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Students' Use of Smartphone Apps in Higher Education Institutions

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ABSTRACT

This study explores the Higher Education (HE) learners' attitude toward using the Smartphone One Lesson Apps (SOLA) as a proactive browser for the topics and skills of the next lesson in the class rooms of Higher Education Institutes (HEIs). A sample of Omani students from different sections of the Foundation Program of Information Technology (FPIT) of the Foundation Program Level (FPL) at the University of Technology and Applied Science (UTAS-Salalah in Oman) had been encouraged to complete the designed survey for this purpose using a 5-points likert-scale. The collected data was formatted and analyzed using SPSS. The outcomes showed that the respondents mostly used the SOLA for proactive review and practice, which led to well prepared for the next lesson's objectives and skills, thus improving the FPIT system and the desired skills as well. Moreover, the respondents in general offered positive attitudes toward the SOLA. Furthermore, the results propose motivated and ambitious inferences for utilizing SOLA applications in FPIT and other courses in the HEIs.

Keywords: Higher Education - eLearning - mobile apps

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INTRODUCTION

In recent years, the dramatic evolution of smartphone devices and their attendant desires have encouraged the employing of smartphone technology in HEIs. Programs of English language teaching and learning have ultimately profited from this direction, and the impact of utilizing smartphone devices for language learning and teaching is a common and significant topic of interest (Chen et al., 2020). In this context, several specific terms for such concepts have been created to describe the corresponding trend, for example, mobile-assisted language learning (MALL). Furthermore, there are many studies investigating the relationship between enhancing the individual skills of the language and MALL (Huong & Hung, 2021), and this brings the idea to apply to the other courses of the FPL, such as IT and Math courses. In this study, the curriculum of IT for the FPL was targeted. The main idea of this experiment is to invent and embrace a new type of mobile application, which is a one-lesson mobile application, to provide the students with the objectives and skills of the next lesson. That must be light, fast, easy to design and develop by the lecturers and instructors, and easy to use by students. Simple, light, fast browsing and practice must be suitable and distinctive for proactive learning through smart phones. The author called it Smartphone One Lesson Apps (SOLA).

Smartphones, considered one of the most usable mobile devices, offer many benefits that may encourage the learning of languages and reinforce the teaching quality to a high level (Dashtestani, 2016). The researcher thought that using the same concept and tools proactively for the other courses of the FPL, such as IT courses, might have positive benefits and/or many advantages too.

There are many predominant benefits of mobile smartphones, such as efficacy, usefulness, convenience, and interactivity, in helping instructors and learners in the education sector (Cheung, 2015). Another common use of smartphones in higher education teaching and learning is their saving of mobile applications, where using the style of mobile learning in some classroom activities provides more flexibility and convenience for the students during their self-learning (Dawson et al., 2011).

For the purpose of this study, the researcher created a smartphone application for one lesson and called it Smartphones One Lesson Apps (SOLA). The Massachusetts Institute of Technology (MIT) recommends the MIT App Inventor platform for widespread digital education in Higher Education Institutions (HEIs) and has developed an intuitive, visual programming environment specifically for this purpose (Norbutayevich, 2023). The SOLA has

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been created and developed using the “Visual Programming Environment of MIT App Inventor." The MIT App Inventor is a very easy platform that can be used free of charge, and the instructors are able to use it easily after just seeing its tutorial, which doesn’t take more than a couple of hours (Massachusetts Institute of Technology, 2022).

SOLA is needed to be created by the teachers and instructors for each lesson that would be easy, time-saving, and cost-free while focusing on the objectives and skills of the next lesson in the context of the preparation of fabric for the curriculum. SOLA will be used as a proactive browsing and practicing tool with the goal of helping the students with the acquisition process of the next lesson’s topics and skills. These types of apps would offer low time cost, superb mobility, customizability, and unlimited accessibility from any place and at any time on the smartphones of the students, hoping to result in a growing interest in using SOLA among the FPL students as previously smartphones apps that had been found among the English learners (Mindog, 2016).

In the same context, experts in higher education curricula may not have designed the applications provided for learning purposes, which could result in a lack of strength, inadequacy, or an unprofessional approach to delivering targeted knowledge to students.

On the other hand, the numerous and excessive number of applications on the present market can also be an issue, leaving students unclear about what applications they should select to fulfill their needs. For this reason, an appropriate baseline design for the proactive helping applications must be ably created by curriculum professionals’ designers with the best interest of students in mind (Bui et al., 2023).

This might be achieved through a thorough study of how the students utilize SOLA to study the FPIT course and their perceptions of the effective and preferable considerations with which those applications might be created with the appropriate arrangements to meet the students' needs.

Taking into account the above-mentioned, the case study deeply examined Omani HEIs’ utilization of and attitudes toward the designed SOLA apps. The study aims to address the primary research question.

What are the FPL students' attitudes toward the proactive use of SOLA?

In the current paper, the researcher wants to enhance the grasp of the use proactively of dedicated smartphone apps by students of HEIs. This case study at the University of

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Technology and Applied Science, UTAS-Salalah, examines their behavior toward this type of smartphone application (SOLA).

In this research, the author aims to enhance students' understanding of the proactive use of dedicated smartphone apps at Higher Education Institutions (HEIs). This case study at the University of Technology and Applied Science, UTAS-Salalah, examines their behavior toward this type of smartphone application (SOLA).

LITERATURE REVIEW

The evolution of ubiquitous mobile technology and the continual utilization of this technology and smartphones have generated modern styles of communicating effectively for working and studying. Further, spatial limitations have been minimized, so it can be said today that people can be connected and reachable anywhere and at any time (Traxler & Koole, 2014). This also applies to HEIs, where not only staff but also students utilize their own mobile devices, such as tablets, smartphones, and laptops, thanks to the rapid access to the Internet, keeping them constantly connected during and even outside of the classroom, while students offer a big acceptance of using modern technology (Carvalho et al., 2014).

Moreover, using technology in education is a powerful tool for teachers and students for teaching and learning processes (Shivakumar & Manichander, 2013). Collaboration among the HEIs, lecturers, and stakeholders with one another and the amalgamation of blended learning and communication technologies could have many positive aspects and benefits in the classroom (Kaite et al., 2012).

Using mobile devices, teachers and instructors are more able to customize education experiences to meet the needs of their students (US Department of Education, 2017). Advisors of the Consortium for School Networking consider that one of the more significant technologies to support, accelerate, and enhance renovation in learning and teaching in the near future is mobile devices (CoSN, 2019). Auquilla and Urgiles (2017) stated that mobile applications are used for educational purposes and have a paramount influence in advanced countries. Moreover, the growing usage of appliances in classroom settings sparked the interest of the researchers in conducting studies on the benefits and roles of these different devices as an effective tool in learning and teaching (Kaite et al., 2012). One of the most considered models that is used to situate the use of mobiles by students in second education as it expounds on how learners might accept and utilize technologies is the Technology Acceptance Model

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(TAM). This model is able to provide an explanation of the predictors of the attitude of humans towards prospect acceptance, usefulness, and ease (Granie & Marangunie, 2019).

METHODOLOGY

This paper intends to investigate and show the major outcomes of research on those targets to comprehend whether the students in HEIs in Oman will use proactively mobile apps. Therefore, they are able to prepare for the next lesson's objectives and skills by showing their attitudes toward using the mobile apps proactively inside and/or outside the classroom in the same context as academics.

Research Design

Using the virtual programming platform of MIT APP Inventor (Massachusetts Institute of Technology, 2022), the author developed the pre-designed mobile apps for this case study that the author called SOLA to be used by the students to respond to a questionnaire corresponding to their real use of this application of SOLA. It also aimed to understand if some other factors could potentially influence the way SOLA uses the mobile apps.

This case study uses the descriptive method of the quantitative type, where a structured survey was employed to collect data and information from answers to the provided specific questions. The variables of the study will identify the factors that affect the student's attitude toward the proactively using of SOLA applications during the course and its influence on the education process with the students.

Research Setting and Sampling

The University of Technology and Applied Sciences, Salalah, is the chosen campus setting for this research paper, where the research was conducted. In this research, the author utilized a sample of the students of the FPL from two sections of the FPIT, for a total of 41 students. Only 29 respondents, based on their shared attributes and characteristics, responded to the questionnaire.

Oliveira et al. (2020) have concluded that researchers can considerably enhance results and make their studies more accurate if they utilize other data sources, such as records, in this context along with the survey report. Further, it is important to examine the logs of the comments on using the SOLA and the marks of the assessment of the objectives and skills related to the SOLA.

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This research used a 5-point Likert-scale survey, where 5 corresponds to strongly agreeing and 1 corresponds to strongly disagreeing. The questionnaire focused on the design and roles of SOLA in objectives and skills practice, acquisition, and learning of the next lecture.
The survey includes three sections: (1) the first section about SOLA design and utilization. (2) The second section is about the attitudes of the students toward SOLA, and (3) the third section is about learning intention.

Section 1 (six items) focused on discovering the attitudes of the participants toward the design and ease of use of the SOLA, and Section 2 (13 items) intended to discover the attitudes of the participants toward the advantages and benefits of using the SOLA. Section 3 (one item) tried to discover the attitudes of the participants toward the learning continuance intention using SOLA with all activities and with other courses.

Gathering the Data and Analysis

In such a study, the researcher targeted the students of the FPL of UTAS, Salalah, from two sections of the Foundation program of IT, for a total of 41 students. Data was collected, and then they used SOLA. The data analysis did not include the uncompleted surveys. Consequently, after reducing the number of responses from 41 to 29, only 29 were ready for analysis.

With the help of SPSS 22 (IBM), all the accepted data were analyzed using descriptive analysis. Results from the study showed that the students rated all items using the 5-point Likert- scale, and the author made the reliability test (Cronbach's alpha) of all the items and of each section that were greater than 0.87 (@ >.87).
Regarding the findings of sections 1 and 2 concerning the goals of measuring students' utilization of the SOLA and the attitudes of the participants towards the SOLA, the researcher analyzed the collected data and interpreted the values of means and standard deviations.
To prepare the collected data for easier analysis, the researcher has categorized the scores of means into smaller groups using the formulation offered by Saxigöz (2016). The authors utilized the following formulation to interpret the values of means by utilizing the converted scores of means representation in Fig 1. S = (MaxV-MinV) / Count = (5-1) / 5 = 0.8
S = (MaxV-MinV) / Count = (5-1) / 5 = 0.8
Where: S: Range of Scores
MaxV: Maximum Value

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MinV: Minimum Value

Count: No. of options

Rank	Interpreted level	Score of Mean	Corresponding order
1	Strongly agree	4.21 - 5	Very high
2	Agree	3.41 – 4.2	High
3	Undecided	2.61 – 3.4	Neutral
4	Disagree	1.81 – 2.6(null hypothesis)	Low
5	Strongly disagree	1 – 1.8(null hypothesis)	Very Low

Figure 1: Interpretation of the Mean Score.

The researcher conducted a t-test from two different angles. The first test is to compare the averages of items 6 and 20 with the mean of the null hypothesis (M=2.6). The outcomes displayed that statistically significant differences are founded, where the values were 0.000 = Sig. (Sig < .05) as in Fig 2. Thus, rejecting the null hypothesis, and accepting the alternative hypothesis. The second test to compare the averages of items 6 and 20 with the mean of the alternative hypothesis (M=4.21) and the showed that there were not statistically significant differences, where the values were 0.589 = Sig and 0.072 = Sig. and both of them (Sig > .05) as in Fig 2a and Fig 2b and again the alternative hypothesis is accepted.

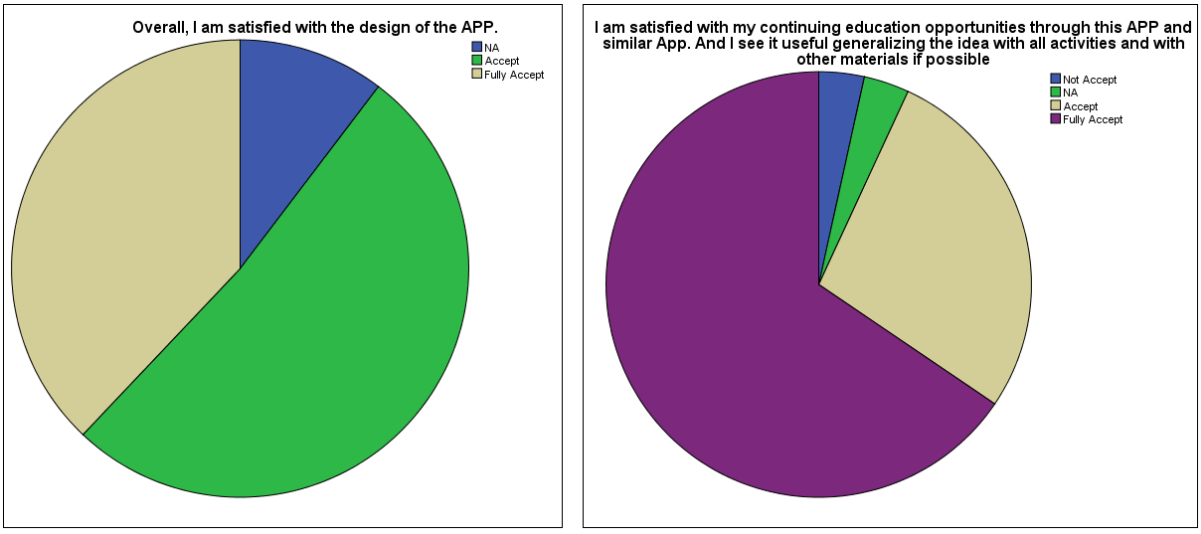

Figure 2a: Students' attitudes mean toward the null hypothesis

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```
T-TEST
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  /MISSING=ANALYSIS
  /VARIABLES=TH1Q6 TH2Q20
  /CRITERIA=CI(.95).
```

T-Test

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Overall, I am satisfied with the design of the APP.	29	4.28	.649	.121
I am satisfied with my continuing education opportunities through this APP and similar App. And I see it useful generalizing the idea with all activities and with other materials if possible	29	4.55	.736	.137

One-Sample Test

	Test Value = 2.6					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Overall, I am satisfied with the design of the APP.	13.906	28	.000	1.676	1.43	1.92
I am satisfied with my continuing education opportunities through this APP and similar App. And I see it useful generalizing the idea with all activities and with other materials if possible	14.278	28	.000	1.952	1.67	2.23

Figure 2b: t-test comparing to the mean values of the null hypothesis (M=2.6)

The outputs of the t-test, as shown in the figures, confirm rejecting the null hypothesis, where the zero was not located between the lower and upper values in the 95% confidence interval of the difference (Fig 2). Further, accepting the alternative hypothesis, where the zero lay in between the lower and upper values of the 95% confidence interval of the difference (Fig 3).

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```
T-TEST
  /TESTVAL=4.21
  /MISSING=ANALYSIS
  /VARIABLES=TH1Q6 TH2Q19
  /CRITERIA=CI(.95).
```

T-Test

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Overall, I am satisfied with the design of the APP.	29	4.28	.649	.121
The application helped me to obtain more knowledge and gain new skills	29	4.45	.686	.127

One-Sample Test

	Test Value = 4.21					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Overall, I am satisfied with the design of the APP.	.547	28	.589	.066	-.18	.31
The application helped me to obtain more knowledge and gain new skills	1.871	28	.072	.238	-.02	.50

Figure 3: t-test comparing to the mean of the alternative hypothesis (M=4.21)

RESULTS

As mentioned in Section 1 of the survey, the items from 1 to 6 are investigated to measure participants' acceptance of SOLA from the design point of view, ease of installation and use, as well as general satisfaction with the product from the same point of view. The survey elements have been sorted in such a data table by the means' values from the high rank to the low rank in the rank column, as shown in Fig 4.

The reliability of the section has been accepted (Cronbach's alpha = 0.602). Generally, most of the students used the SOLA proactively to well prepare for the objectives and skills of the next lesson while they were looking for understanding as the most important element needed to be

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available from the well-designed product, whose mean score was Rank 1 of the first section items.

Furthermore, the majority of students prefer the product to be simple to use and install, in addition to being easy to apply and track.

Q.NO.	Item	Mean	S.D.	Rank
1	The App is easy to install	4.66	0.484	5
2	The App is easy to use	4.69	0.471	6
3	The App is easy to follow	4.55	0.506	2
4	The App is easy to understand	4.55	0.632	2
5	The App is easy to apply	4.59	0.568	4
6	Overall, I am satisfied with the design of the APP	4.28	0.649	1

Figure 4: Students' attitudes toward the design and ease of use of the SOLA.

The purpose In Section 2 of the questionnaire, items (7–19) were investigated to measure participants' attitudes toward the point of view of the acquisition of the advantages and benefits of using the SOLA.

The survey items from seven to nineteen have been sorted in such a data table by the means' values from the high rank to the low rank in Rank-Column Table 1.

Table 1: *Students' attitudes toward the acquisition of the advantages and benefits of the using of the SOLA.*

Q.NO.	Item	Mean	S.D.	Rank
7	The App enables me to study at any place	4.41	0.733	5
8	The App enables me to study on any times	4.52	0.738	13
9	The App enables me to study even if there to Internet connectivity	4.34	0.897	3
10	The App encourages me to study more than before	4.28	0.922	1
11	The App encourages me to study independently	4.45	0.686	7

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12	The App encourages me to solve the required Activates independently without external help	4.48	0.634	9
13	The App encourages me to study at places that I wasn't able study at before	4.48	0.686	9
14	The App encourages me to study on times that I wasn't able to study on before	4.48	0.574	9
15	The additional local translations within the App encourage me to study on any times	4.31	0.660	2
16	The additional local translations within the App encourage me to study independently	4.48	0.574	9
17	The additional local translations within the App encourage me to study more than before	4.34	0.614	3
18	The additional local translations within the App encourage me to solve the required Activates independently without external help	4.41	0.628	5
19	The application helped me to obtain more knowledge and gain new skills	4.45	0.686	7

The reliability of the section has been accepted (Cronbach's alpha = 0.865). Generally, most of the students used the SOLA proactively to well prepare for the objectives and skills of the next lesson, and they showed their higher level of agreement with items 8 with mean scores and SDs of (M = 4.52, SD = 0.738). In the second order, items 12, 13, and 14 shared M = 4.48 and SD =0.634, 0.686, and 0.574, respectively. Their responses to these items revealed that SOLA helped them to study anywhere and anytime.

Furthermore, the students' ratings of statements 16 showed high levels of agreement with mean scores and SDs of (M = 4.48, SD = 0.574), which encourages them to solve the required activities independently without external help. Their responses to these items revealed that the use of SOLA and adding some additional local translations within the app helped and encouraged them to start studying independently, as Bağcı, & Pekşen (2018) stated in their paper.

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In Section 3, there was one item that aimed to uncover the participants' attitudes toward the learning continuance intention using SOLA and generalize the idea with all activities and with other materials such as English Language Learning and Math.

Table 2: Students' attitudes toward continuance intention using and generalizing SOLA.

Q.NO.	Item	Mean	S.D.
20	I am satisfied with my continuing education opportunities through this APP and similar App. And I see it useful generalizing the idea with all activities and with other materials if possible	4.55	0.736

The students' ratings of statements 20 showed a high level of agreement with mean scores and SDs of (M = 4.55, SD = 0.736), as shown in Table 2. This item revealed that the use of SOLA was useful, and they hope to get similar opportunities and continue using SOLA in the learning of the other activities of FPIT and generalizing with other programs' courses of the FPL.

The correlation measurements using Spearman's test correlation formula indicated that the good design of the apps encourages the students to study more than before and independently (r = 0.737 and r = 0.717). In addition, (r = 0.881), there is a strong direct correlation between studying independently and more than before, as shown in Fig 5a and Fig 5b.

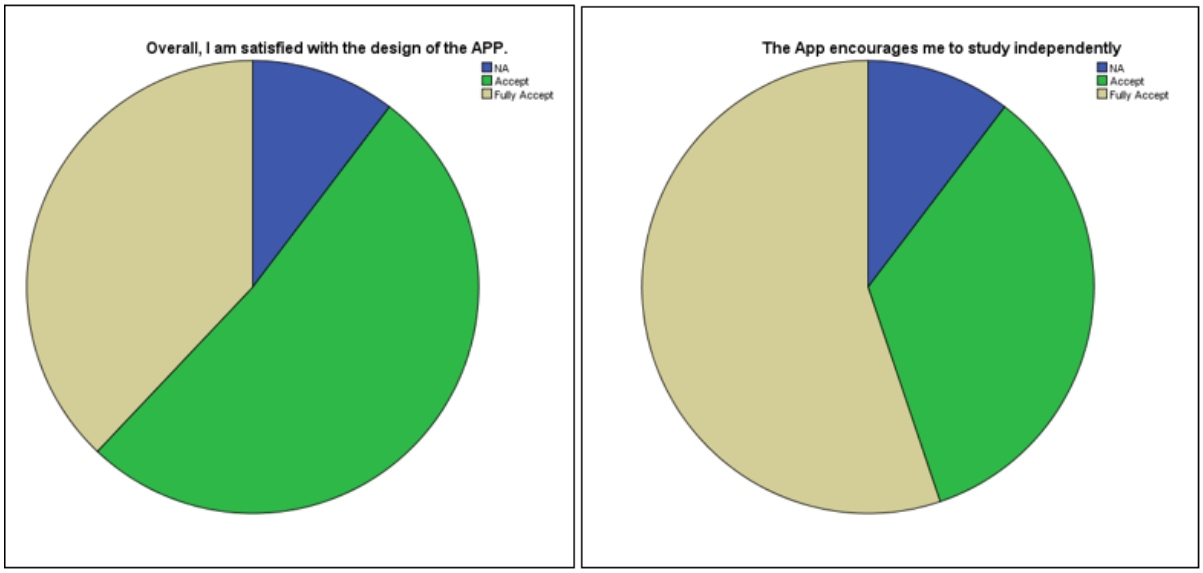

Figure 5a: Nonparametric Correlations between Design, studying independently and more

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Nonparametric Correlations

Correlations

			Overall, I am satisfied with the design of the APP.	The App encourages me to study more than before	The App encourages me to study independently
Spearman's rho	Overall, I am satisfied with the design of the APP.	Correlation Coefficient	1.000	.737**	.717**
		Sig. (2-tailed)	.	.000	.000
		N	29	29	29
	The App encourages me to study more than before	Correlation Coefficient	.737**	1.000	.881**
		Sig. (2-tailed)	.000	.	.000
		N	29	29	29
	The App encourages me to study independently	Correlation Coefficient	.717**	.881**	1.000
		Sig. (2-tailed)	.000	.000	.
		N	29	29	29

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

Figure 5b: Nonparametric Correlations between Design, studying independently and more

Also encouraging the students to study independently helped them to study more than before. This enable them obtaining more knowledge and gaining new skills where the Spearman's correlation coefficients are (r=0.684) and (r=0.712) respectively as in Fig 6a and Fig 6b.

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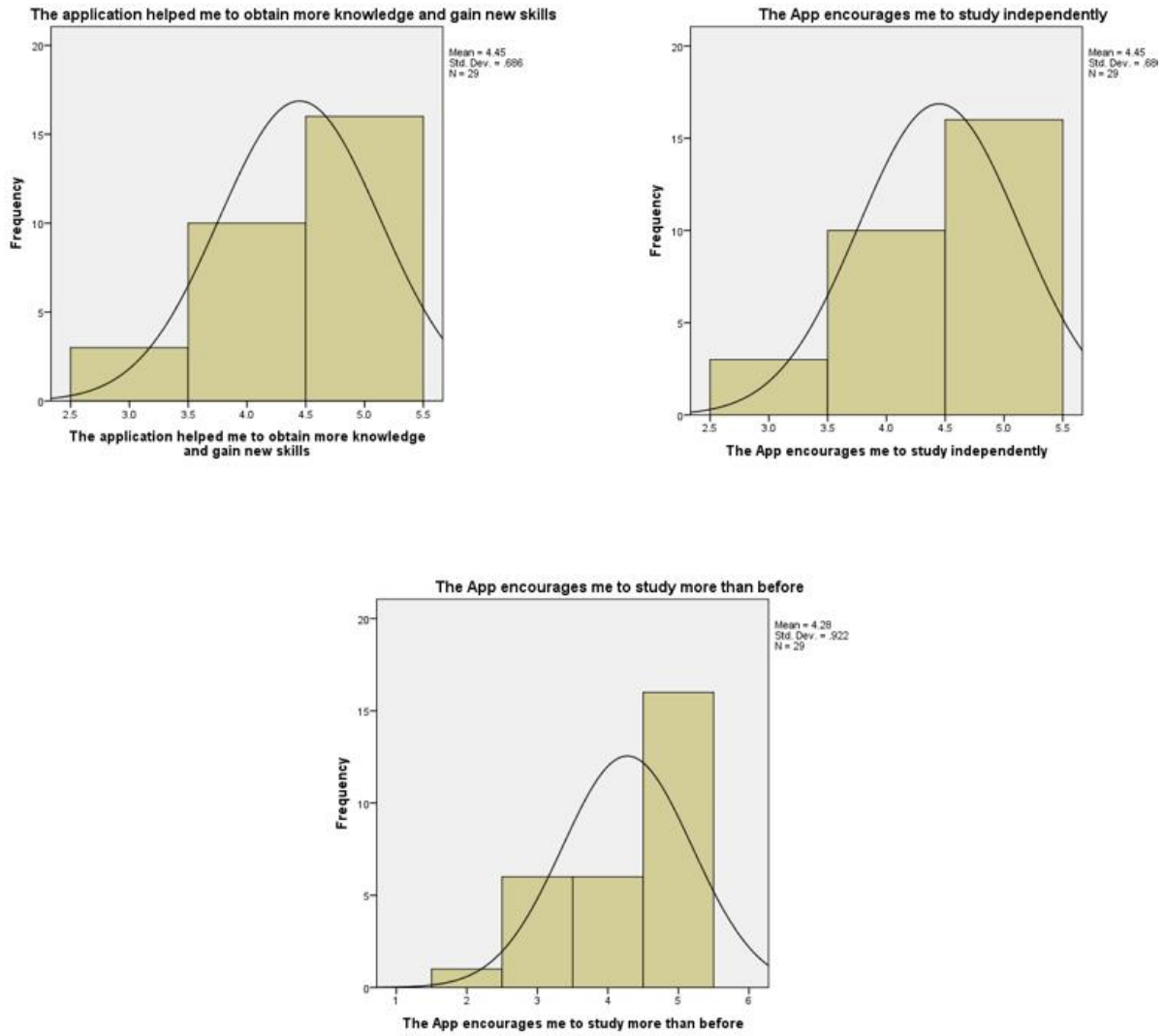

Figure 6a: Students' attitudes toward gaining knowledge and skills, studying independently and more.

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Nonparametric Correlations

Correlations

			The application helped me to obtain more knowledge and gain new skills	The App encourages me to study independently	The App encourages me to study more than before
Spearman's rho	The application helped me to obtain more knowledge and gain new skills	Correlation Coefficient	1.000	.684**	.712**
		Sig. (2-tailed)	.	.000	.000
		N	29	29	29
	The App encourages me to study independently	Correlation Coefficient	.684**	1.000	.881**
		Sig. (2-tailed)	.000	.	.000
		N	29	29	29
	The App encourages me to study more than before	Correlation Coefficient	.712**	.881**	1.000
		Sig. (2-tailed)	.000	.000	.
		N	29	29	29

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

Figure 6b: Nonparametric Correlations between gaining knowledge and skills, studying independently and more

Furthermore, obtaining more knowledge and gaining new skills is a strongly direct correlation to satisfaction with continuing education opportunities through this APP and similar App. And even generalizing the idea with all activities and with other materials if possible where the Spearman's correlation coefficients (r=0.842) as in Fig 7a and Fig 7b.

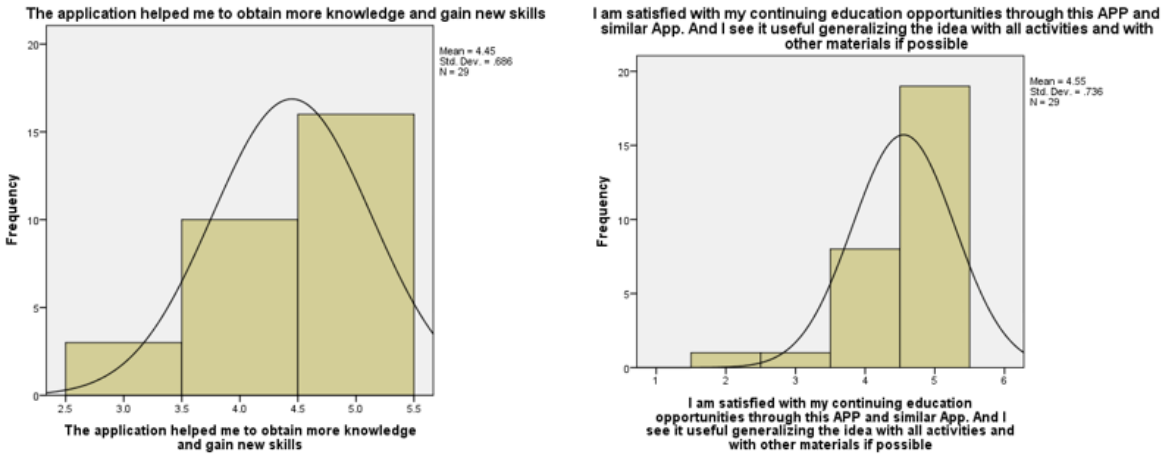

Figure7a: Students' attitudes toward gaining knowledge and skills, and generalizing SOLA

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Nonparametric Correlations

Correlations

			The application helped me to obtain more knowledge and gain new skills	I am satisfied with my continuing education opportunities through this APP and similar App. And I see it useful generalizing the idea with all activities and with other materials if possible
Spearman's rho	The application helped me to obtain more knowledge and gain new skills	Correlation Coefficient	1.000	.842**
		Sig. (2-tailed)	.	.000
		N	29	29
	I am satisfied with my continuing education opportunities through this APP and similar App. And I see it useful generalizing the idea with all activities and with other materials if possible	Correlation Coefficient	.842**	1.000
		Sig. (2-tailed)	.000	.
		N	29	29

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

Figure 7b: Nonparametric Correlations between gaining knowledge and skills, and generalizing SOLA

DISCUSSION

Current research investigates FPL students' use of SOLA and examines the main question: the students' attitudes toward SOLA. In general, the students' responses showed that they used SOLA proactively and offered efficacious attitudes toward utilizing SOLA to better understand and learn the objectives, items, and skills of the next lesson.

In view of adopting the technology acceptance model, it could derive the participants' "attitudes from their beliefs about ease", utility, endorsement, and satisfaction (Granié & Marangunié, 2019). The participants assessed their satisfaction with the design and use of SOLA very highly among all the included statements. They also replied that SOLA encourages students to study anywhere and at any time, as Alexander et al. (2019) stated, and encourages them to study

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independently. Further, they stated that SOLA helped them understand the main objectives of the next lesson and foster their skills through practice with it. According to the TAM model, the adoption of the technology by the users comes from their perceptions and the ease of use, in addition to its benefits. Then, the users' utilization of a particular technology supports or contradicts their perceptions and provides them with real-life experiences that enable the students to determine if they should continue to employ that technology.

The responses of the case study revealed that the students have used the SOLA at various levels of intentions that might have influenced their assessment. The results showed that the participants utilized the SOLA almost all to understand the main objectives and the skills practiced in the next lesson. That had been clarified during rating the highly mean values of the sentences of understanding and studying.

Moreover, the responses pointed out the relationship between using the SOLA and adding local translations of some terminologies and definitions included in the next lesson. In addition, how far it encouraged them to start studying independently and helped them to understand the objectives and practice the skills.

The students' responses also showed that the SOLA not only helped them to gain more knowledge and practice new skills even before the next lesson started, but also encouraged them to state that they see the usefulness of generalizing the idea with all other lessons, activities, and even the other courses' materials if possible.

The null hypothesis of this study assumes that using the SOLA has no impact on enhancing the educational process. Nevertheless, in the data analysis section and through applying one sample t-test for and focusing on the statements of items (19 and 20), the results show that there are statistical differences where the sig. = 0.000 is < 0.05 with the average of the null hypothesis (where M = 2.6). So it would be refused and accepted as an alternative hypothesis, and it could be said that SOLA has a positive impact on enhancing the educational process.

The results of the study point out that HEI students learn better when they utilize mobile apps proactively and along with conventional classroom learning. As previously noted, the students received higher marks in the questions related to the SOLA's applied objectives and skills in their post-quizzes. Thus, the proactive use of mobile apps in the HEIs shows that it has contributed to enhancing learning outcomes.

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CONCLUSION

The research paper examined the attitudes and purposes of HEIs students toward proactively utilizing SOLA apps for the Foundation Program. The paper can be a beneficial trend for HEIs that target embracing this new type of light smartphone apps into their educational structures, as well as for organizations seeking to promote such types of apps to match the demand of HEI students. Furthermore, practitioners and researchers can employ this research paper as a reference in case they want to examine the subject more closely with other foundation program curricula, such as math and English.

SOLA's proactive utilization appears to be underexplored. Thus, further examination into this study area is of magnificent significance, as the study on using smartphones in education still has an extended path ahead, and modern findings and insights will provide the pathway with more thoughts into the matter.

As the proactive use of mobile apps has significantly enhanced the learning outcomes of the HEIs students, it can be concluded that proactively using mobile apps helped the HEIs students obtain more knowledge and gain new skills, and it is useful to generalize the idea with all activities and with other materials if possible.

Recommendations and Future Research

In order to benefit from the findings of this study, it would be useful to conduct workshops for lecturers and instructors on how to use the MIT platform and similar platforms to create SOLA applications. Also, creating and preparing some light templates for various lectures and lessons will become an aid for lecturers and teachers.

It will be useful for the next study's subject to examine the attitudes of instructors and lecturers towards embracing this idea with the new type of smartphone apps that characterized ease of creation and usability, as well as dealing with visual programming platforms such as MIT. And how much they are interested in developing this type of light mobile app to serve the educational process.

Furthermore, practitioners and researchers can employ this research as a reference source in case they go for more examinations of the subject with the other foundation programs curricula, such as math and English.

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This study is the first of its type, discovering the practical experience of academics and students using the light SOLA mobile apps for teaching and learning. Therefore, the data from this study could inform academics and researchers to better support students with a new kind of light SOLA mobile app and use it within other curricula in the academic context.

The proactive utilization of SOLA seems to remain underexplored. Thus, further examination into this study area is of magnificent significance, as the study on using smartphones in education still has an extended path ahead, and modern findings and insights will provide the pathway with more thoughts into the matter.

Further research papers might investigate, including Artificial Intelligence (AI) with mobile apps and specifically with SOLA, how to significantly enhance the learning outcomes of HEI students.

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