Smart edu: smart city in a learning system to build collaborative knowledge on lectures deepening science material

R H Zulkarnaen*, W Setiawan, D Rusdiana and Muslim

1Science Education Program, Postgraduate, Universitas Pendidikan Indonesia, Jl. Dr. Setiabudi, Bandung, Indonesia
2Department of Computer Science Education, Universitas Pendidikan Indonesia, Jl. Dr. Setiabudi, Bandung, Indonesia
3Department of Physics Education, Universitas Pendidikan Indonesia, Jl. Dr. Setiabudi, Bandung, Indonesia

*corresponding author’s email: ridzkihadiwijaya@yahoo.com

Abstract. Technology is created to facilitate human performance. Technology develops every time so it becomes a major need in life. Industry era 4.0 is one example where the existence of technology is the main key in life. In this article we develop the use of technology in learning systems. The Smart Edu program was used as the main project in the development of this research. The research was conducted in lectures on the deepening of science materials with research and development (R & D) methods of the programs developed. The development of this program adapts the transparency of smart cities that can connect the existence of a factual environment into the lecture system. Students, lecturers and even teachers in the field can access this program with a predetermined portion. With the nature of Transparency, this program can build collaboration from these three things so that full learning can be created covering the theoretical and factual sources from the field.

1. Introduction
Technology is something that plays an important role in life. Technology is created to facilitate human work, with technology efficiency and effectiveness in a job can be achieved. Entering the industrial 4.0 era, technology is becoming a basic necessity in living life today. The role of the internet, virtual, augmented, cloud technology and others is characteristic in the current era of the industry era [1]. Technology penetrated into various aspects of life, as in the field of manufacturing as a pioneer in industry 4.0, the operation of using computing systems, the internet and network modes became one of the things that could be effective in relation to production [2]. Technology in the era of 4.0 was marked by the integration of automation technology with cyber technology, so that someone who is skilled in operating it [3] is needed.

Technology enters the life structure of society as well as in making systems that facilitate the coordination of the community. The government seeks to create an open situation by utilizing an internet-based information system through applications in social networks. Mobile is one of the tools to accommodate this. One of the application systems developed by the government is a smart city application [4]. This application provides information related to urban conditions, the community can...
easily access the program and they can use public services if they find something that is not good in the urban environment, such as damage to public facilities, the occurrence of something or the other [5].

The use of an open system allows every community member to access this program. The community can coordinate with the city government to form a good urban society [6]. They can openly provide input and advice to the government regarding the condition of the city. Thus the role of the community in the sustainability of urban conditions in this case can be well established. The existence of society and government can synergize well when the system is running well. The existence of this system makes transparency the existence of the city with the principle of openness. This existence is very good and benefits the progress of the city in a city government [7]. Transparency conditions like that are adapted in the lecture system. Smart edu is a formation of lecture system programs by adapting the concept of smart city [8]. Transparency in learning can be formed in this case. Smart city based learning is a learning concept that emphasizes the aspect of transparency. Collaboration of learners with the learning environment as support in learning can be established so as to provide complete learning.

Learning that occurs in the field generally does not involve the environment directly. The environment is only used as an infrastructure but does not have a significant impact on the sustainability of its environment. As in a lecture, the field is used as an object in a learning activity, so a case study is often carried out related to educational problems in the field. However, when the problem is raised and used as learning material to find alternative solutions, the solution does not reach the field. Solutions are used as a point in learning.

Data from the preliminary observations show that out of 100 students (from one of the private universities in Tasikmalaya, Indonesia) who take classes with a learning system that utilizes schools as learning objects, states; 88% of students think that visiting a school as a real condition in the field is very helpful in understanding the real condition and connecting it with the theory learned at school. 92% stated that through field lectures, data collection was used for lecture purposes without any good feedback for the school that was the place of observation. The data was strengthened by the results of interviews with 5 teachers in the field who stated that, students who came to observe the field generally only took data related to the needs of their lectures, however the study of problem solving results did not reach the field again.

The role of the environment and campus in lectures does not synergize well. There is one thing that benefits, but not for the other. In this case the researcher develops the lecture system by bridging environmental conditions with lectures directly through a system. The use of this system in glorification is like the use of smart cities. Transparency in lectures can be formed, such as transparency in smart cities. The environment can participate in this system directly. The environment in this case is the teacher in the field, and those in the campus system are lecturers and students.

Other analysis related to this, the facts in the field show that the use / consumption of technology is a major thing in life. They feel that dependence on technology is a matter of importance. The lecture system was developed with an analysis of needs in the field. Smartphone is one of the media used as the application of this system. Smartphone is something that has become a basic necessity. Someone feels lost if they forget the cellphone. From this it indicates that smartphone is a necessity that is very important for life. Based on this, the researchers developed their research in the form of applications in smartphones.

2. Methods
The research design used in this study is a type of research and development (R & D). This research is development research as a process used to develop and validate educational products. The steps of this process are usually referred to as the R & D cycle, which consists of studying the research findings related to the product to be developed, developing the product based on these findings, the field of testing in which it will be used eventually, and revising it to correct deficiencies found at the stage of submitting the test. In programs that are more stringent than R & D, this cycle is repeated until the test data fields show that the product meets defined behavioural goals. The steps in conducting this research include (a) research and information collecting; (b) planning; (c) develop preliminary form of product; (d)
preliminary field testing; (e) main product revision; (f) playing field testing; (g) operational product revision; (h) final product revision [10].

3. Result and Discussion

The University is an educational institution that is one of the centers of learning for students who continue to pursue higher education. The role of the university is far broader than the previous school, the development of research and community development is one of the distinguishing points of the previous school. Based on this, the role of the university does not only focus on learning for students, but more than that, universities must be responsive to renewal and have a good impact on the environment [9]. The research was conducted at one of the private universities in Tasikmalaya Indonesia, with research concentrating on elementary school teacher programs. This study aims at how to build collaborative systems in students with their learning environment.

The results of the study in the field showed that during the lectures and lecturers and students liked to coordinate well, but not with the teacher as a field that became the center of core activities. The lecturer directs students to look for problem data in the field, so students go directly to the field. The discussion was raised in learning so that it made one good solution, but the solution was the solution to the field not reaching the field in any way, so that the teacher could not be known in the field. From this, scientific development only occurs between lecturers and students in the class, but more than that there is no good impact on environment. As for the R&D steps developed in this study include:

3.1. research and information collecting

Program development is the main focus of this research. Observation related to field conditions is the first step in this research. This research was carried out limited in lectures on the deepening of natural science material in elementary school teacher education. Preliminary studies carried out in universities and schools with teachers as the object. The preliminary results concluded that the role of the university could not be felt directly in the field. In this case, innovation and learning activities developed at universities do not reach the school as a university (school) environment. This indicates that learning system collaboration has not yet occurred between universities and schools. The scope of this research development is limited to lectures on the study of natural science. Collaboration in learning that involves teachers from the university environment is one way to bridge the role of universities in schools. In addition to this, collaborative review is not limited to this, collaboration is adapted to lecture material as well so that in order to strengthen the data of research results, researchers also develop assessments and learning to enhance collaboration through the smart edu program developed. The instrument was developed in the form of a project, the project contained problem solving regarding science in the field proposed in this program by the teacher in the field. The project in the form of a short video contains a problem solving made by students as one of the evaluations submitted in lectures.

3.2. planning

Technological developments in this regard related to the evolution of smartphones are rapidly developing in all aspects, especially in the field of education [11]. The use of smartphones has great potential in educational innovation so as to enable learning that is not limited in space and time [12]. The use of technology, especially smartphones, is one of the hallmarks of 21st century learning, becoming a tool that can facilitate interaction between individuals so that by its existence it can foster collaboration in learning [13]. Smartphone is the focus of program development in this research. This research bridges the role of universities and schools through developing smartphone applications [8]. The design in this study is as follows:
Figure 1 shows a map of collaboration in learning that connects universities with schools.

3.3. develop preliminary form of product

Transparency in learning is one of the core in the development of research carried out, the system is built on the basis of smart city, where the environment can easily assess and provide contributions to the system. The results of observations in the field about the problems in the field can be assessed without the need to jump directly in the field. This system connects the university community consisting of lecturers and students as well as teachers as the environment of the university. They have a portion that matches the designation. Through this program the real conditions and development of knowledge are theoretically well bridged. Learning outcomes that are the solution to the problems observed in the field can be conveyed again and the documents are assessed by the teacher in the field through this system. As for the formation of the application that was developed as shown below.

Figure 2. Smart-edu application
Based on the image above, it shows a general description of the smart edu application, this application can be accessed on the page http://smartedu.bausir.net. This system is divided into several features, including the "chat" feature for interaction between the elements of this smart edu system. Next, feature "problem" which is related to the problems that occur in the field, and what the impact is. As well as the "News" feature related to the information submitted both related to the solution to the problem posed or the renewal of the development of knowledge. All of these can be accessed openly by each user, both students, teachers and lecturers. The teacher can submit problems in the field through the problem menu printed on the smart-edu system. The problems raised are problems related to education.

This program is a development of a program design that has been designed before. This is further research from the project program being undertaken. This program has only been completed in the manufacturing stage and has only been tested in a limited scale. Strengths related to collaboration in this program.

4. Conclusion

Smart edu is a lecture system development by adapting to the transparency of the smart city system. This application bridges the conditions of learning in a class with factual on the field so students, teachers and lecturers in the field can collaborate in this system to form a complete learning. Teachers can convey problems related to education that occur in the field, while students through lecturer guidance respond to these problems and solve them through the learning process carried out at the university. The solutions from the learning outcomes are then reported back in the smart edu system which later can be accessed openly by teachers in the field. With such a scheme, collaboration in learning can be formed.

5. References

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Acknowledgments
This research involves several parties, including researchers, students, research objects and participants who have contributed so that it can run well. Researchers sincerely thank all parties involved, especially from the Perjuangan University and LPDP who have supported and facilitated all research that has been done.