Ubiquitous learning model using interactive internet messenger group (IIMG) to improve engagement and behavior for smart campus

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\textbf{Abstract.} The recent popularity of internet messenger based smartphone technologies has motivated some university lecturers to use them for educational activities. These technologies have enormous potential to enhance the teaching and ubiquitous learning experience for smart campus development. However, the design ubiquitous learning model using interactive internet messenger group (IIMG) and empirical evidence that would favor a broad application of mobile and ubiquitous learning in smart campus settings to improve engagement and behavior is still limited. In addition, the expectation that mobile learning could improve engagement and behavior on smart campus cannot be confirmed because the majority of the reviewed studies followed instructions paradigms. This article aims to present ubiquitous learning model design and showing learners' experiences in improved engagement and behavior using IIMG for learner–learner and learner–lecturer interactions. The method applied in this paper includes design process and quantitative analysis techniques, with the purpose of identifying scenarios of ubiquitous learning and realize the impressions of learners and lecturers about engagement and behavior aspect, and its contribution to learning.

1. Introduction

The idea of a smart campus today is incredibly powerful. Smart campus has been widely accepted and used in strategy of education reformation in several countries in the world for improving the quality of the campus learning environment\cite{1}. With the adopted of technological development of smartphone technology, smarter campuses are built to benefit the lecturer and learner, manage the available resources and enhance user experience with proactive services anytime and anywhere \cite{2}.

Within the context of smart campus, technology of smartphone devices can be used to support teaching and learning in ubiquitous environment through Interactive internet messenger group (IIMG). Some examples of IIMG educational activities are content generating, interacting, collaborating and sharing \cite{3}\cite{4}. Content generating occurs when affective interaction and developing Question and Answer sessions. This application is designed to provide a platform for learners to share their knowledge, broadcast news, and asks for help \cite{3}\cite{5}\cite{6}. Member are able to share or publish their work and ideas by message for others to view and download. For example, multimedia and documents files can be shared with message\cite{3}\cite{7}. IIMG can be used by learners to collaboratively learn how to solve problems with members of a group, or to organize collaborative learning and study groups\cite{3}\cite{4}.
Many researchers have discussed and focused on the infrastructure required for constructing smart campuses and applications that related to learning at ubiquitous environment, in [8] have proposed a framework specification for u-learning in a smart campus model that integrates real world learning resources with a social network of campus. This model aims to embed of learners within a smart campus environment that provides context based personalized learning and interaction or feedback, in [5] has designed and implemented a prototype system based OnCampus scheme. The model developed in three functional modules, namely Group, Transaction, and Forum modules to provide services related to learning. The model OnCampus can significantly contribute in the following: through the creation of social environment based on interests mining, the equipping of educational guidance based on emotion analysis, as an information sharing platform, and by developing a secondary platform that aimed at the optimal allocation of campus resources, in [9] has proposed an adaptive contents delivery model for context aware ubiquitous learning according to three level service models, which create the adaptive contents for learners to get a all access in learning according to learners’ interest and contexts. The evaluation of a Ubiquitous learning system shows that the learners may not only study in media on mobile device at anytime and at any place and also get a better learning experience.

The majority of mobile and u-learning model studies showed positive effects. However, the design ubiquitous learning model using interactive internet messenger group (IIMG) and empirical proof that would favor a broad application of mobile technology devices and ubiquitous learning in smart campus settings to improve engagement and behavior is still limited. In addition, the expectation that mobile learning could improve engagement and behavior on smart campus cannot be confirmed because the majority of the reviewed of studies followed instructions paradigms.

This paper aims to design and implement and showing empirical evidence about Ubiquitous learning model using interactive internet messenger group (IIMG) to improve engagement and behavior for learner–learner and learner–lecturer interactions on smart campus. The method applied in this paper includes model design process and quantitative analysis techniques, with the purpose of identifying scenario of the ubiquitous learning model using IIMG and realize the impressions of learners and teachers about the engagement and behavioral aspects, and its contribution to learning.

2. Literature review

2.1. Ubiquitous Learning on Smart Campus

Education in a smart campus supported by mobile and smart technologies, making use of smart tools and mobile devices, can be considered smart education with ubiquitous environment. In this respect, we observe that novel technologies have been widely adopted in campus for provides connectivity between learners and their surrounding environments. For learners, learning goals is inherently identified to trigger didactic models which guide their instruction around real world data, based on unique learning contexts and delivered with the right information, at the right time, at the right place, at the right way, to the right person[10]. The learning process as ubiquitous learning doesn’t restrict to be in the classroom or formal learning environments. On the contrary, the learning involves situating learners in both the real and the virtual world to extend learners’ learning experiences[11]. Therefore, ubiquitous learning on smart campus must provide learners with opportunities to learn in their own environment, with another term, selecting and using the proper equipment for their work and with their living experiences, so that it can support an ongoing, contextualized and useful learning to the learner[12][13].

2.2. Use IIMG communication for ubiquitous learning

Internet Messenger (IM) can be used an alternative approach to smart campus based learning environment, IM has a series of attractive features, interaction in IM provides a mobile group communication service among members of the campus community, if a group member send a message to a group, the member sends the message to the IM server and then the server forwards it towards the each of a group members. This interaction makes the IM as an essential component of the learning process. In the u-learning environment, interaction among participants is a crucial concern to lecturer and learner[14]. As a complex and multifaceted component, interaction provides a diverse range of
functions in u-learning, and is vital for effectively improving learning[14]. Some researches indicated a positive effect of interaction on learners' academic achievement and performance as well as their satisfaction[15].

2.3. IIMG to improve engagement and behavior
Some literature used term of engagement to indicate readiness for devotes considerable energy to studying, desire and compulsion to actively participate in everyday campus activities involving things like attending to classes, participates actively in learner organizations, adherence to lecturer's directives in the class like submit a report of progress or assignment[16][17]. Learner engagement includes both the academic and non academic activities and when get more engaged in campus experience, it tends to generate high quality learning[18].

The rapid development of IM like whatsapp, Catfiz, facebook messenger has sparked the creative incorporation of media into current pedagogical application and processes, this technology are rapidly moving beyond their original purpose and significantly increased, even impact on learner’s collaboration and engagement[19], thus contributing to the improvement of learning efficiency and learner engagement when the specific instruction is aimed to encourage learner-centered activities[20].

3. Approach and methodology
In describing the methods used to conduct this research, the model design of u-learning using IIMG, participants, data collection and analysis will be discussed and follows the guidelines of quantitative research technique[21].

3.1. U-Learning model using IIMG
This modeling technique adopted to purpose development of scenarios and conceptual design of the u-learning environment as illustrated in fig. 1, the scenario shows that a learner can learn in the ubiquitous learning environment, Notifications and adaptive learning support messages are sent to learners by IM on the group, like illustrated in fig. 2. The learner can use the smartphone or mobile devices to perform learning tasks quickly. Moreover, the model of learning system can be recommended by lecturers to learner to consult on their learning problems by IM.

Figure 1. Scenario and conceptual design of the u-learning environment
Figure 2. U-learning model using IIMG
In this model we designed a four-mode interactive mechanism for the platform. The first mode is to change a class for certain subjects into groups, lecturer as admin can assemble, organize and coordinate those groups by themselves, and the learner can join to group after registration and approved by the lecturer. The second mode is the scenario to post and circulate information using this platform, for example: lecturer transmit and distribute information like curriculum, syllabus, college contract and learning material. During online course, the learner can control what is distributed by the lecturer, the discussion pace and posting and demonstrate their own understanding or the result of the test or homework via text or visual media. The third mode is to track and record. When interaction exists between lecturer and learner, The IM platform automatically recorded all of feedback on every work
from all learners and lecturer. The final mode is to conclude with brief remarks about the learners' knowledge acquirement and achievement via self-report based on the feedback.

3.2. Participant
In 2015/2016, participants in this study were two lecturers of UIN Walisongo Semarang and 147 learners (80 Male, 67 Female) from five classes, they were enrolled from dakwah and communication faculty.

3.3. Data collection and analysis
After the socialization of learning model for students in the mid lecture on December 2015, next, an initial questionnaire was given to the whole class of 147 learners before the start of the experiment to find out if they owned mobile devices and whatsapp. During the pilot program, daily activities of the group were facilitated by the lecturer that as a group administrator, moderator and driver to set the discussion or communication within the group, and researchers join in the group to monitor and determine the extent of use of the IIMG for engagement and collaboration between learner’s communities, learner and their lecturer. Just before the end of the semester, the evaluation questionnaire was used to collect data from the students to measure the impact of IIMG on their engagement and behavior. Each participant was provided a questionnaire consisting of 22 items was designed. The survey contained questions regarding learner self-perception of their engagement during IIMG use. The results of attitude survey were converted into a numeric system allowing calculation of mean scores for each question and for each learner.

Measurement of learner attitudes was obtained using an existing attitude survey modified by the researcher. There were a number of questionnaires about learner attitudes toward technology. There is the Computer Attitude Questionnaire (CAQ) a 65-item Likert-scale type instrument for measuring of learners' attitudes was chosen by the researcher. Same item for measuring the importance and enjoyment of computer use were modified into an attitude survey to measure learner perceptions of the impact of the instructional technology being investigated, that is IIMG, and their perceptions about their enjoyment and its importance in groups instruction. This is a free instrument available online at https://iittl.unt.edu/content/computer-attitude-questionnaire-caq developed by The Technology Applications Center for Educator Development. There are 7 subscales measuring various learner attitude components, but only part 1 was used and it was modified by changing the word "computer" to "u-learning model using IIMG.

This instrument has been tested and used extensively by researchers. The reliability and validity data of CAQ are provided as part of the survey packages conducted in 1995 by Knezek and Christensen with a population of five hundred eighty learner and eight seventh and eighth grades in Texas to determine stability of measurement for the instrument. This attitude survey was modified by the researcher for comparative analysis of actual actual learner behavior and their own perception of their attitudes towards the IIMG.

4. Result
This section presents the results obtained from the model defined and implemented in order to develop u-learning model and analyze its impact in real environment, the results of the research based on the data collected and presented. Results are analyzed and presented in various sections below;

- Do you have a smart phone?
  This question required for detection of participants to indicate if they had a cell phone and if so which type (for example, smart phone or normal phone). The result from this question, 100% of the participants had a mobile phone and 85% of those devices were smart phone with the capabilities of accessing the internet, sending instant or multimedia messages, and other applications.

- Do you have a whatsapp application?
  With our research, it was important to find out the average number of participants that had whatsapp applications on their mobile phone. The result from this question, the data show that 95% of the
participants who have a smartphone, they also have a whatsapp application and 5% did not have and did not use whatsapp for personal reasons.

- How often do you use your smart phone to chat with whatsapp application?

This question was directed at finding out how often students used their mobiles to access whatsapp for class-related matters like discussion with peer friends or consult with their lecturer before and after learning models included. It was important to find out the contribution of the learner while accessing whatsapp to ascertain the number of the learner who were active participation, or sometimes or those who were not participating at all. The results are presented in Table 3.

### Table 3. Chatting with peer learner or lecture

|               | Regularly | Sometimes | Never did |
|---------------|-----------|-----------|-----------|
| **Before**    |           |           |           |
| With lecturer | 5%        | 11%       | 84%       |
| With Peer learner | 66%   | 23%       | 11%       |
| **After**     |           |           |           |
| With lecturer | 71%       | 21%       | 8%        |
| With Peer learner | 76%   | 17%       | 7%        |

- Learns perceptions about benefit using whasapp

The learner was asked to specify their level of agreements or disagreements on a scale to measure of subject attitude. Learner self-perception of personal attitudes of u-learning model using IIMG was collected using the modified CAQ. The results are presented in Table 4.

On the information accessed on the whtasapp as shown in table 4. 74% either agreed or strongly agreed that they are enjoy classroom instruction in the u-learning model using IIMG, while 11% neutral and 15% either disagreed or strongly disagreed. Similarly, 79% of participants agreed or strongly agreed if u-learning model using IIMG can make concentrate better on the lesson and 67% agreed or strongly agreed if they are know how to interaction in IIMG they will be able to get a good job. It is inversely with they are who tired in the u-learning model using IIMG as shown in table 4, 14% either agreed or strongly agreed, while 8% neutral and 78% either disagreed or strongly disagreed.

On the issue of usefulness of u-learning model using IIMG for engagement (Table 4 Item 1, 3 to 11, 13 to 17, 19, 21 and 22) a large number of 78% of the participants believed that the u-learning model using IIMG helped them to engage and be informed about the module in and outside the classroom. 11% neutral position and 11% disagreed.

The results of this observation and investigation showed that u-learning model using IIMG use has a positive effect on the behavior of all learners, thus, on their engagement with the ubiquitous learning environment. Overall, learners were aware of the positive impact of u-learning model using IIMG use on their engagement in ubiquitous classroom instruction. They regard positively, and this was evidenced by their task behavioral improvement. The investigation data showed general improvement in student behavior which translates into improved student engagement.

### Table 4. U-learning model using IIMG Attitude Survey Results

| No | QUIZ                                                                 | SA | A     | N   | DA  | SDA |
|----|----------------------------------------------------------------------|----|-------|-----|-----|-----|
| 1  | I enjoy classroom instruction in the u-learning model using IIMG      | 32%| 42%   | 11% | 7%  | 8%  |
| 2  | I am tired in the u-learning model using IIMG                       | 7% | 7%    | 8%  | 46% | 32% |
| 3  | I will be able to get a good job if I know how to interaction in IIMG | 33%| 34%   | 21% | 9%  | 3%  |
| 4  | I can concentrate better on the lesson in u-learning model using IIMG| 38%| 41%   | 12% | 7%  | 2%  |
| 5  | I would work harder if in u-learning model using IIMG                | 25%| 49%   | 13% | 7%  | 6%  |
| 6  | I know that u-learning model using IIMG gives me more opportunities to learn new things | 42%| 37%   | 12% | 7%  | 2%  |
|   | Statement                                                                 | 36% | 39% | 12% | 9%  | 4%  |
|---|---------------------------------------------------------------------------|-----|-----|-----|-----|-----|
| 7 | I understand the lesson better when the u-learning model using IIMG is used |     |     |     |     |     |
| 8 | I believe that if more teachers used the u-learning model using IIMG, I would enjoy school more | 38% | 38% | 11% | 7%  | 6%  |
| 9 | I believe that it is important for me to be able to use technologies such as the u-learning model using IIMG | 47% | 35% | 9%  | 6%  | 3%  |
| 10| I can learn new things when the u-learning model using IIMG is used       | 41% | 36% | 9%  | 9%  | 5%  |
| 11| I feel comfortable in u-learning model using IIMG                         | 53% | 32% | 5%  | 8%  | 2%  |
| 12| I think lessons take longer in u-learning model using IIMG                | 3%  | 8%  | 3%  | 36% | 50% |
| 13| In u-learning model using IIMG does not scare me                         | 43% | 35% | 10% | 8%  | 4%  |
| 14| In u-learning model using IIMG does not make me nervous                  | 51% | 31% | 9%  | 6%  | 3%  |
| 15| In u-learning model using IIMG not difficult                             | 38% | 46% | 8%  | 5%  | 3%  |
| 16| In u-learning model using IIMG, I want to work and learn whenever I can  | 53% | 31% | 5%  | 8%  | 3%  |
| 17| I work very hard on my schoolwork                                        | 33% | 34% | 21% | 8%  | 4%  |
| 18| I do not try hard in school                                              | 5%  | 9%  | 14% | 46% | 26% |
| 19| I pay attention in class                                                 | 27% | 47% | 13% | 8%  | 5%  |
| 20| When I am in class, I just act as if I’m working                         | 4%  | 20% | 46% | 21% | 9%  |
| 21| It is important to do my best in campus                                  | 48% | 36% | 5%  | 8%  | 3%  |
| 22| I always try to complete my assignments                                  | 47% | 35% | 8%  | 7%  | 3%  |

*The scoring scale for questions 2, 12, 18, and 20 was reversed*

5. **Conclusion and Recommendations**

The result of this research shows that the u-learning model using IIMG emphatically positive and can improve significantly on learner's engagement and behavior. Our analysis indicates that learners and lecturer, highly engaged in the learning process in ways transcended traditional classroom activities. The experimental evidence shows that IIMG can be used as an educational tool for u-learning in smart campus to help learners to engage and collaborate. Therefore, we conclude that, u-learning model using IIMG could be effective for student to engage as well as succeed in their campus activities.

For future work, the opportunities exist for further studies in this area. Corporation between u-learning model with mobile learning or e-learning it is possible to be done to produce models more smart in order to create a smart campus dream, so the learning activities between students and professors increasingly interwoven dynamic and output is expected to have high competitiveness.

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