered around the Philippine community pharmacy practice - be created. As these future Pharmacy professionals approach their internship and soon practice, a Filipinized version of MyDispense will allow them to make mistakes safely in an environment that is more accurate to what they will see in the future [9]. Therefore, the researchers aimed to modify MyDispense® in collaboration with Monash University, to contain Philippine-branded medication, Filipino patients, and dispensing cases, and have the interface be in Filipino; therefore "Filipinizing" the simulation.

The Filipinized version was then tested by 2nd and 3rd year Filipino Pharmacy students to determine if their performance level regarding their knowledge gained, perception, competency skills, and confidence were affected by this localization. Through this, the researchers aimed to mirror the results of another study conducted by other researchers in 2017 [5] and show a positive effect of the Filipinization.

II. METHODS

A. Study Design

This study used a mixed quantitative and qualitative design. The quantitative section sought to discover the significant relationships between the socio-demographic characteristics and the pharmacy students' level of perception of MyDispense virtual simulation. It used a survey questionnaire to investigate this study's variables. The qualitative approach assessed the students through essay questions available through Google Forms. These questions include those that ask about the advantages, barriers, and challenges the responders experienced as well as the recommendations they have to improve the overall experience while using MyDispense.

B. Subject Participants

Twelve universities and colleges were chosen from the sixteen (16) partner Philippine institutions of Monash University. These institutions were chosen based on the following criteria: (1) has an exclusive Uniform Resource Locator of MyDispense®; (2) active member of the Federation of Junior Chapters of the Philippine Pharmacists Association; and (3) has 2nd year and 3rd year Pharmacy students with a dispensing subject. The researchers randomly selected 384 pharmacy students from the 12 institutions. The researchers used the Cochran formula to determine the sample size. The sample size was computed using the Raosoft software with a margin of error of 5% and a confidence level of 95%. 32 respondents were randomly divided into two; 16 respondents served as the control group and another 16 served as the experimental group. For the inclusion criteria for the participating schools: (1) has an exclusive Uniform Resource Locator of MyDispense®; (2) active member of the Federation of Junior Chapters of the Philippine Pharmacists Association; and (3) has 2nd year and 3rd year Pharmacy students with a dispensing subject. For the inclusion criteria for the participants: 1) Respondent must be bonafide second-year and third-year college students currently enrolled in the Bachelor of Science in Pharmacy in the Philippines 2) Has a registered email or account to MyDispense®; 3) Respondent must have experienced using the MyDispense® virtual simulation and completed at least two MyDispense® cases; 4) Has a dispensing subject; 5) Not enrolled in another course; 6) Not a college graduate; and 7) Has a gadget and internet connection. For the inclusion criteria for the participating schools: (1) has an exclusive Uniform Resource Locator of MyDispense®; (2) active member of the Federation of Junior Chapters of the Philippine Pharmacists Association; and (3) has 2nd year and 3rd year Pharmacy students with a dispensing subject. For the exclusion criteria of the participants: 1) Currently enrolled first-year and fourth-

year BS Pharmacy student; 2) Do not have a registered MyDispense® email and unable to complete at least two MyDispense® cases; 3) Not a Philippine Pharmacy Student; 4) No dispensing subject; 5) Currently enrolled in another course; 6) Graduate of any baccalaureate degree and 7) No gadget and internet connection.

C. Instrument

This study utilized an adapted and modified online survey questionnaire from the research studies of Oser (2013), Fortune et al. (2011), and Paul (2006) [7,8,9]. The survey tool consisted of three parts with a total of twenty-five (25) questions. The first part comprised seven questions about the respondents' socio-demographic backgrounds. The second part included fifteen (15) equally distributed statements among the five factors of perception that utilized a five-point Likert scale system, with one (1) strongly disagree and five (5) strongly agree. The last part of the survey tool consisted of four questions that required short essay answers about the advantages, barriers, challenges, and recommendations for using MyDispense. The researchers conducted pilot testing to test the appropriateness and clarity of the questions. It was then evaluated using Cronbach's alpha, a reliability coefficient that showed the connection of the items. The general rule of thumb is that a Cronbach's alpha of 0.70 and above is considered good and acceptable, yet 0.80 and above is better and preferred [10]. The survey tool used obtained a reliability score of .874, which corresponds to the rule as better. Hence it is considered very reliable. It took ten (10) to fifteen (15) minutes to answer the survey questionnaire.

D. Data Collection Procedures

Before collecting data, the researchers sought approval to conduct the study with their students from the institutions. The researchers sent letters via email to each institution's dean for their approval of the research and asked to provide students' lists with their email addresses. Once approved, the research team sent each participant an informed consent form. The respondents' participation is voluntary. Maximum efforts were made to maintain the confidentiality, anonymity, and privacy of the respondents' data and responses. The questionnaires were not numbered, and their names and the institutions of where they came from were not revealed. The researchers did not share information about the respondents with anyone outside the research team.

E. Data Analysis

The researchers employed three statistical tools to analyze the data. Mean and standard deviation were used to understand the participants' demographics such as: age, year of study, etc. Mean provided the average response for each question, while standard deviation showed how spread out the answers were from the average. This approach helped answer the first two research questions. To assess group differences in key outcomes, like performance, inferential statistics were used. T-tests and ANOVA were employed depending on the research question and the number of groups. These tests aimed to identify statistically significant differences between groups (e.g., control vs. experimental) on the variables of interest, addressing the last research question.

III. RESULTS AND DISCUSSION

➤ *Perceived Performance Level*

The perceived performance level in the control condition revealed that the standard MyDispense® program offered the participants acquirement of relevant knowledge, perception, competency skill, and confidence in drug dispensing. Likewise, the observed results obtained from the experimental group that employed the Filipinized MyDispense® closely followed the same level of performance in these areas. Both overall and across each category, competency skills were found to be the most

favorable indicator which indicates the MyDispense® has more features for improving the competency of the students in drug dispensing than the other indicators. Slightly lower mean scores in favor of the control group in all four indicators also point towards the fact that while using the Filipinized version of MyDispense® is not necessarily better than using the standard version, it is definitely not worse in terms of improving students' perceived performance. Such breakdown gives a clear picture of the performances as observed and rated by students who undertook different tasks using the two versions of the MyDispense® program.

Table 1 Perceived Performance Levels of the Control and Experimental Group

| | Control Group | Description | Experimental Group | Description |
|--|---------------|-------------|--------------------|-------------|
| Knowledge Gained | 4.10 | High | 4.04 | High |
| Perception | 3.86 | High | 4.00 | High |
| Competency Skills | 4.19 | High | 4.24 | Very High |
| Confidence in Drug Dispensing | 3.98 | High | 3.91 | High |
| Overall Perceived Performance Level | 4.03 | High | 4.05 | High |

➤ *Performance Levels of the Experimental Group before and after using the Filipinized My Dispense*

Among the four indicators of the performance levels of the experimental group before using the Filipinized My Dispense®, four areas that were categorized as competent were able to register very high competency skills with a mean score of 4.24. From this, it can be understood that students performed well in competencies of MyDispense® not only with the changed version, but the original as well.

The lowest level of confidence was the point made concerning dispensing drugs: This was still relatively high – a mean of 3.86 which before using the Filipinized MyDispense® were considered to have satisfactory levels of confidence.

A relatively high mean score indicates that the students appreciated the theoretical knowledge introduced by the basic MyDispense®. Perception of their performance scored almost equally to it with the mean score being at 4.00, also called high based on the students' level of performance according to their perception.

Furthermore, the study demonstrates that adapting educational tools like MyDispense® to local contexts, as with MyDispense® into Filipino, can significantly enhance students' theoretical knowledge, performance perceptions, and actual competency in specialized skills such as drug dispensing. These findings suggest that tailored educational technologies are crucial in optimizing learning outcomes within specific cultural and educational contexts.

Table 2 Performance levels of the Experimental Group before and after using the Filipinized MyDispense®

| | Before | Description | After | Description |
|----------------------------------|-------------|-------------|-------------|------------------|
| Knowledge Gained | 4.04 | High | 4.23 | Very High |
| Perception | 4.00 | High | 4.51 | Very High |
| Competency Skills | 4.24 | Very High | 4.35 | Very High |
| Confidence in Drug Dispensing | 3.91 | High | 4.35 | Very High |
| Overall Performance Level | 4.05 | High | 4.36 | Very High |

➤ *Significant Difference in the Performance levels of the Experimental Group using the Filipinized MyDispense® Compared to their Perception of using the Standard MyDispense®*

The third research question was an analysis of the significant difference between the performance levels of the experimental group when using the Filipinized MyDispense® compared to their performance levels based on their previous experiences when only using the standard MyDispense®. This was compared in terms of knowledge gained, perception, competency skills, and confidence in drug dispensing. This has been addressed by computing the mean differences of each performance level of the experimental groups before and after using the Filipinized MyDispense.

As shown by the findings of Table 3, several points can be made about the effects of the Filipinized MyDispense® on the learners' performance. Coupled with this, the p-value of 0.061 obtained for knowledge gained shows a slight trend towards the null hypothesis but does not attain the research alpha level of 0.05 from the descriptive analysis earlier where there were mean scores of 4.04 to 4.23 shows that there was a suggestion of a positive effect that might, however, be enhanced with the effect of increased sample size or use of different approaches.

The findings indicate that perception has an enhanced score and this has a significance level of <0.000 and above and the mean scores increased from 4.00 (standard) to 4.51

on the scale much better and more relatable using Filipinized. By this, we can infer that students consider the Filipinized version more helpful and realistic. Nevertheless, as stated earlier, the increase in competency skills is insignificant ($p < 0.05 = 0.332$) but the mean scores for the subjects were higher with a range of 4.24 to 4. When comparing the pre-and post-pandemic results, confidence in drug dispensing improves greatly with a p-value less than 0.000 is also seen while the mean scores increased from 3.91 to 4.35. This considerable

improvement reaffirms that the modified MyDispense®, which contains evident Filipino influences, greatly enhances the students’ confidence, perhaps because they are presented with familiar contexts and learning situations. Collectively, although all increases did not attain statistical significance, the direction of means for all items pointed to improved Filipinized MyDispense® where perception and confidence constituted a greater interaction and assurance that augments the educational practice among students.

Table 3 Significant Difference in the Performance levels of the Experimental Group when using the Filipinized MyDispense® Compared to the Standard MyDispense®

| Profile | Group | Mean | P-Value | Decision | Interpretation |
|--------------------------------------|---------------------|------|---------|-------------------|--------------------|
| Knowledge Gained | Before (standard) | 4.04 | 0.061 | Fail to Reject Ho | Not Significant |
| | After (Filipinized) | 4.23 | | | |
| Perception | Before (standard) | 4.00 | 0.000 | Reject Ho | Significant |
| | After (Filipinized) | 4.51 | | | |
| Competency Skills | Before (standard) | 4.24 | 0.332 | Fail to Reject Ho | Not Significant |
| | After (Filipinized) | 4.35 | | | |
| Confidence in Drug Dispensing | Before (standard) | 3.91 | 0.000 | Reject Ho | Significant |
| | After (Filipinized) | 4.35 | | | |

➤ *Significant Difference between the Performance levels of the Experimental Group using the Filipinized MyDispense® Intervention and the Control Group that did not use the Filipinized Version*

Table 4 in the study highlights the pre- and post-implementation performance levels by contrasting the experimental group, which employed the Filipinized MyDispense® against the control group that used the standard MyDispense®. Ultimately, some interpretations and conclusions which are vital can be inferred from the table despite the fact that numerical values, and statistical decisions themselves are definite and clear. From the results obtained, the p-values obtained were insignificant throughout all the performance aspects, which include the amount of knowledge gained, perceived knowledge, competency skills, and level of confidence in drug dispensing; this means that both the

experimental and control groups shared similar general characteristics.

This kind of distribution before the intervention launches the validity of the experimental setting since the two groups displayed similar performance levels. This lent support to suggestions that finding the effects in the later stage actually indicates the efficacy of the intervention and not the disparity. This helps in bolstering the findings submitted in the study to support the effectiveness of the Filipinized MyDispense®. Moreover, they also have the same education and training in terms of drug dispensing contenance before they take the new Filipinized version. This can be considered as a positive sign that the standard MyDispense® program is indeed replicable and convergent across different contexts as well as institutions participating in the study.

Table 4 Significant Difference in the Performance levels of the Experimental Group before using the Filipinized MyDispense® Compared to the Control Group using the Standard MyDispense

| Profile | Group | Mean | P-Value | Decision | Interpretation |
|--------------------------------------|-----------------------------|------|---------|-------------------|-----------------|
| Knowledge Gained | Control Group | 4.10 | 0.591 | Fail to Reject Ho | Not Significant |
| | Experimental Group (Before) | 4.04 | | | |
| Perception | Control Group | 3.86 | 0.300 | Fail to Reject Ho | Not Significant |
| | Experimental Group (Before) | 4.00 | | | |
| Competency Skills | Control Group | 4.19 | 0.627 | Fail to Reject Ho | Not Significant |
| | Experimental Group (Before) | 4.24 | | | |
| Confidence in Drug Dispensing | Control Group | 3.98 | 0.571 | Fail to Reject Ho | Not Significant |
| | Experimental Group (Before) | 3.91 | | | |

Table 5 contains much of this same as but with the overall performance levels of the control group compared to the experimental group using the MyDispense® Filipinized version pinpointed in greater detail. While these results reveal a range of different quantitative data and trends, it is the general significance of extracting information in this way from mobile technologies that warrants reflection here.

Firstly, on the knowledge gained metric, there were no significant changes between the experimental group that received the moderated forum (mean score of 4.23) and the control group that used the unmoderated forum (mean score of 4.10). This means that both the standard and Filipinized version can help in the improvement of students’ knowledge in drug dispensing though there was a slight increase shown

in the Filipinized version which was not attributable to significance.

The metric on the other hand, which assessed the confidence in drug dispensing, indicated a meaningful difference with a p-value of 0.005. The validity of the test also

Furthermore, they asserted that localization improves interaction and self-assurance; nonetheless, the regular edition of MyDispense® is suitable for the knowledge and competency abilities. Thus, it is possible for institutions to spend a balance of their resources in the production of content specific to certain geographic locations and optimization of existing tools. In conclusion, the cultural translation MyDispense® is favorable to the students’ perception and

reflects that the experimental group has a relatively higher confidence mean score, 4.35 than the control group 3.98. This means that the improvement attained by the Filipinized version is enhanced significantly thus increasing the student’s confidence in their responses could be attributed to better understanding of the supplied situations.

confidence level while the non-cultural translation MyDispense® was as effective as the cultural one in terms of knowledge and competency skills hence supporting the use of culturally relevant educational material in the improvement of students’ understanding and the level of confidence. This forms the basis for further localization of the various educational technologies that are needed in the systems.

Table 5 Significant Difference in the Performance levels of the Experimental Group after using the Filipinized MyDispense® Compared to the Control Group using the Standard MyDispense®

| Profile | Group | Mean | P-Value | Decision | Interpretation |
|-------------------------------|----------------------------|------|---------|-------------------|-----------------|
| Knowledge Gained | Control Group | 4.10 | 0.296 | Fail to Reject Ho | Not Significant |
| | Experimental Group (After) | 4.23 | | | |
| Perception | Control Group | 3.86 | 0.000 | Reject Ho | Significant |
| | Experimental Group (After) | 4.51 | | | |
| Competency Skills | Control Group | 4.19 | 0.208 | Fail to Reject Ho | Not Significant |
| | Experimental Group (After) | 4.35 | | | |
| Confidence in Drug Dispensing | Control Group | 3.98 | 0.005 | Reject Ho | Significant |
| | Experimental Group (After) | 4.35 | | | |

➤ *Discussions*

The study suggests that customizing MyDispense® to reflect actual Filipino community pharmacy practices may have boosted students' confidence and perception due to its relatability. This aligns with literature proposing that students achieve better educational outcomes when using tools that relate to their culture and context. For example, it is noted that similar applications, like MyDispense®, provide a real-life scenario of dispensing processes, enabling learners to develop practical skills without real-world exposure [10]. Similarly, it was found that contextualized learning environments, such as practicing MyDispense® in an American context, offer advantages in pharmacy education [11].

The study results show that both the control and experimental groups taught with different methods have similar knowledge and skills by the end of the academic year. Localized versions may improve certain aspects like confidence and perception, but the knowledge and skills gained from the simulation remain consistent regardless of localization. Virtual simulations are important in achieving similar learning outcomes despite contextual variations [12]. The experimental group showed increased perception and confidence, attributed to the relevance and frequency of the localized content. This contrasts the suggestion that heightened engagement may result from reduced cognitive demands [13]. The study underscores the importance of culturally appropriate educational resources, especially in multilingual countries like the Philippines.

In conclusion, it reveals that MyDispense® is valuable for pharmacy education, as outlined above and also identifies localization as improving students’ confidence and perception. In consonance with the existing literature, these learning outcomes corroborate the positive effects of localized education technologies by enhancing student achievement.

IV. RECOMMENDATIONS

➤ *Challenges in Recruitment Limited Study Scope*

The researchers initially aimed for a much larger sample size (384 participants) but could only recruit 32 due to practical limitations like resource availability. The complexity of the study, requiring participants to complete three MyDispense cases, discouraged many potential participants despite outreach efforts.

This highlights the need to explore alternative recruitment methods for future studies that minimize inconvenience for participants while maintaining engagement.

➤ *Recommendations for Future Research*

The study suggests further investigation into broader aspects beyond just dispensing skills, such as knowledge retention, perception, and confidence. The researchers also recommend expanding the sample size to include pharmacy students beyond the second and third years, potentially including freshmen and seniors. This would provide students with more time to practice their skills, even through online platforms, at their own pace.

Finally, the researchers propose the inclusion of seminars and workshops specifically focused on navigating and modifying applications relevant to Pharmacy, not just MyDispense®. These workshops would help students develop a strong foundation in utilizing technology for learning and practicing their skills in a simulated environment. This focus on online learning methodologies aligns well with the current educational trends and allows students to practice and enhance their knowledge repeatedly.

V. CONCLUSION

The study compared the effectiveness of Filipinized MyDispense® against the standard MyDispense® system in enhancing pharmacy students' learning outcomes and skills. Despite aiming for similar educational objectives, the Filipinized version was developed specifically to cater to the unique needs and expectations of pharmacy students in the Philippines. The findings indicate that while the adapted simulation positively influenced students' perception and confidence in drug dispensing tasks, it did not significantly increase their knowledge or competency compared to the standard overlay. This differential impact suggests that cultural and contextual adaptations in educational tools are crucial for engaging students and enhancing their confidence and perception, although they may not uniformly improve measurable learning outcomes.

Moreover, the study underscores the importance of culturally sensitive educational strategies in bridging the gap between theoretical knowledge and practical skills. By tailoring educational tools to local contexts and cultural characteristics, such as with the Filipinized MyDispense®, educational environments can become more effective and relevant to students' future professional practices. This research not only highlights the value of localized simulations in pharmacy education but also suggests broader implications for improving learning outcomes across various educational contexts by aligning educational tools with students' cultural backgrounds and practical needs.

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