Chang, M. et al. (Eds.) (2019). Proceedings of the 27th International Conference on Computers in Education. Taiwan: Asia-Pacific Society for Computers in Education

Designing Pre-test Questions as Phone Notifications: Studying the Effects of a Mobile Learning Intervention.

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Abstract: Mobile devices are increasingly becoming more pervasive and emerging as part of our daily life, particularly with university students. From these devices developed in tandem with face-to-face class interaction it has opened new possibilities for ubiquitous learning. We present our work on designing a smart-phone Mobile Learning application that streamlines pre-test questions into a "set it then forget it" input system where students can answer quiz items as slide-down notifications within the day prior to a scheduled lecture. Teachers are afforded a web application to create pre-tests in advance and review class scores. The study was conducted to first-year Computer Science and Information Technology students of a university in the Philippines. Data collection techniques used in the study used experience questionnaires, usability tests, interviews, and tests of student learning outcomes. Usability testing showed consistent satisfactory scores across three iterations. Results from the Learning Experience questionnaire maps to the general answers from the focused group discussion presenting indicative of a positive learning experience. Evaluation of the pre and post test scores signified that using the mobile application can be an effective substitute to class administered tests.

Keywords: Mobile Learning, Android Notifications, Usability

1. Introduction

The act of teaching students requires several resources, such as manpower and especially time (Baker, Fabrega, Galindo, & Mishook, 2004). In our educational setting, extending class time is not a new idea. Governments spend millions of out-of-school programs such as tutorials, homework assistance and modifying class schedules such as block scheduling to expand learning opportunities for students (Saliva, 2007).

Institutions recognized that the learning environment extends beyond the classroom thus, an area of interest is finding varieties of technological support options that would allow students to engage with learning outside class hours (Vogel, Kennedy, Kuan, Kwok, & Lai, 2007).

As in every traditional classroom setting, pre-tests are common to schools and universities as it allows teachers to preview of what the students know and where to focus next. Given their prior knowledge with test scores, teachers are afforded to make changes to accommodate weak and strong points. Although one limiting point of classroom-based pre-tests is that pre-tests are not time sensitive which take time away from class instruction (Kelly, 2019).

We turn to Mobile Learning or m-learning as a pedagogy that addresses the need for giving more time for classroom instruction. Mobile Learning is learning made flexible with the use of mobile devices to access educational resources and can be shared with others, both inside and outside classrooms (Squire & Dikkers, 2012).

To make efficient use of the limited time available to learn in a classroom-based setting, we describe our work in attempts to redesign the process of conducting class administered pre-tests into utilizing android notifications to deliver pre-test questions day before the actual class lecture while looking into its impacts on the student learning experience.

1.1 Research Questions

This study is aimed to perform qualitative and quantitative approach on designing and developing a mobile learning pre-test tool which answers the following research questions.

- Is using Android notifications as a pre-test tool, usable in conducting pre-test quizzes?
- How will sending Android quiz notifications impact the student learning experience in the context of class-administered pre-tests?

2. Related Work

Current research approaches have adopted to use mobile phones as part of the new learning tools in the curricula. According to Duggan (2015) it was reported that among smartphone users in ages 18 to 29 years old used messaging apps in their daily lives as with the increased use of mobile devices this generation preferred collaborating and gaming than doing serious tasks and enjoyed the "customized, collaborative and interactive learning". Common systems made using m-learning are implementations of an SMS quiz-based systems where students are sent quiz questions within a given time period (Vogel et al., 2007). This type of systems explored the usability and acceptance of the system outside university grounds and overcome the challenges of a classroom-based setting. Results of the study showed that it is possible to extend learning opportunities even outside the classroom. Empirically, results from these studies suggests that students are more confident and enthusiastic to use mobile applications to study and review for their classes combined with face-to-face traditional learning methods (Mehrotra, Pejovic, Vermeulen, Hendley, & Musolesi, 2016). Although these mobile applications may have some downsides in terms of user experience such as small screen size, problems with navigation, size of messages and speed of processing and connectivity limiting the user's full engagement with the use of mobile applications (Kumar & Vasimalairaja, 2019).

In this work, we are to set-up a similar environment of mobile learning where students answer pre-test questions directly using a slide-down notification feature that allows less throughput and decrease interaction time as to reduce distractions by opening unnecessary applications thus an increase of engagement. We hypothesize that this simpler interaction would elicit sustained engagement among students. In the next subsections, we will discuss each feature on by one.

2.1 How do users engage with notifications?

Mobile notifications are extremely beneficial to the users, however, at the same time, they are a cause of potential disruptions, since it often requires users' attention at inopportune moments (Mehrotra et al., 2016). Thus, there are several ways a user can engage with a notification. In this section we discuss on how we can understand the use of notifications for designing a better and effective notification feature in our mobile learning application.

There are five ways a user may interaction with notifications (Pradhan, Qiu, Parate, & Kim, 2017). First is read, this is when the user spends time reading the notification but does not take any action. Second, it can be sometimes be partnered with Read and Dismiss where the user spends some time reading the notification the but does not take an action. Third is Take action, is it another interaction wherein notifications provide users with embedded set of buttons to take quick actions. Fourth is Launch an app, as in this form is the highest level of engagement where a user launches the app corresponding to the notification and lastly, Ignore or dismiss is when the user may ignore the notification.

In summary, although there are numerous ways of how a user may interact with a notification, we take into consideration into using the five types of engagement in creating our application.

2.2 Mobile Learning Applications with Time Adaptability

Mobile learning systems that adapt to the learners learning time schedule is one of the many ways that a learning application can retain the user's motivation to learn and use the application. A study that

implemented an SMS quiz system feature that sends quiz items for the user to answer. Initial test results showed that learners tend to lose interaction and feel burdened with too much information when learning systems spam quiz items by sending multiple SMS messages at random hours of the day (Li et al., 2010). Improvements had been made to adapt to the students learning schedules resulting to an increase of motivation and participation by synchronizing the users time schedule using time adaptation that studies habitual interaction between user and application (Li et al., 2010).

In our study we see this as one important aspect in our application to adapt and synchronize the sending of quiz items and made our own adaptation algorithm discussed in section 3.2.

3. Methodology

3.1 Scope and limitations

We implemented our system in a university where 18 students are taking up an Introductory Programming Course aging from 18 to 20 years old owning Android phones and run operating systems 6.0 Marshmallow and above as the custom notification features cannot be catered to lower Android operating systems.

3.2 Time Adaptation Algorithm

The application implements a time adaptation algorithm that computes a simple frequency check every time the students answers an item on a specific time of the day. For every user, an array of Preferred Time (PT) is assigned to record and receive quiz notifications. Each PT corresponds to the item during the day. Quiz items are arbitrarily appointed each time. However, an item might not be answered within the PT. In this note, we developed range periods.

Range periods are a set of interval block which varies per preferred time. The idea is to adapt to the student's habitual time to answer quizzes. As aforementioned, range periods vary in relation to PT and the Quiz deadline which is at midnight. These sets of time will also be a cue to notify or re-notify students about dismissed items.

3.3 Implementation of Web and Mobile Application

The quiz system is packaged into a downloadable mobile application and a web application deployed on the server. Test group A composed of 10 Computer Science Students, upon testing did not have the time adaptation algorithm and solely relied in the static preferred time stated in the demographic's questionnaire. Test group B of 8 Information Technology students had already been using the mobile application with the Time Adaptation Algorithm.

Test groups had been exposed to pen and paper and notification pre-tests. The intervention of the class instructor remained the same throughout the study as it can be seen in Figure 1.

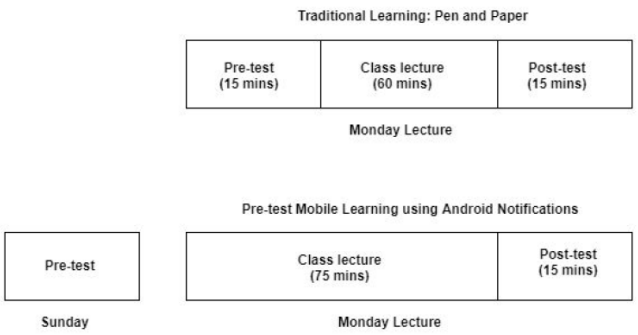

Figure 1. Classroom Design Set-up for Traditional and Mobile Learning.

We used the five concepts of a notification stated in the literature and tweaked the Ignore Notification feature into a Set Reminder when the user dismisses and ignores the quiz item. The Set Reminder feature is designed to remind the student of any unanswered items before the deadline. We opted to use these interactions to provide a byte size chunked of content as a notification for the user and set them to be personalized to their study habit with the Time Adaption Algorithm.

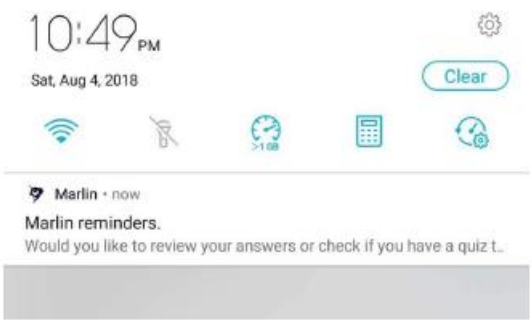

Figure 2. A set reminder notification for dismissed or missed quiz items.

Considering the design of the application, the main activities and functions for the application lets the users log in into the system, receive, and answer the quiz item or be dismissed through notifications and review the quiz result summary.

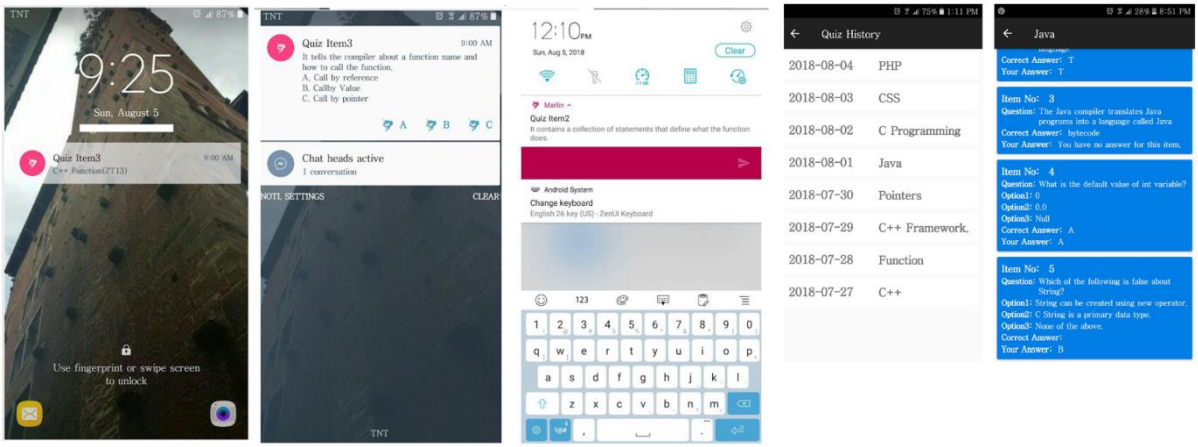

Figure 3. Pre-test items as Android Notifications (Left) and Quiz History Panel for reviewing pre-test items (Right).

4. Results and Discussion

4.1 System Usability Scale Results

To measure our mobile application systems usability, we used Brooke's (1986) System Usability Scale (SUS) as our evaluation matrix to measure usability.

4.1.1 Beta Testing

Preliminary testing revealed that the mobile application fell under the Acceptable-Good with a score of 73.85. Notable comments from the 13 testers were that the application lacked user feedback in terms of loading pages. Respondents were observed dragging down the screen multiple times to refresh pages. Thus, in the next iteration we implemented loading screens or splash screens to improve user experience.

4.1.2 Test Group A and B SUS Results

Results from the SUS questionnaire showed that the mobile application for both test groups fell under the Acceptable-Good category with the scores 71.75 for test group A and 77.18 for test group B. We note that during the implementation the Time Adaptation Algorithm was not yet implemented in test group A while test group B had their mobile learning application integrated with the Time Adaptation Algorithm.

4.2 Learning Experience Results

4.2.1 LEQ Results for Test Group A

For this group, majority or 80% of the participants strongly agreed that answering quizzes through the use of mobile notifications helped in their study habits by reminding them to review via Set Reminder Notification. Although they have been exposed to pen and paper pre-tests, 60% agreed that taking pre-tests on the same day has the same effect in their learning experience as taking quizzes with the mobile application.

4.2.2 LEQ Results for Test Group B

For test group B, 87.5% agreed that they were able to learn more by accessing and revisiting their answered quizzes through the application. The group in general made use of the app as a preparation for their next lecture while the other 12% said that mobile application made no difference in influencing their study routine. Mixed reactions from the group were observed when asked for the difference both methods to their learning routines as it shows that the majority answered Strongly Disagree/Disagree and Neither.

4.3 Focused Group Discussion

In general, both groups commented that they like how mobile pre-tests were sent to them in intervals because they felt that they were not bombarded with too much information at once. Groups A and B felt that they were more confident and prepared during class discussions because they have a sense of the lecture with the learning content sent to them is short and bite-sized content in comparison to condensed learning concepts delivered to them in a traditional classroom setting. However, improvements on the Time Adaption Algorithm can be improved. Most of the interviewees from test group B strongly agreed that delivery of quiz items as slide-down notifications is "… just enough for me to not be overwhelmed of what to study", and "I like how I don't feel stressed with learning all things at once" Both groups generally preferred the dismissal feature because it made them feel in control with the pace they want to learn. A particular instance was told by groups A and B that they formed peer groups during the study. High achieving members group A expressed enjoyment in competing along with the members as to who gets the most answers correct while Group B formed groups to tutor each other after receiving and answering items.

Overall the participants from both test groups strongly agreed that learning through the notification feature is one good way for them to learn as they were more confident for lectures having received their pre-test day before actual class lectures as their mobile phones were easily accessible to them than their laptops.

4.4 Test validation

At this point of the study, our main goal was to test the effectivity of taking pre-tests day ahead of the lecture using android notifications by comparing it to class-administered pre-test. In this evaluation the elements that were not as controlled as we should have wanted were block sections, difference in teaching methods, and topics per lecture session this is because of the lack of teacher distribution between classes and the availability of mobile devices used.

In order to determine if the two differ significantly for written and mobile learning pre-test in both test groups, we computed using paired t-tests. There was a significant difference in the scores for class administered test (M=2.11, SD=1.81) and mobile learning (M=3.33, SD=1.1882) conditions; t(17): -2.61, p = 0.02. These results show that the use of the mobile learning application is an effective tool for administering pre-tests.

5. Conclusion and Future work

Our work primarily focused on designing and testing a mobile application wherein Android Notifications were utilized to streamline pre-test items and blast them to student's mobile devices before an actual class lecture. Evaluations across three iterations show that using notifications as pre-tests can be applicable and that the inclusion of the Time Adaptation Algorithm increased the SUS score. However, it is not conclusive but only indicative of its effects. Based on the interviews and experience questionnaire, overall students report that they were more confident and prepared during class lectures as they like to take learning at their own pace delivered in bite-sized content. While this study was not explicitly designed to be a collaborative learning tool, reports from the FGD affirms that the application can be an effective collaborative pre-test tool. We can infer that the mobile learning application does indeed enforce a positive learning experience.

For future work, we suggest confirming whether the pre-test questions in text-mode could be another cause of motivation as learners in the "App Generation" seem to prefer the use of video and games.

Acknowledgements

For their encouragement, support, and guidance we would like to thank our mentors, Ms. Michelle Santos, Mr. Glenn Fabia, Mr. Rey Herman Vidallo, Ms. Jenilyn Agapito, and Mr. Frederick Olaño. To the Ateneo Innovations Center and Ateneo Laboratory for the Learning Sciences especially to Dr. Ma. Mercedes T. Rodrigo, Jaclyn Ocumpaugh, and Dr. Joseph Beck for their feedback.

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MOOD: A Mobile Phone-enabled Educational Data Collection Platform

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Abstract: Formative evaluation is an indispensable way to evaluate students and teachers. However, it is difficult to collect classroom behaviors of students and teachers. To deal with this issue, this paper focuses on the design of the mobile teaching platform integrating into the WeChat. We develop the MOOD, a mobile phone-enabled educational data collection APP. MOOD mainly includes digital check-in, homework assignments, online testing, topic discussion, shared library, classroom performance and other modules, so it can collect data and calculate the daily scores of students automatically and scientifically, which enlarges its application area. It is not only beneficial to evaluate students and teachers formatively, but also provides a decision-making reference for the educational administrators.

Keywords: Formative evaluation, mobile teaching platform, crowd sensing

1. Introduction

Formative evaluation is a very important method in education and teaching (Bloom, 1971), which aims to improve the teaching and learning by providing teachers and learners with immediate and effective feedback (Dixson & Worrell, 2016). It is a developmental evaluation based on the continuous observation, recording and reflection of the whole learning process, which makes the students change from passive acceptance evaluation to the initiative participants of evaluation. Besides, formative evaluation helps students break the cognition that the score is the only criterion for learning. The final exam is no longer the only standard to evaluate students' achievement (Yao, 2015). This enables the teacher to understand the student's learning situation fully and discover the problems timely in the teaching process, so that the teacher can obtain continuous feedback in the teaching process (Curry, Mwavita, Holter, & Harris, 2016). Therefore, more and more people pay more attention to formative evaluation and actively carry out formative evaluation in practice.

One key issue in formative evaluation is how to collect the educational data especially the behavioral data of students and teachers. A general way is the questionnaire. However, it is high cost and low efficiency. Moreover, it is difficult to collect procedural data. Crowd sensing or mobile sensing

(Ma, H., Zhao, D., & Yuan, P., 2014) is a new paradigm in pervasive computing, where the owner of a portable device (such as a mobile phone) can be regarded as a sensing source. Mobile teaching platform integrating crowd sensing is an effective tool to implement formative evaluation in colleges. It fits well with the school-running philosophy that everyone can learn anytime and anywhere, and it adapts to new changes of continuous innovation and reform in demand for education. For example, teachers can ask questions and students race to be the first to answer a question. After that, teachers mark stars for the student. In the above process, both teachers and students are viewed as sensors.

Although there are some mobile teaching platforms, it is not used in the campus widely. The existing mobile teaching platforms also have some limitations. Most of them focus on the pushing or sharing of teaching resources and fail to collect classroom behaviors of students and teachers. Therefore, it is difficult to acquire the learning situation of students accurately. Students' learning results cannot be feedback timely. Since process evaluation is an important part of education and teaching, it is necessary to study and design a mobile teaching platform, which not only facilitates the implementation of formative evaluation, but also provides decision-making reference for the educational administrators.

In this paper, we conduct learning and teaching management on the mobile teaching platform. The proposed platform is based on the mobile terminal and is generated by the WeChat public account. Different from traditional platforms, it can collect students' classroom behaviors for formative evaluation and accumulate the data generated in education and teaching to meet the various needs of learning and interaction by being integrated into WeChat. What's more, our proposed mobile teaching platform has been put into use, which makes the theory into practice.

2. Related Work

In 1994, researchers have studied mobile education, mainly in economically developed countries such as Europe and the United States (Churchill, D., & Churchill, N., 2008). Blackboard Mobile (Kinash, & Mathew, 2012) is a smart terminal-based mobile learning platform developed by Blackboard Company of the United States. Relying on the powerful features of Blackboard Learn, Blackboard Mobile can teach and learn anytime, anywhere, and supports smart terminals currently such as iOS, Android, webOS and other operating systems. Jorge Villalon designed a collaborative marking platform in (Villalon, 2019) to support summative and formative feedback in higher education, which includes modules for printing management, scanning support, on-screen-marking, markers training and peer reviews by students. The study of mobile learning in China began with a report by Dr. Desmond Keegan, a famous international distance educator, at the 40th anniversary of Shanghai TV University (Keegan, 2003). Subsequently, China has carried out a lot of research on mobile learning and its application. In 2013, MOOC entered China as a large-scale online platform. The diversification of curriculum resources and the autonomy of curriculum participation provided a good learning environment for students. The effective teaching evaluation cannot be done through MOOC platform, and the subjective content of students' emotions or thinking ability is difficult to reflect (Zhou, P., 2016). For example, in (Yu, J., 2018), the authors proposed a SPOC (Small Private Online Course) platform based on the MOOC concept. This platform can analyze the frequency and residence time of students' online learning, but cannot be applied to the teaching and management in the classroom, since the classroom behaviors of students and teachers cannot be collected. In (Li, J., & Qiu, H., 2016), the mobile teaching platform is designed based on the mobile phone APP. Compared with the mobile teaching platform integrated into WeChat, the cost is higher, students need to install the APP, it is not

conducive to mass promotion, and the platform cannot collect student learning behavior data, so it cannot conduct formative evaluation.

Through research and comparison, some main problems existing in the development of mobile learning platforms at home and abroad. For example, the interaction design is simple relatively, and it is difficult to meet the various needs of interaction for learners in the mobile learning process. It can't be combined the characteristics at the same time such as low-cost, ultra-lightweight, and formative evaluation. Therefore, we need further research on the mobile teaching platform to improve its management functions, especially in the collection of students' behaviors for formative evaluation.

3. System Design

3.1 Framework Design of Mobile Teaching Platform

MOOD is a mobile teaching software based on WeChat development, covering all three situations before, during and after the class. It adopts the micro service architecture design concept (Zheng, Z., Cheng, J., & Peng, J., 2015) to meet the functional requirements of the mobile teaching platform. The core idea of micro service architecture design is to disassemble complex application systems into specific services of multiple independent business units. Each service is implemented with the most suitable technology and runs independently, thus applications which are easy to expand and suitable for mobile terminals are generated. In addition, each service implements a complete application, which has an independent development, deployment and operation. These features assure a high scalability and low coupling. The architecture of the mobile teaching platform is shown in Figure 1. It consists the following layers.

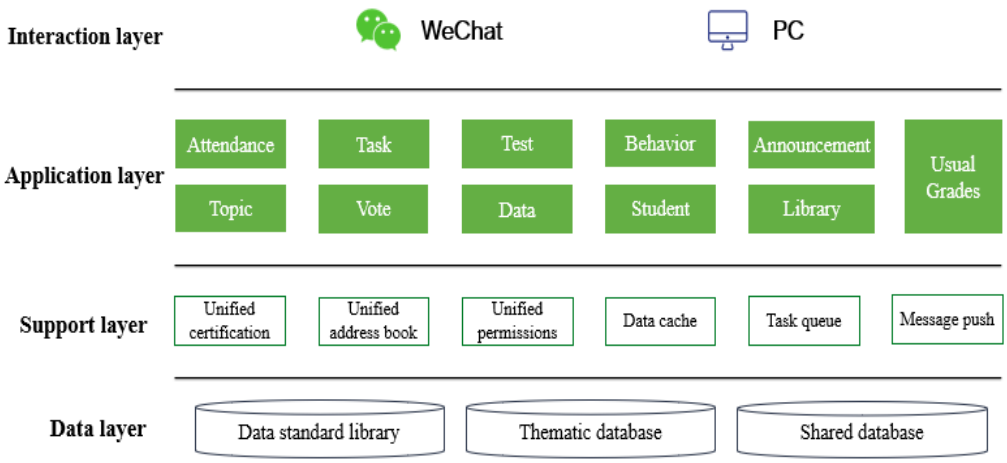

Figure 1. System Architecture

- Interaction layer: The mobile teaching platform supports the login by WeChat and PC, allowing students to use the mobile terminal to learn anytime and anywhere.
- Application layer: It consists of multiple independent services, and has multiple function modules such as check-in, operation, test, performance, etc.

- Support layer: As an integrated environment for information, it can aggregate distributed applications and information resources. It also realizes seamless access and integration of various application systems. In addition, it provides an integrated environment that supports access, delivery, and collaboration of information.
- Data layer: The data layer is divided into data standard library, special database and shared database. It not only has powerful test database resources, but also enables online testing at any time.

3.2 Function Design of Mobile Teaching Platform

The mobile teaching platform is divided into two parts: the student and the teacher. Students and teachers have the same functional modules such as check-in, homework, test, library, and grade. Through the student terminal, students can conduct related course learning, access to platform learning resources, sign on the platform, submit assignments and participate in topic discussions. Teachers use the platform to achieve course teaching, share learning materials, have an attendance checking and a classroom testing and arrange some assignments. The main interface of the mobile teaching platform is shown in Figure 2. The specific functions are as follows:

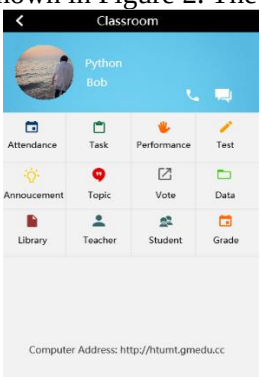

Figure 2. The Main Interface of the MOOD

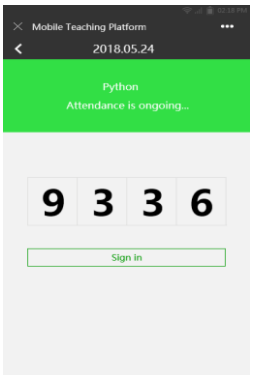

Figure 3. Digital Attendance

Figure 4. GPS Attendance

Figure 5. QR Code Attendance

3.3 Student Terminal

- Attendance: Students can sign on the platform according to the teacher's attendance method, after they log into the mobile teaching platform on the mobile phone. The attendance mode includes: (a) Traditional Attendance; (b) Digital Attendance as shown in Figure 3; (c) GPS Attendance as shown in Figure 4; (d) QR Code Attendance as shown in Figure 5.
- Job Submission: The mobile teaching platform supports students to submit pdf, word, excel, ppt and image format jobs. They can also update their assignments and resubmit them before the deadline. After the teacher corrects the assignment, the student can select the desired assignment to view.
- Classroom Performance: It is mainly a record of answering questions in the classroom. After the teacher releases the answer, the students enter the classroom and click on the performance to answer. The operation interface is shown in Figure 6.
- Participate in the Test: After the student enters the class list on the mobile phone, select the class, click the test, enter the test interface, select the test to be tested, or check the score after the test.
- Classroom Members: After the students enter the class, they can click on the teacher or classmate to view the member information in the class, as shown in Figure 7.
- Data: After the student enters the classroom on the mobile phone, click on the data to view the information published by the teacher in the classroom, as shown in Figure 8.

3.4 Teacher Terminal

- Class Attendance: After entering the class list, select the class, click attendance, enter the attendance interface, enter the attendance name, select the attendance mode, and then the teacher can check if the student is present. After the attendance is completed, the teacher can modify the attendance status manually, as shown in Figure 9. The same as student terminal, the class attendance mode includes: (a) Traditional Attendance; (b) Digital Attendance; (c) GPS Attendance as shown in Figure 10; (d) QR Code Attendance.

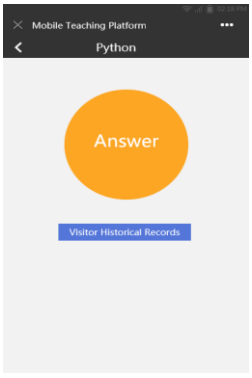

Figure 6. Classroom Performance

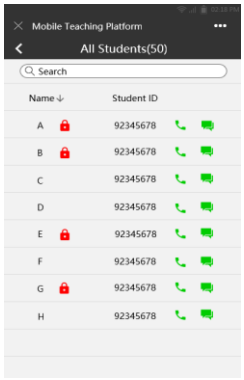

Figure 7. Classroom Members

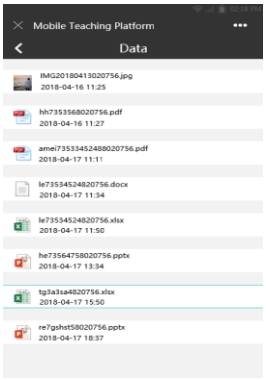

Figure 8. Data

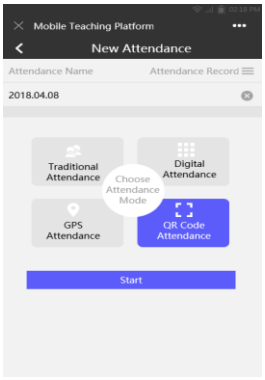

Figure 9. Class Attendance

- Classroom Work: the platform allows teachers to release tasks, which include: (a) Create A Job (b) Correcting Assignments (c) Job Settings: Select to hide or display grades for students; to remind students who have not submitted assignments, or to extend the deadline of assignments; teachers can click on the marker button to mark student assignments as needed; (d) Job Review: In the Job discussion interface, teachers and students can add comments to the assignment.
- Classroom Performance: After entering the class list, select the class, click on the performance to enter the performance interface, select the question mode to ask questions, and it divides into three questioning methods: random question, race to be the first to answer a question, and name-calling question, as shown in Figure 11. In the performance interface, the teacher can view previous questions and class summary. As shown in Figure 12, the performance interface also includes the interface of waiting for answer.
- Voting: At present, only the mobile phone supports the voting function. After the teacher enters the classroom, he/she chooses vote button. Click the plus sign on the upper right to add a vote, edit the voting content, and begin to vote after setting.

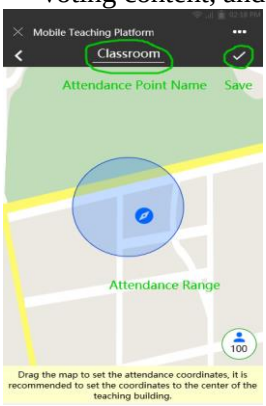

Figure 10. GPS Attendance

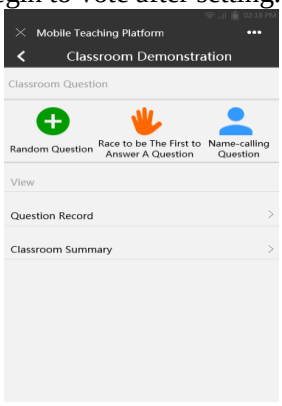

Figure 11. Three Methods

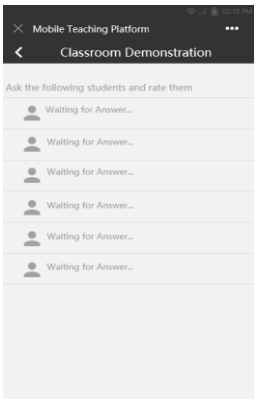

Figure 12. Answer

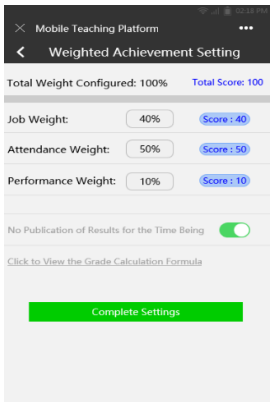

Figure 13. Grade Weighting

4. Implementation and Evaluation Results

We designed a mobile teaching platform software using the convenience of the WeChat public platform, which can collect data on students' daily grades. In this section, we show the relationship between the usual grades (daily performance) and the final exam grades, as well as the impact of the homework achievements, attendance results and classroom performances of the daily grades on the final exam grades. When calculating the usual grades, the teacher can click the score weighting setting on the total score interface to assign weights to each grade component, as shown in Figure 13. After the teacher performs the score weighting setting, click to get the latest data, and the system will calculate the usual score automatically.

In order to verify the positive impact of the usual grades on the final exam grades and the auxiliary role of the mobile teaching platform in student learning and teacher teaching, this paper uses

the mobile teaching platform to collect the students' usual learning data and final exam data. This data comes from 89 undergraduate students. We recorded a semester learning data for the PHP programming course through the mobile teaching platform, which made the learning evaluation method diversified, not only rely on the final exam scores. It can be seen from the change trend of the daily performance and the final exam grades, as shown in Figure 14. The daily grades have a certain influence on the final exam grades. Through analysis, 49 students in the final exam grades are above the median score. There are 54 students in the usual grades above the median score. It can be seen that the students with good daily grades have relatively good final exam grades. Through the analysis of Figure 15, it can be obtained that the homework grades are more correlated with the final exam scores. Among the homework results, 64 students are above the median scores. For the attendance, it is impossible to clearly see its impact on the final exam grades. This is mainly because most students have a higher attendance ratio. In addition, the classroom performances have not been analyzed because of the page limitation. In summary, paying attention to students' daily grades is very helpful for improving students' performance and teachers' guidance for students' learning, and the homework grades can better reflect students' learning.

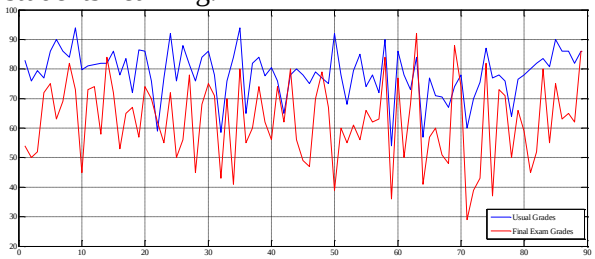

Figure 14. Daily Grades and Final Exam Grades

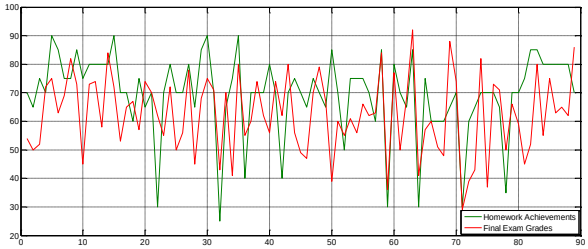

Figure 15. Homework Achievements and Final Exam Grades

5. The Conclusion

The mobile teaching system implemented in this paper is a third-party mobile learning platform based on the open interface function of Tencent WeChat public platform. The structure function is clear and the operation is simple. The system function includes various requirements of education and teaching. Teachers use this system for supplementary teaching, which is convenient and simple. Students only need to pay attention to the course WeChat public number loaded with this system, and they can use mobile intelligent terminal to study, discuss and evaluate.

The mobile teaching platform can monitor and record the student's learning progress and test situation, and provide a decision-making reference for the teacher when they monitor students' learning process. It is beneficial to evaluate students and teachers formatively. Due to the real-time interaction of the functions, it enhances students' ability to collaborate and explore when they discuss in a group and have a test in the class. And it improves students' initiative in learning while supervising students' classroom behavior. The model is not only low in development cost but also easy to implement, and it is ultra-lightweight and highly stable. And the mobile teaching platform has a good cross-platform nature. It can be used on both the WeChat and PC sides. Due to its technical simplicity and convenience, students are easy to use and it is conducive to mass promotion.

The mobile teaching model based on the WeChat public platform has practical application value. For related teachers, it is necessary to further develop the superiority of the WeChat public platform in the future work. We still have a long way to go especially in the use of mobile teaching platform to monitor student learning behavior. And we should find more new paths that will help to carry out mobile teaching. Finally, we can reach the goal of further improving the quality of teaching.

Acknowledgements

This work was supported in part by the National Natural Science Foundation of China under Grant U1804164 and U1404602 and Science and Technology Development Center of Ministry of Education under Grant 2018A03008, and in part by the Science and Technology Foundation of Henan Educational Committee under Grant 19A510015.

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