LeG for Enhancing Student Communication and Learning Experience

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Abstract — **This paper presents an experimental mobile app called Learning eGroup (LeG) for enhancing student communication and learning experience. In particular, it facilitates the formation of mobile learning groups, enhancing student/teacher interaction and sharing open educational resources (OERs). A basic chatbot function is also provided. The LeG app has been tested by students and student survey results are presented in the paper, providing insights into the development of mobile learning groups.**

Keywords — Mobile Learning, OERs, E-learning

I. Introduction

With the popularity of mobile phones or smartphones, they are well suited for supporting student learning, particularly to facilitate efficient communication and interaction. For example, WhatsApp can be used to support group discussion and sharing learning materials, according to the study in [1]. [2] and [3] also reveal that WhatsApp can enhance student-teacher, as well as student-student, communication and interaction, enhancing their connections (i.e., bringing them closer). In addition, it can also enhance student learning interest, providing a positive effect on student learning. Furthermore, WhatsApp or instant communication tools in general can be used for teaching specific subjects as well, such as design-based and math subjects in [4] and [5], respectively. Due to the COVID-19 pandemic in recent years, WhatsApp has widely been used to enhance communication with students and maintain their learning interest.

From a wider perspective, mobile phones can be used to support mobile learning in general, allowing students to learn anywhere, and anytime [6]. In particular, there are now various open educational resources (OERs) (e.g., videos and websites) available to facilitate mobile learning [7][8]. In this paper, we consider a broader definition of OERs, covering Internet learning resources in general (e.g., YouTube videos). It has been shown by previous studies that YouTube videos can greatly facilitate student learning [9]. For instance, as shown by the study in [9], 98.6% of students thought that YouTube videos could help them better understand the lectures. Moreover, YouTube videos can enhance student engagement [10]. For more advanced uses, special tools can be used to generate notes and quizzes from YouTube videos dynamically, fostering interaction with students [11].

The development of Artificial Intelligence (AI) can further enhance mobile learning. In particular, there has been considerable interest in the use of AI for developing chatbots for teaching/learning purposes [12][13][14][15]. For example, with intensive training, a chatbot can be trained as a virtual teaching assistant to answer basic student questions, leaving more complex questions to be answered by teachers and teaching assistants. Furthermore, chatbots can also be used to train teaching assistants.

Inspired by the above related work, the aim of this project is to develop a LeG app with the following objectives:

- To form mobile learning groups for students to enhance communication, interaction and learning experience

- To cultivate peer learning and a collaborative student learning culture

- To complement various teaching/learning scenarios, such as outside classroom learning/interaction.

- To foster the use of OERs to enhance student learning

In summary, to better support mobile learning, the LeG app seeks to integrate instant communication with OERs and basic chatbot functions. The remaining sections of this paper are outlined as follows. Section II gives an overview of the LeG app. Section III discusses the evaluation results. Section IV gives a conclusion and addresses future work.

II. Overview of LeG App

In this section, we first give an overview of the mobile app based on the previous work in [16]. This paper is an extension of the previous work, particularly with supplementary student survey results. In general, the app is designed based on the 5I elements (see [16] for details): Inception, Interest, Instruction, Information and Inspiration. The aim is to cover the major learning phases, complementing traditional teaching/learning. First, the inception element seeks to initiate the learning process (i.e., starting the learning engine). Second, the interest element stimulates student interest, for example, by providing some interesting videos. Third, the instruction element provides the guidance. Fourth, the information element provides information and OERs for learning. Last but not least, the inspiration element seeks to inspire students to learn more broadly and more deeply.
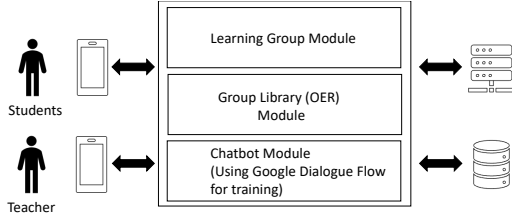
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Fig. 2. Basic system architecture

As discussed in [16], Fig. 2 shows the basic system architecture. In essence, students and teachers can access the system through the LeG mobile app. On the server side, there are three major system modules for creating learning groups, sharing OERs and interacting with a chatbot. A database is used to store the required data and to support administrative functions. The chatbot is supported based on Google Dialogflow.

The LeG mobile app provides the following main functions (see [16] for details):

- Learning groups – This is the major function. Basically, teachers or students can create learning groups similar to WhatsApp chat groups. They can chat with each other and share learning materials such as OERs. That means, it is specifically designed for learning purposes.

- Group library – For each learning group, there is a group library. Basically, OERs (e.g., YouTube videos) shared in a learning group can automatically be stored in the corresponding group library for ease of access. In other words, students do not need to go through the chat messages to find the OERs. They can easily find them in the group library.

- Chatbot – There is a chatbot function. Training can be conducted for subject-related materials. Students can communicate with the chatbot by typing "@bot" in a chat message. If a question cannot be answered by the chatbot, it will be forwarded to the teacher's message box, so the teacher can answer it through the chatbot.

- Other administrative functions – The LeG app also provides administrative functions. In particular, it can monitor the student usage rate, such as the number of messages sent and OERs posted.

III. EVALUATION

Students from three BSc/MSc subjects were invited to try the LeG app (i.e., during their study). A total of 35 students participated and completed an anonymous survey. Basically, they were asked to complete a web-based form and the form was set such that only one response from a valid email address could be accepted (i.e., to avoid any duplicated responses). The trial seeks to provide information for future development and studies.

For the evaluation, the following general questions were asked:

- Do you agree that you like the mobile app together with the learning methodology more than conventional teaching methods"?

- Do you agree that the mobile app, together with the learning methodology, helped you become a better learner?

In addition, students were asked to rate, on a 7-point scale (1: slightly enhanced – 7: highly enhanced), whether the LeG app could enhance their learning in the following ways (i.e., learning principles/catalysts inspired by [17][18][19][20]):

- Interest: Student learning can be enhanced if students are more interested in learning.
- Satisfaction: Students can learn more effectively with more satisfaction.
- Association: Student learning can be enhanced if there is a stronger association with the current knowledge.
- Challenge: Students can learn better if there is an appropriate challenge.
- Feedback: Students can learn more effectively if feedback and encouragement are given.
- Enjoyment: Students can learn better if they enjoy the learning process.
- Exercise: Student learning can be enhanced through exercises (i.e., solving problems).
- Involvement: If students are more involved, they can learn better.
- Relevancy: Students can learn better if they find that the learning materials are relevant to their learning needs.
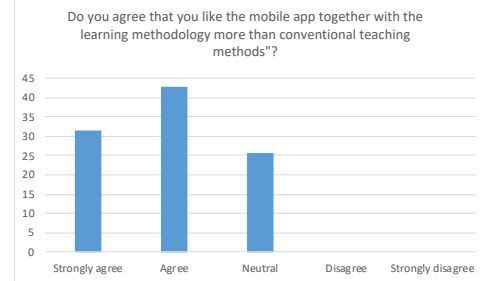

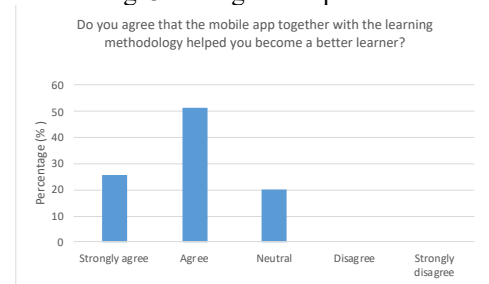Fig. 3: First general question

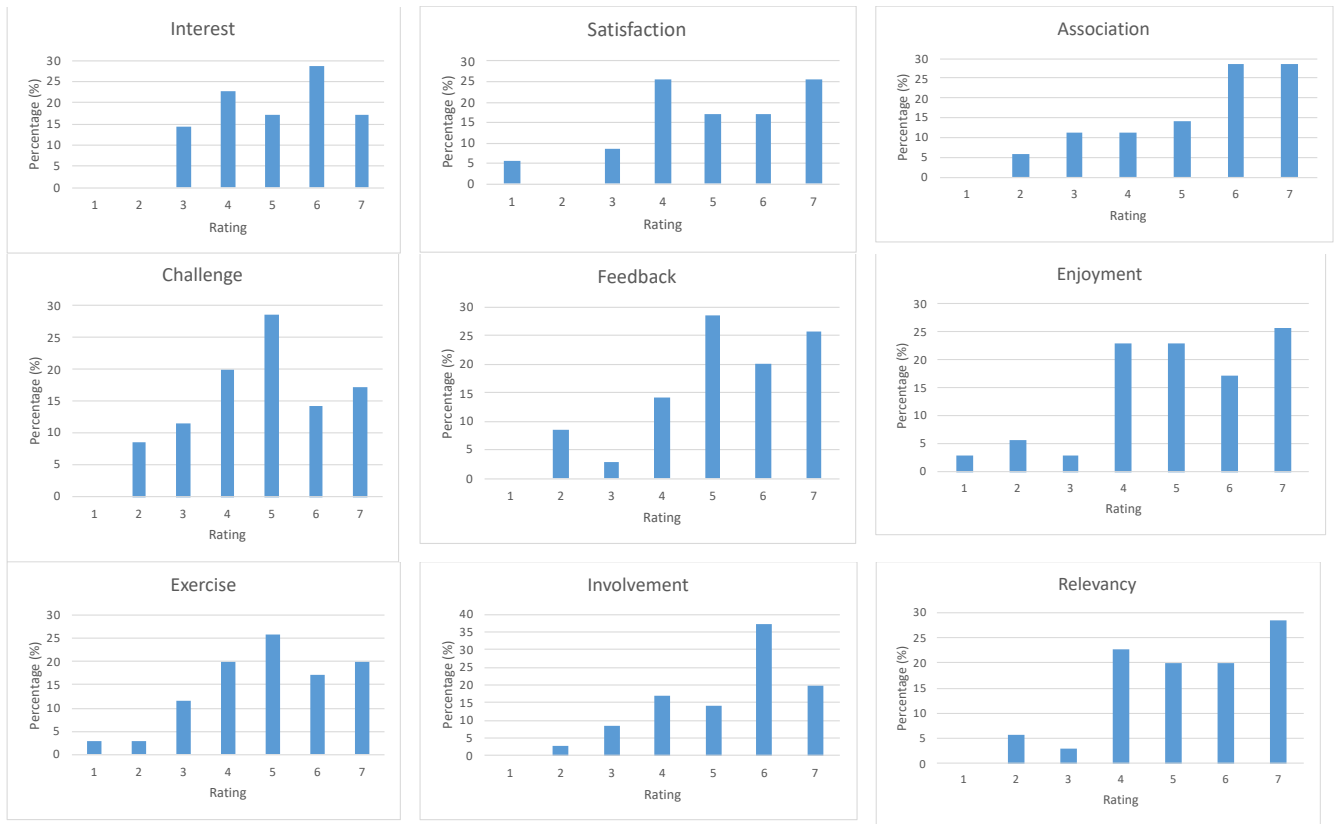Fig. 4: Second general question

Fig. 5: Evaluation of the nine learning principles/catalysts

Fig. 3 indicates that more than 73% of students strongly agreed or agreed that they liked the mobile app (together with the learning methodology) more than conventional teaching methods. In general, students welcome trying new methods that can complement traditional classroom-based teaching/learning. Fig. 4 indicates that more than 76% of students strongly agreed or agreed that the mobile app could help them become a better learner. Indeed, students can learn better through mobile learning and more effective interactions.

Fig. 5 shows the evaluation of the nine learning principles/catalysts providing further information on student learning enhancements. In general, the graphs show positive results on learning enhancement. In particular, we can evaluate the significance of learning enhancement based on the scores of 6 and 7. Using this criteria, "Association" and "Involvement" show more significant learning enhancement. "Relevancy", "Interest", "Feedback", "Satisfaction" and "Enjoyment" show a similar level of significant learning enhancement. "Challenge" and "Exercise" show a relatively low level of significant learning enhancement. They are areas for future improvement for the LeG app.

Fig. 6 shows the mean scores for learning enhancement. It can be seen that "Relevancy", "Involvement", "Association" and "Feedback" have the top four mean scores. Fig. 7 shows the standard deviation of the scores. In general, the results are consistent. However, "Satisfaction" and "Enjoyment" have slightly higher deviations. This indicates that some students were more satisfied and experienced more enjoyment than other students. This may also depend on student learning attitude or expectation, as it is an optional/additional learning activity.
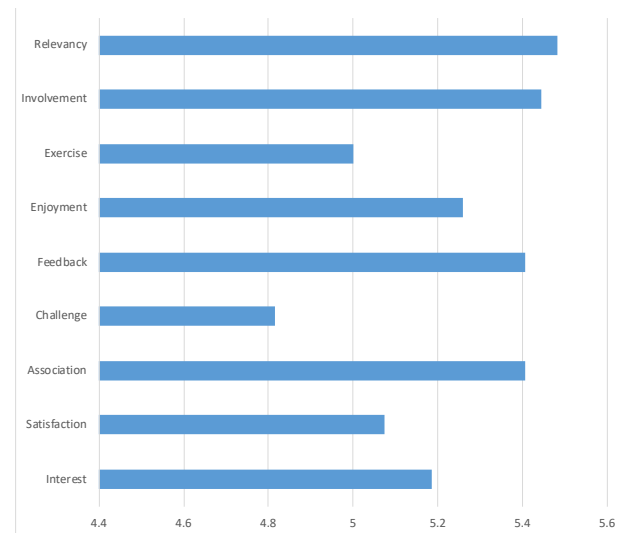

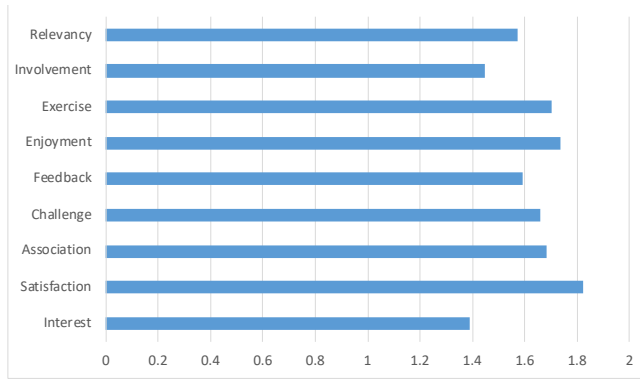Fig. 6: Mean scores for learning enhancement

Fig. 7: Standard deviation for the learning enhancement scores

Based on the observations and experience, there were also the following findings. First, the app can facilitate instant communication with students, fostering a better connection with students. Students can also ask questions more easily by attaching images or files. Second, the app can be used for more informal communication with students as well. For example, a teacher can communicate with students using another account to provide more informal communication (i.e., to complement formal communication). Third, for better effectiveness, teachers should take the lead to share OERs with students. Indeed, the mobile app can greatly facilitate the sharing of YouTube videos with students. Students can conveniently view the videos through their mobile phones. Fourth, for the chatbot function, it is difficult to cover many questions or to provide effective answers. In other words, comprehensive chatbot training is difficult. An alternative is to link to related websites through the chatbot based on student questions, so that students can be guided to explore further learning materials.

IV. CONCLUSION

In conclusion, this paper has presented a LeG app for enhancing student communication and learning experience. In particular, the app allows the formation of learning groups for chatting and sharing (e.g., OERs), provides a group library for each learning group to store and manage OERs, and offers basic chatbot functions. The app has been tried by students. The student survey results provide insights into the development of mobile learning groups in general and into enhancing the app in particular.

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