Analysis of infrastructure for integration of mobile learning and project based learning in technological and vocational education

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Abstract. The development of applications on smartphone devices might be potential to help in improving teaching and learning process. This research addresses IT-infrastructure and readiness in integration of mobile learning and project based learning (PjBL) for vocational education. The research data were collected by questionnaires from 100 students of the tenth grade of a computer and network engineering program of the vocational school. The results show that the IT-device owned by the school has been qualified for implementing mobile learning and project based learning (PjBL). The research also found that the students are ready to participate actively in learning process by using proposed model that will be carried out by online, so that teachers can implement learning scenarios by using the online system. The mobile application is accessed by using IT-devices such as smartphones, netbooks, personal computers through internet/intranet network media by data sources of various digital documents learning in documents files, pdfs, videos, presentations and images stored in the cloud suitable the syntax project based learning based on basic competencies.

1. Introduction
The activity of the number of technology users in communication has increased. E-learning approach in the utilization of information technology for the process of improving the quality of learning in human resource education and training [1]. Indonesia is the fourth largest smartphone user in the world after China, India and America [2]. The level of use of information technology dominates the mindset of the world’s population and influences education in schools. Modern information network technology enables a change in the philosophy of the educational process, creating a new educational culture [3]. Learning to use mobile technology devices is one of the needs in the education process to improve the learning process in schools. The focus of M-Learning is demonstrated by mobile learning that interacts with portable technology, learning that accommodates an increasingly mobile environment to meet community and school needs in education [4]. The role of the teacher must be able to assemble a wireless computing system that is comparable, similar to cable technology. M-learning is the next step after e-learning in subsequent educational technology [5]. M-learning supports adaptive, invasive, communicative, collaborative, and productive learning activities that can be used by teachers [6]. Moving learning involves the use of wireless-capable digital cellular devices in pedagogically designed learning environments [7]. Information technology devices can increase students’ interest and attention.
The implementation of mobile learning requires an implementation method that is relevant to Vocational education. The project based learning method is considered more relevant to be implemented in Vocational Schools, the PBL obtains knowledge and skills through planning and solving problems that may occur in real life work environments [9]. Mobile-android devices that display images, videos and animation, provide a complete understanding of concepts and meaningful representations of the results of intact science learning [10]. The success of learning to use a smartphone depends on the quality of good, inexpensive devices that can access the internet; good global network speed capacity; Learning content is available online [11]. Improving learning outcomes using the method of integration of mobile learning and Project based learning on computer assembly learning in Vocational High School education requires an analysis of the availability of infrastructure in the implementation of this model.

2. Method
The method used in this study is field studies to know mobile learning infrastructure requirements and the implementation of learning models in technology and vocational education. This analysis is divided into two part, first part is to determine the availability of technological infrastructure in the implementation of mobile learning, and the second part is to determine the urgency of implementing PjBL integration and mobile learning in vocational education. The field study was conducted through observation and distribution of questionnaires to 100 tenth grade students in computer and network engineering.

3. Design development model
The development of mobile learning and project based learning integration design in improving competency is based on the development of the needs of the learning process in the classroom or outside the classroom based on project based learning and mobile based learning by optimizing information technology resources that are currently developing. Development of mobile learning and project based learning integration design shown in figure 1.

![Figure 1. Mobile learning and PjBL integration design.](image)

Project based learning and mobile learning are integrated in an android based application that can be accessed by using smartphone, netbook, personal computer with various digital documents, such as Doc., Pdf, videos, presentations and images stored in cloud to be implemented based on the syntacs of the project based learning model.
4. Result
The feasibility study was carried out by field studies and general descriptions which include analysis of mobile learning infrastructure requirements and analysis of the integration of mobile learning and project based learning in vocational technology education. Need analysis of the integration of mobile learning and project based learning in personal computer assembly subjects in the 10th grade of computer and network engineering expertise programs in vocational schools.

4.1. Analysis of the availability of infrastructure requirements for information technology devices
The analysis of this need is as follows:

- Availability of information and communication technology (ICT) devices in the learning process in the Department of Computer and Network Engineering as the object of research at SMKN 1 Jamblang
- Know the ability of students to use mobile learning applications and browser applications.
- Knowing the level of usage habits of mobile application devices used by students.
- Knowing the availability of internet access for students in accessing the internet network either at home or in the school environment.

| Table 1. Availability of infrastructure for information technology devices. |
|---------------------------------------------------------------|
| **Indicator about ICT infrastructure to meet the learning needs of mobile learning** | **Presentase** |
| | Yes | No |
| Students have a smartphone | 98 | 2 |
| Smartphones that are often used in internet access | 99 | 1 |
| Students can use internet access | 100 | 0 |
| Internet usage is more than 1 hour | 77 | 23 |
| Android application used to access the internet | 72 | 28 |
| The most preferred android application for internet access | 67 | 33 |
| Internet network that is in the student's residence | 97 | 3 |
| Mobile internet network services that are often used by students to access the internet | 97 | 3 |

From the results of observations of students, 98% of students have information and communication technology devices (smartphones, laptops / personal computers). With a percentage of 99% students use smartphones and the rest are laptops. All students stated that they were able to use the internet. These findings indicate that devices to access information and communication technology services are available and adequate. Another finding, almost 80% of students use a smartphone device more than 1 hour a day to access various mobile internet applications. And more than 70% of students prefer the android application to access the internet. Through this approach, learners have a good provision in using browser applications to access the internet and mobile applications that are in the hands of students as a foundation for students’ ability to use the internet, and supported by learning simulation materials and digital communication as a basic reinforcement of the ability to use ICT in the learning process.

The level of habits of students in using mobile and browser applications based on the survey results of internet users in Indonesia by PUSKAKOM and APJII provides findings of internet users in Indonesia that have reached 88.1 Million lifts. Other findings presented in the survey results, it turns out 85% of the total internet users in Indonesia use mobile devices when surfing in cyberspace. The second most frequently used device is a laptop, followed by a PC / computer, and finally a tablet.

From these findings, the first ICT device is available, both students are able to use mobile applications to access the internet either at home or in the school environment through various ISPs.
The mobile learning application can be implemented in the learning process of vocational technology education.

4.2. Analysis of the urgency of implementing PjBL integration and mobile learning in learning in vocational education

This analysis aims to determine the extent of the readiness of students in the learning process using the integration of PPA and mobile learning in schools.

Table 2. Implementation of integration PjBL and Mobile Learning in vocational education.

| Indicator | How far is the readiness of students in the learning process by using integration Project-based learning and mobile learning | Percentage |
|-----------|-------------------------------------------------------------------------------------------------------------------|-------------|
|           | Always | Often | Sometimes | Never |
| Student participation in learning activities | 23 | 30 | 46 | 2 |
| Planning in learning activities | 8 | 20 | 62 | 10 |
| Evaluation and assessment of the learning process | 36 | 34 | 29 | 1 |
| Uncover conclusions in learning | 15 | 31 | 48 | 6 |
| The use of ICT as a means of learning resources | 9 | 39 | 48 | 4 |
| **Average** | 18 | 31 | 46 | 5 |

- Students have a tendency to want to actively participate in the learning process, but do not have the freedom to express opinions and express creative ideas. The response of students to be active in the learning process requires stimulation of learning models in the learning process towards students, the level of discipline of students in learning is quite high.
- Lack of collaborative planning aspects between teachers and students who are found, so students can have a sense of responsibility with the learning project implemented.
- The efforts of teachers to assess and measure the level of competency of students are almost fulfilled, but the level of monitoring in the mentor process and recording activities is still low.
- Disclosure of conclusions in the learning process is considered low, so that the role of the teacher is needed in designing the learning process that can be revealed both in the classroom or outside the classroom.
- The level of internet and ebook usage is still low, even though many learning resources from these facilities are found from various sources. The level of use of mobile applications by teachers is also still low, while the condition of students who are more comfortable using a mobile application is quite high.

Students need to implement the PjBL integration model and mobile learning in the learning process at school, because the level of student participation is low, planning activities between teachers and students are low, learning evaluation and the level of students’ ability to draw conclusions are still low and ICT optimization is also low.

5. Conclusion

The results of this paper indicate that the use of mobile devices increases student motivation. This means that there is a direct and significant relationship between the use of mobile devices and student motivation [12]. In general, the results of the current survey are consistent with the results of the research achieved. The role of mobile information technology devices as a learning tool is needed in current learning to improve student competence in the learning process. Mobile learning has provided the context of using information technology facilities, collaborative training and learning and providing quick feedback and easy learning evaluation [1]. The level of readiness of students in the learning
process using PjBL integration and mobile learning in schools is considered ready. Students do not always remember all the content they learned in class, but when it is presented in a way that is memorable and meaningful, they are more likely to remember the important points of the content. Using PjBL can help students build more meaning from content because it is not delivered traditionally [9]. The results of this analysis indicate the availability of ICT infrastructure and the readiness of teaching vocational technology in the implementation of the mobile learning and project based learning integration models in the learning process. And provide recommendations to be implemented in Vocational High School education.

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