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PAPER

Development and Testing of Mobile Assisted Language Learning Application to Improve Oral Clinical Case Presentation of Student Nurses

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ABSTRACT

Background: Nurses' oral case presentation is a core clinical communication skill with distinctive linguistic qualities that require specific language training. The present paper is a user feedback analysis of a start-up Mobile Assisted Language Learning application (MALL app) developed and implemented to provide English language training to improve Oral Case Presentation (OCP) of student nurses pursuing baccalaureate degrees from a nursing college in South India. Objective: The aim was to develop and test an Android based OCP-MALL application for user acceptability and effectiveness in improving OCP performance and decreasing the perceived language difficulty. Methodology: Sixty-two student nurses from a reputed nursing college in Chennai, South India, using Android mobile phones participated in the study. All the participants were given access and instructions on the use of OCP-MALL app. A comparison of pre and post-test of perceived level of language difficulty and OCP pre and post score along with users' acceptance were collected. Results: The users' acceptability showed that all participants rated the clarity in reading the text with highest mean score of 8.29 and std of 1.276, simplicity in navigation – moving to next page with next highest mean score of 8.19 and std of 1.526, clarity in text application layout with a mean score of 8.14 and std of 1.497 and user friendliness of the application with a mean score of 8.13 and std of 1.393. Conclusion: This startup OCP-MALL app user satisfaction feedback proves that Indian ELT trainers can create cost-effective and need-based m-learning applications.

KEYWORDS

mobile assisted language learning application (MALL), oral case presentation (OCP), student nurses, effectiveness, user satisfaction, English language training, m-learning

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1 INTRODUCTION

Mobile phones have become the most common device of all digital learning [1]. There is an increase in the number of mobile learning applications due to the enhanced e-learning readiness created among learners after Covid [2]. Mobile learning applications have been effective due to their accessibility from any corner of the world at any time and their interactive features that motivate every learner [3]. Mobile learning (m-learning) applications have proven to be a convenient, versatile and effective adjunct and also an alternative to traditional learning methods in nursing education [4].

Many reviews assessing the effectiveness of m-learning applications in enhancing academic and clinical performance of healthcare professionals have proved them to be effective in improving knowledge retention and clinical skills development and motivation [5, 6 & 7]. A scoping review on nurses adopting m-learning applications shows a favourable and improved clinical performance [8].

Studies highlight that nurses have expressed positive perception towards m-learning and enough conditions to promote nurses' m-learning should be provided [7, 9]. Further, teaching digital professionalism early in undergraduate nursing curricula and promotion of modelling digitally professional behaviour by nurses within healthcare environments is also imperative [10]. The design of learning and teaching of undergraduate nursing curriculum for Australian healthcare settings insists on the need to consider development of policies to support the use of m-learning at point of care [11].

Learner readiness is one of the crucial determiners on implementation of m-learning. A cross-sectional study done among 332 students of medical sciences showed a moderate level of m-learning readiness of the students, which indicated acceptance of m-learning [12].

Mobile-assisted language learning (MALL) is a type of m-learning that uses mobile devices to aid language learning and has high demands among English as Second Language learners to acquire linguistic skills [13]. Android phones are identified as the most popular mobile among MALL mobile platforms [14]. MALLs are developed to provide knowledge on vocabulary, grammar, phonetic practices [15, 16], and can be either general or created to target groups with specific language learning objectives under English for specific purpose (ESP) [17, 18].

Nurses' oral case presentation is a core clinical communication skill with distinctive linguistic qualities that contributes to complexity among ESL nurses [19, 20, 21]. The student's oral case representation is depicted in Table 1. It comprises details of the patient's personal profile, the past and the present health status and the identified illness and the nursing intervention, which is generally followed by a question session by clinical mentors during clinical postings [22, 23]. Dustyn E Williams [24] points to OCP as an understudied area in nursing teaching curricula. According to C Fang, et al., [25] many ESL student nurses face challenges in OCP due to inadequate grammar, insufficient vocabulary, low listening comprehension, low speaking and pronunciation ability.

Table 1. Oral case presentation of students

Name of the Investigator	Year	Content				Procedure & Approach		Multimedia & Technological Features (Videos/ Graphics/ Sound/Music/ Resolution Size)	Outcomes	Study Design	Reference
		Target Learners	Interest (General, ESP)	Proficiency Level	Topic	Instructional Materials	Tasks (Test /Quiz / Assessment)				
Barrett,	2022	30 Taiwanese undergraduate students	General	Advanced	Language and presentation skills	Multimedia learning material	Assessment	English Oral Presentation Application (EOPA) (Researcher developed app)	37% of students found EOPA to be useful for learning, 33%had some difficulties using the app	Focus-group interviews	Barrett, N. E., G. -. Liu, and H. -. Wang. "Student Perceptions of a Mobile Learning Application for English Oral Presentations: The Case of EOPA." Computer Assisted Language Learning, vol. 35, no. 9, 2022, pp. 2476–2501. SCOPUS, www.scopus.com, doi:10.1080/09588221.2021.1881975.
Zhang, Y.	2021	24 immigration officers at Don Muang International Airport.	ESP	Intermediate	Oral communicative learning (Two units – Arrival and Departure, and ten lessons that were under each unit)	Materials developed in ADDIE model	Task, Assessment	ETAIPO (English for Thai Airport Immigration Police Officers – Self-instructional materials) offered through WeChat public platform	Instructional materials had high quality of content, rational organization, pleasant presentation and convenient functions of the platform.	Assessment	Zhang, Y. (2021). A development of MALL materials to quality education and support English oral communicative learning of Thai airport immigration police officers. Paper presented at the *E3S Web of Conferences*, 295 doi:10.1051/e3sconf/202129505029 Retrieved from www.scopus.com
Kassem	2018	EFL Teacher Trainees of Assiut University, Egypt	General	Advanced	Vocabulary acquisition	Introduction and four units on vocabulary.	Quiz	4 vocabulary learning applications: • Quizlet • Digital Vocabulary Notebook • Digital Video Games Online Dictionaries	improvement in vocabulary acquisition, enhanced motivation perceptions	Pre and Post Test	Kassem, Mohamed Ali Mohamed. "The effect of a suggested in-service teacher training program based on MALL applications on developing EFL students' vocabulary acquisition." *Journal of Language Teaching and Research* 9.2 (2018): 250–260.

(Continued)

Table 1. Oral case presentation of students *(Continued)*

Name of the Investigator	Year	Content				Procedure & Approach		Multimedia & Technological Features (Videos/ Graphics/ Sound/Music/ Resolution Size)	Outcomes	Study Design	Reference
		Target Learners	Interest (General, ESP)	Proficiency Level	Topic	Instructional Materials	Tasks (Test /Quiz / Assessment)				
Moreno	2015	16 Spanish Erasmus students at the department of Translation,	General	Intermediate	Oral Skills	Communicative approach, Task based approach	Analysis of the transcriptions of the participants' recordings	VISP (Videos for Speaking) is a MALL app developed by members of the UNED-based ATLAS research group and the Ghent University-based GOLLD research group to promote oral practice in English.	Improved accuracy in vocabulary usage	Pre and post questionnaire	Moreno, Ana Ibáñez, and Anna Vermeulen. "Using VISP (Videos for Speaking), a mobile App based on Audio Description, to promote English Language Learning among Spanish Students: a case study." *Procedia-Social and Behavioral Sciences* 178 (2015): 132–138.
Qun Wu	2015	Chinese college students of Jinjiang University	General	Intermediate	CET4-English (L2) vocabulary – spelling, pronunciation and Chinese definitions.	Researcher designed Word Learning content	Tutorials and drill	Word Learning-CET4 Application (Researcher developed app) Basic4Android (B4A), very similar to Visual Basic, is a simple programming language with Touchscreen with commands, a B4A application with touchscreen	Improved vocabulary acquisition	Pre and Post Test	Wu, Qun. "Pulling mobile assisted language learning (MALL) into the mainstream: MALL in broad practice." *PloS one* 10.5 (2015): e0128762.

Generally, OCP skill is developed through observation while inadequate language preparation is one of the OCP challenges of ESL nursing graduates [22, 26]. Presently, there aren't any OCP MALL apps that are available for ESL nurses. Although m-learning applications that help to develop knowledge on OCP skills such as decision making are available, still most of them aren't primarily for language enhancement. However, many of these are meant for novice doctors [27, 28] and so the content significantly differs from nursing practice. Considering these deficits, the present OCP MALL application was developed and implemented to provide English language training to improve Oral Case Presentation of student nurses pursuing baccalaureate degrees from South Indian University.

2 REVIEW OF LITERATURE

Studies related to effectiveness of MALL applications show a positive acceptance of mobile techniques [29], a complementary method [30], higher scores on tests, increased motivation, interest, and confidence after four consecutive weeks of intervention [31, 32]. Studies integrating m-learning in nursing education showed better academic achievements and satisfaction [33], positive students' attitudes, students' satisfaction, and students' academic achievements [6].

2.1 Phase 1 – OCP mall development

A. Instructional Module

The OCP MALL instructional module was developed in the ADDIE model based on language and learning theories and principles to develop the materials which comes with five phases: analysis, design, development, implementation, and evaluation. As readily available English language training modules for OCP were not available, the content was prepared through review of literature on genre analysis of medical case reports. The structural move analysis [34] to understand the characterization of organizational and textual patterns and the lexico-grammatical structure [35] typical to the medical discourse were identified. Based on the review, the learning content framework was designed as per SOAP (Subjective, Objective, Assessment and Plan) [36] format, a highly structured format for delivering the health details of patients. The entire learning content was organized into small learnable chunks of digestible bits of information, with clear learning objectives and asynchronous learner-controlled instructional materials. A landing page consisting of characteristics, structural moves and barriers of OCP followed by five levels of learning content on grammar and vocabulary and quiz at each level (Figure 1) was developed.

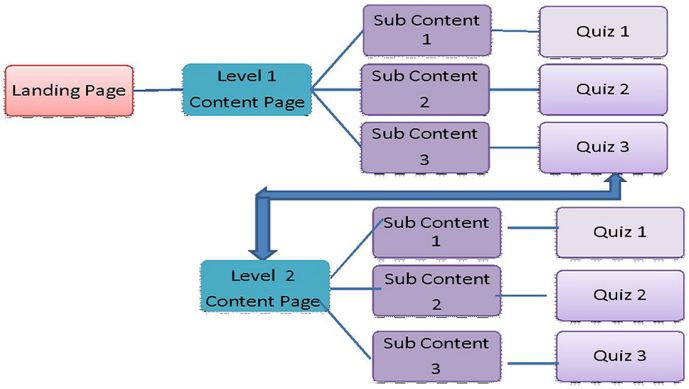


Fig. 1. OCP MALL pipeline

B. Integration of Multimedia

Digital tools such as Screencast o'matic, Free Cam (Screen Capturing) for video making, render forest app (free animation tool) and note vibes (for conversion of plain text to digital format graphics) and free music (from https://www.bensound.com) were integrated to add digital effects and make videos is mentioned in Figure 2.

Fig. 2. Screenshots of the videos

C. Technical Features

i. Technology Stack

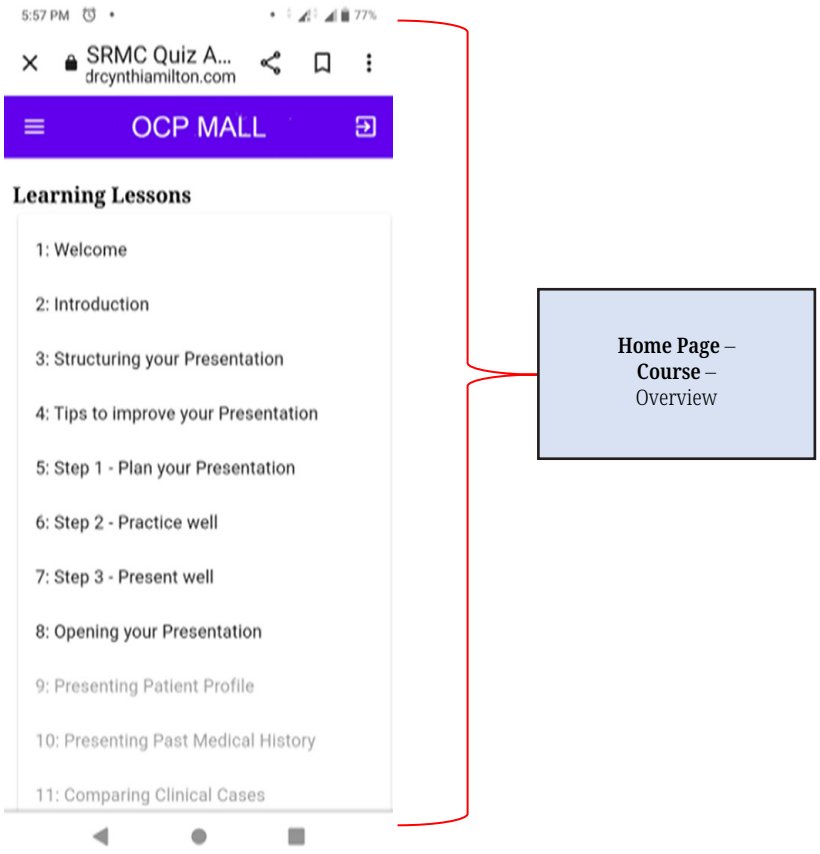
The application was developed as a Progressive Web App using modern open-source frameworks listed below.

UI	-	React
CMS	-	Strapi
Database	-	Postgres
Cross Platform	-	Ionic Framework

The following features were introduced in the development of OCP MALL app.

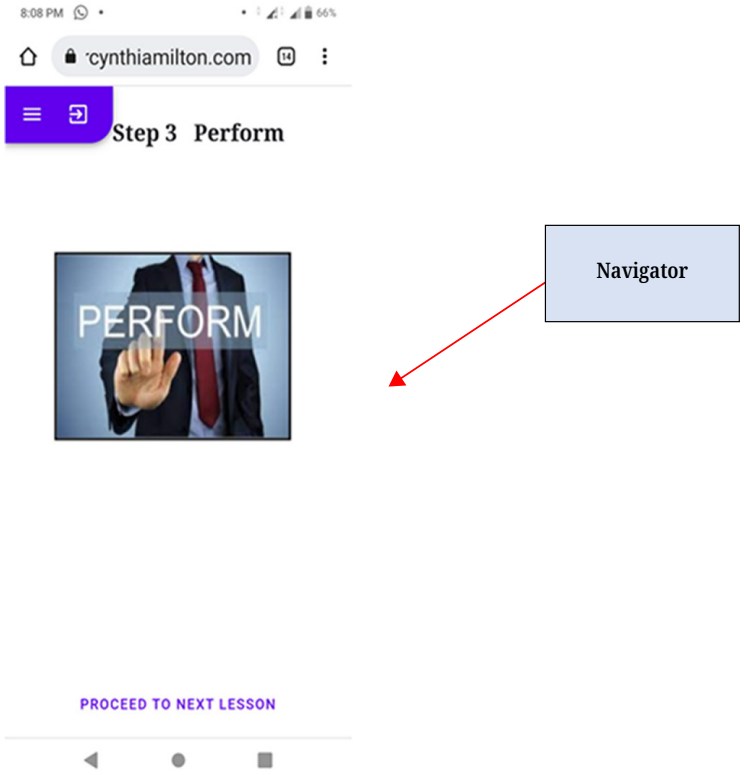
ii. Course overview

The course overview screen was provided for learners who are taking the course for viewing important information. It introduced the main idea of the course describing the topics or concepts that the course covers.



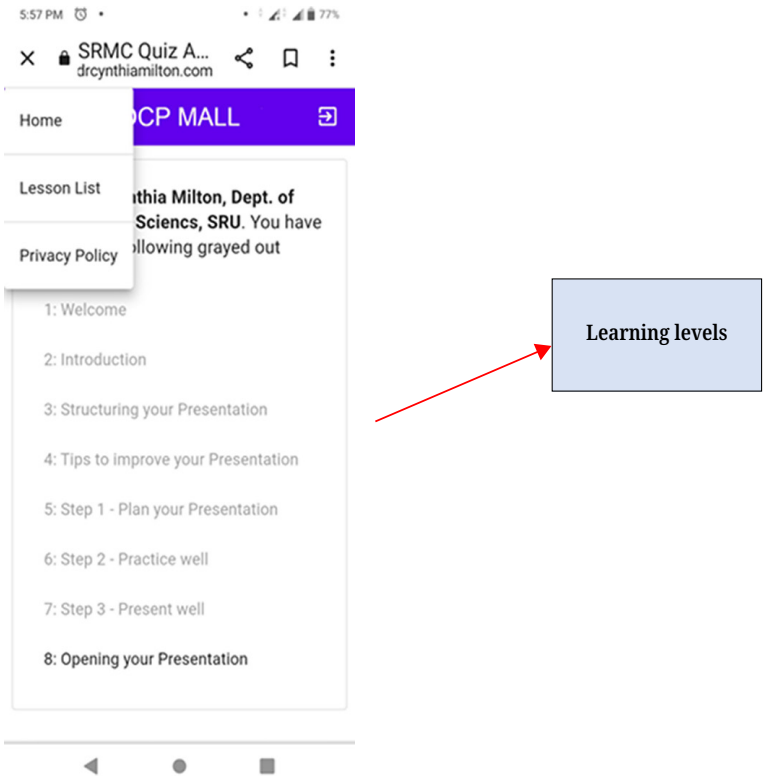
iii. App navigation

The navigation feature allowing users to navigate across, into, and back out from the different pieces of content within the app was introduced.



iv. Level based progression

A description of increasing levels of difficulty and complexity in acquiring knowledge, skills and attitudes within a domain. It implies that learning is a process of increasing difficulty and complexity, rather than a body of content to be covered within specific grade levels.



v. Dynamic content management

A Learning Content Management System (LCMS) is a platform that integrates authoring, delivery, publishing and analysis of content in a multi-user environment. In our LCMS definition, it provides content professionals a way to manage their content and collaborate in one centralized location.

vi. Quiz based assessment

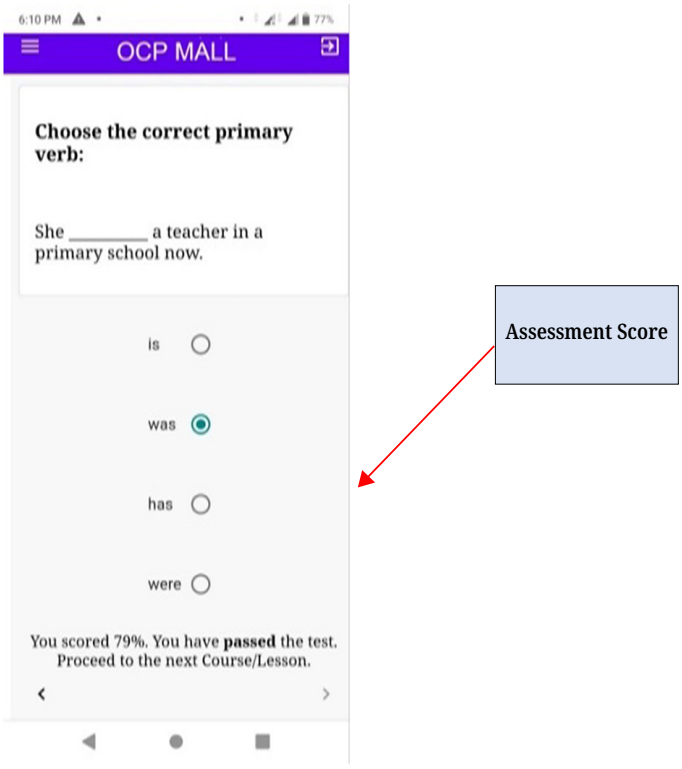
A quiz is a quick and informal assessment of student knowledge. So, at every level following each learning content, a quiz was introduced

vii. Performance tracking

Mobile application performance monitoring is the tracking of key app performance indicators in order to maintain awareness of your app's performance and potential quality issues.

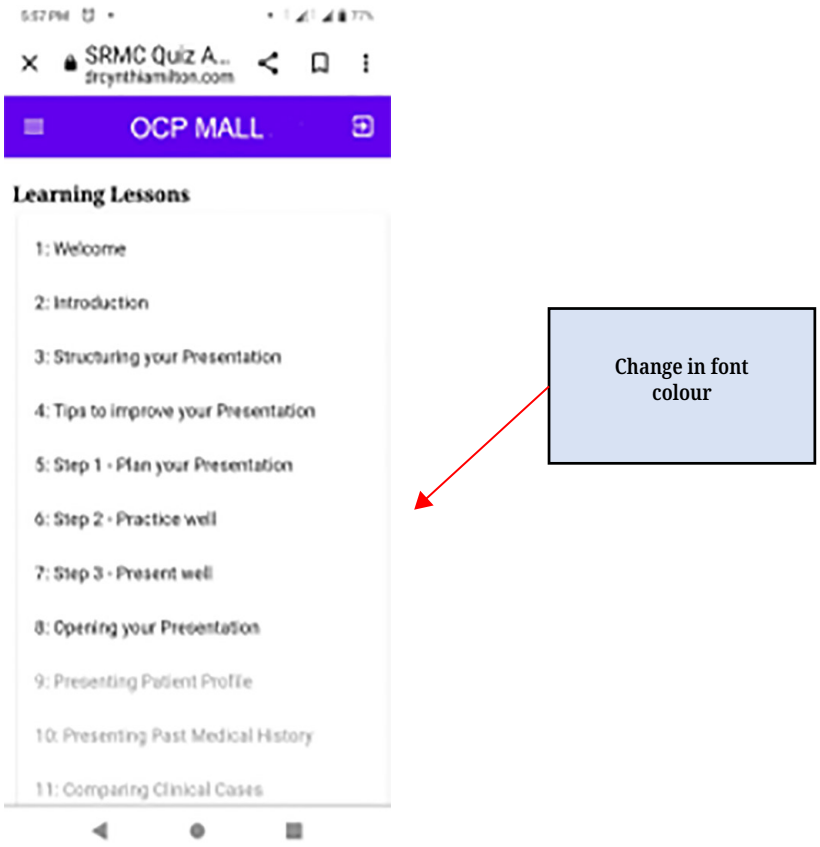
viii. Retake of quiz to improvise performance

Allowing students to retake any quizzes where they don't achieve a perfect score. A "Restart Quiz" button is displayed after each quiz. During a retake, students are only presented with questions they answered incorrectly on the previous attempt.



ix. Progression reporting

A progress report is a report which updates information about the learning to the learners. Progress reports make it possible for learners to change or improve their performance. Here the students' level of progress could be tracked through the change in the colour of the heading caption from grey to black.



x. Suitable for Android phone

The app was developed suitable for Android phone.

D. Alpha Test

Alpha testing was carried out with research team members. The OCP-MALL application was downloaded and tested for all the features of the application. In case any errors occurred during the testing phase, it was reported to the mobile app developers after rectification of the errors and retesting again with team members.

E. Beta Test

In the development process of the OCP-MALL, beta testing was carried out with 13 nursing students from the BSc Nursing (Post Basic) Programme. The researcher insisted the end users use all the features of the application. The end users used the application in a real-time environment and provided feedback about the application. In case any error occurred in the testing phase, the end users reported it to the researcher. The researcher reported to one of the researchers doing mobile application development to rectify the errors. The researcher asked end users to give feedback on the applications. Using this feedback, mobile developers further improve the application.

2.2 Phase – 2 OCP-mall feasibility

a. ***Study Design***

A pre and post-test design was used for the study.

b. *Participant Selection and Sample Size*

The sample size was calculated using the OpenEpi menu considering the primary outcome variable as confidence and based on previous study done by Jenny Lee [37]. Based on confidence mean ($mean_1 = 28.78$, $mean_2 = 25.77$) and standard deviation ($S_1 = 5$, $S_2 = 3.42$) 40, considering attrition, the average sample size 60 was taken into consideration.

The participants consist of 62 nursing graduates from the 2nd year of B. Sc Nursing programme from a reputed nursing college in Chennai, South India, undergoing clinical posting, using an Android mobile phone and willing to participate.

c. *Methodology*

i. Pre-Test: The pre-test included a published standardized self-plotting tool [38] to capture the perceived language difficulty in explaining the case in English. It consists of 16 language difficulty statements which addressed the perceived level of difficulty in explaining the cases (OCP) in English, use of nursing terms, grammatical errors and especially the tense mistakes, asking and answering questions.
ii. App Usage: OCP-MALL application was hosted from a local server. The link of the app was shared with the participants through e-mail. Access was given to the participants who enrolled using the link and the user manual was shared through e-mail. The users were given a four-week time period to complete the practice of learning using samples in the OCP-MALL app. A WhatsApp group was created with all the participants and reminders were sent.
iii. Post Test: At the end of the assigned period and another round of post assessments, the following were identified (1) User feedback on acceptance of OCP-MALL, (2) Perceived language difficulty in explaining the case in English. Along with these, (3) A comparison of the real time ward performance practical marks were given by the nursing mentors before and after the practice using OCP-MALL was completed.

3 RESULTS

3.1 Descriptive statistics

Table 2. Demographic details of the participants

S. No	Variables		(No. 62)	%
1	**Gender**	Female	46	74
		Male	16	26
2	**Age**	17–20	62	100
		21–23	0	0
3	**Type of Mobile in use**	Android	61	98
		Apple IOS	1	2

The demographic details showed that most of them were female student nurses (74%) from the age group of 17 to 20 (100%) and using an Android type of mobile phone (98%).

3.2 User acceptance

The efficacy of the OCP app was tested for the level of user acceptance of OCP-MALL. A semi-structured questionnaire constructed based on literature review on the participant's experience, their level of satisfaction and acceptance of the OCP-MALL performance was used to elicit the participants' response. The details are represented in Table 3.

Table 3. User feedback on ocp mobile app functionality

Items	Minimum	Maximum	Mean	Std. Deviation
Login with ease	2	10	7.99	1.620
Clarity in reading the text – Clear font size (caption, texts, and typography)-	4	10	8.29	1.276
Clarity in text layout	3	10	8.14	1.497
Clarity in audio	5	10	8.03	1.464
Smooth running of audio without troubleshooting	3	10	7.91	1.567
Clarity in video	4	10	8.04	1.536
Smooth running of video without troubleshooting	2	10	7.77	1.617
Easiness in attempting quiz	4	10	8.06	1.483
Simplicity in navigation – Scrolling the page	3	10	8.06	1.531
Simplicity in navigation – moving to next page	4	10	8.19	1.526
Resuming your task during your next login.	4	10	7.96	1.583
User friendliness of the application	4	10	8.13	1.393
Privacy and security issues of the application	2	10	7.80	1.708
TOTAL	47.00	120.00	96.3286	14.74294

In this study, the operational definition for acceptability for each item was assumed as the mean score of app usability ≥70%, derived from the m-learning application acceptance questionnaire developed by the researcher. The scale has 12 items, with each scored on a 10-point Likert scale (1 = strongly disagree; 10 = strongly agree). Higher scores identified a greater perception of usability. A score of ≥7 was considered to have good usability

Upon completion of OCP app usage, all 62 participants filled the questionnaire. Participants rated the clarity in reading the text with highest mean score of 8.29 and std of 1.276, simplicity in navigation - moving to next page with next highest mean score of 8.19 and std of 1.526, clarity in text application layout with a mean score of 8.14 and std of 1.497 and user-friendliness of the application with a mean score of 8.13 and std of 1.393. More details are presented in Table 3.

3.3 Comparison of perceived language difficulty in explaining the case in English

Table 4. Comparison of the pre and post test levels of perceived language difficulty in explaining the case in English

Item	Pre		Post		Mean Difference	Z-Value	P-Value
	Mean	S.D	Mean	S.D			
Inability to fluently present OCP in English	4.96	0.209	2	0.798	2.96	4.13	0.0005
Difficult to explain the case handling procedures in English	4.96	0.209	2.09	0.668	2.87	4.26	0.0005
Inability to comprehend Mentors instruction in English	4.3	1.259	1.96	0.825	2.34	3.93	0.0005
Giving excuses for not answering in English	4.96	0.209	2.17	0.778	2.79	3.76	0.0005
Difficulty pronouncing nursing terms.	4.43	0.945	2.17	1.072	2.26	4.31	0.0005
Hesitation to use any new word/Terms	4.83	0.388	2	1	2.83	3.95	0.0005
Making many grammatical errors while presenting OCP in English	4.43	0.896	2.09	0.949	2.34	4.06	0.0005
Difficulty to understand the questions asked in English during OCP.	4.83	0.388	2.14	0.774	2.69	4.26	0.0005
Inability to answer in English for the questions	4.35	1.027	2.39	1.033	1.96	4.13	0.0005
Difficulty to understand the meaning of the words which I use in my OCP	4.87	0.344	2.39	0.941	2.48	4.34	0.0005
Memorizing the lines in my OCP	3.91	1.311	1.91	0.996	1	4.01	0.0005
Knowing very less of English words	4.87	0.344	2.09	1.203	2.78	4.23	0.0005
Lack fluency to present OCP in English	3.33	1.091	1.87	0.785	1.46	–5.417b	0.0005
Difficulty to clarify doubts.	3.87	1.103	1.77	0.902	2.1	–6.267b	0.0005
Not knowing how to correct my grammar mistakes that I make.	4.	1.033	1.75	0.699	2.25	–6.301b	0.0005
Not knowing how to use different tenses in my OCP	4.08	0.971	1.66	0.75	2.42	–6.514b	0.0005

The above Table 4 presents pre- and post-test analysis of the perceived changes in the language difficulties of student nurses in performing OCP in English. The findings show that all of aspects of the identified language difficulty have decreased in significant ways after the participants had undergone the practice using OCP-MALL.

The overall pre-test and post-test analysis pertaining to language difficulty shows that the highest perceived change was seen in the use of tenses (Q 16) which had

a mean difference of 2.42; applying grammar concepts in OCP (Q-15) had a mean difference of 2.25.

Similarly, a significant change was also found in confidence to build fluency needed to carry out OCP (Q-1), which had a mean difference of 2.96; explaining the procedure (Q-2) showed a mean difference of 2.87; ability to clear doubts (Q-3) had a mean difference of 2.34; decrease in the practice of memorizing (Q-11) had a mean difference of 1. Next to these, the perceived changes were in the use of vocabulary with a mean increase of 2.78 in lexical skill (Q-12).

3.4 Comparison of OCP practical marks

Table 5. Inferential statistical analysis of the clinical presentation scores

Variable	Mean	N	Std. Deviation	Mean Difference	T-Value	P-Value
P 1	62.79	62	7.541	–5.574	–6.095	.000
P 2	68.36	62	7.893			

Table 5 represents the comparison of second year Medical Nursing OCP practical marks with Surgical Nursing CP practical marks. The analysis found a significant change in the mean score of P1 with P2 with a moderate increase, which could be interpreted as a gradual betterment over time.

4 DISCUSSION

The content of the present OCP-MALL has been designed using the well-accepted ADDIE model base. Berking P, Haag J, Archibald [39] recommend the ADDIE model to be the most generic, universal, and simple one that can be adopted into m-learning.

With regard to the technical features, the present mobile application developed is a start up with all essential basic features. However, on comparison with native applications, some of the advanced multimedia features of native applications could be missing. Yet, these differences were not pointed out by the participants in their feedback on application acceptance. This could be attributed to the fact that the participants could have perceived it beneficial as this is the first-of-its-kind application to learn English required for improving OCP skills. Likewise, in the sequential grouping of learning content being based on the SOAP format, which is the generally recommended and familiar structure for all student nursing case presentation practice, no contradictions or deviations in their regular case presentation styles were observed. The overall effectiveness is reflected in their significant change noted in the real time performance score and perceived language difficulty ($P \leq 0.05$). Similar effectiveness was observed in the study by Al-Fahad FN [40] among graduates from a Saudi Arabian university which liberated m-learning. The findings showed that students learnt more easily when information was divided into small learnable amounts to enable effective micro-learning.

A good cloud infrastructure is required for the deployment of applications from a remote mode. This requires a constant financial backing that could lead to financial constraints for novice start-up application designers unless it is commercialised. Verma K, Dubey S, Rizvi M [41] proposes details on how cloud-based m-learning can

make use of local resource opportunities available in higher education institutions that can be used effectively to implement and enhance m- learning.

5 CONCLUSION

Experience is the best teacher which can offer great learning opportunities to acquire new skills. The researcher, understanding the demand for m-learning applications, has attempted to identify a specific clinical communication task of student nurses. The researcher has also gained hands-on experience in developing e-content, designing the framework for mobile applications. The researcher has also checked the feasibility and user feedback of this cost-effective mobile application.

Ethical Consideration: Ethical clearance approval for the conduct of study was obtained from the Institutional Ethics Committee of a deemed university attached to a teaching hospital which runs nursing programmes with a nursing students' strength of 1400 (Ref. No. IEC-NI/21/FEB/77/14).

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