Factors Affecting the Integration of ICT in Education

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Abstract. This study aims to find the factors that influence the integration of ICT in learning by high school teachers throughout Makassar. This study is the result of preliminary research conducted on five schools as a sample. The method is surveyed. Sampling was conducted on 134 subject teachers. The results of this survey show several factors that influence, among others; factors of vision and personal perception, the competence of teachers, lack of time, lack of resources, and lack of electronic-based learning resources.

Keywords: ICT integration, ICT in education, teacher competencies

1. Introduction
In the last two decades, Information Communication Technology (ICT) has experienced very rapid development. Fundamentally, it has brought significant changes in the acceleration and innovation of educational implementation in various countries. There is even enormous ICT pressure on the education system globally because (a) developing technology provides enormous opportunities to develop education management and learning processes, (b) specific student learning outcomes can be identified by the use of ICT, and (c) ICT has enormous potential to transform all aspects of education and use it to achieve learning goals [1][2].

ICT in education is generally agreed as the best tool to describe information, to present information in new ways and to improve access to information. ICT is seen as a very suitable tool for distributing and accessing learning resources which in turn have great potential. ICT can be a catalyst by providing tools that are used by teaching staff to improve teaching and students by providing access to electronic media that make concepts more explicit and more accessible [2][3][4].

2. Literature Study
Some countries have integrated ICT in the planning and implementation of national education. Singapore, for example, has applied interactive information technology to school systems with a ratio of one computer to two students. The network system is built to connect education, the international world, the world of high-tech industry, and the world of work. In summary, several countries have changed the learning culture by integrating digital technology into learning and working activities in schools.

The cultural transition referred to above can only occur if the education community has a strong commitment to utilizing ICT. These community groups are practitioners of education both related to
management and teaching and learning processes at all levels and education units, which consist of teachers, lecturers, instructors, principals, supervisors, administrative staff, and officials within the education department. Equally important are educational subjects from all levels consisting of students/students. The same thing is revealed that the most fundamental in the implementation of the internet in schools is the motivation, readiness, and seriousness of institutions that are realized through a comprehensive policy, including the policy of changing teaching methods, policies on management and procedures, policies of accessing the internet and others. Because all of that is the primary key to successful internet utilization for learning in the school environment, ICT Jimoyiannis & Komis in Cartelli [1].

This commitment needs to be maintained to maintain the sustainability of the use of ICT in the world of education. Experts suggest that in the past programs to provide technology to schools most achieved little success over a long period and rarely showed progress. Laboratory requirements are a typical example. There are six main problems, namely: (a) budget for maintenance of initial facilities is not available, (b) training is usually too specific and not related to the needs in the field or changes in attitude, (c) the unavailability of employees for routine maintenance and development, or lack of attention to maintenance or maintenance of ICT facilities/equipment that the school has (energetic in building/hold but weak in maintenance/maintenance), (d) the unavailability of expert technicians or too expensive, (e) materials that are suitable for teaching are not available, and (f) weak working conditions of teachers in the field encourage that they cannot divide their time to develop creative teaching material. The above also identified that the teaching staff did not get an appreciation for the extra effort or work they had done in optimizing the utilization of ICT facilities/equipment available at the institution.

Figure 1 on the left side presents a measurement of investment that is interconnected. Each type of investment produces a specific output in the form of computer availability or internet access (for the case of ICT infrastructure), Digital Learning Resources (DLR) or the development of teaching staff competencies. The combination of some of these outputs will affect the actual use of DLR and ICT in general. However, several complex macro factors are also determinants of DLR/ICT investment [5]-[7].

![Figure 1. Investment measurement and output](image-url)
In addition to the three main variables above, some "environmental factors" also affect the use of DLR/ICT and thus should also be taken into account. These variables relate to the ICT environment as a whole in a community that can be a driving force or even become an obstacle to the use of ICT. These factors can be very different in scope, and the impact depends on each level. For example, the commitment of the teaching staff to use ICT in the classroom is a critical factor that directly affects end users (students) from DLR or ICT in the classroom. Besides that, its utilization can also be influenced by other factors such as efforts to promote ICT on campus, teaching staff behavior and policies/rules relating to the role of ICT in the teaching and learning process. Student expectations are another variable that significantly affects the use of DLR and ICT and this is far from the influence of public intervention. These factors are likened to "land" where the DLR ICT investment is likened to "seeds" which are the determinants in getting something "fruit" desired [1][8][9].

![Figure 2. Main variable affecting ICT integration](image)

However, in this study, all of the above factors are summarized into three main variables. These three variables are; institutional vision, culture/perceptions of instructors on the importance of ICT in education and the learning process. These three variables are believed to represent the entire data needed in this study. In the picture of the mindset below, the learning process is in the deepest circle along with the management function and administrative functions which are the consequent circle of the overall functioning of the supporting factors. However, in education, the learning process is the most expected impact of the use of ICT. The factor is illustrated in a chart (Figure 3).
3. Research Methods
The initial stage of the research was a series of research and development to get the final product in the form of Technical Support ICT competency standards for Senior High Schools. The preliminary study was carried out by conducting a literature review and field survey of the current state of school units relating to the use of ICT and the need for teaching staff for ICT technical personnel. Respondents of this study consisted of leaders, teaching staff and administrative staff at public secondary schools in Makassar City.

4. Results and Discussion
Some preliminary findings obtained from schools which was respondents from this study can be stated as follows. At the beginning of this questionnaire, it asks about the vision and perceptions of the teaching staff. In general, respondents believe that ICT was effective in presenting effective and efficient learning. They believe that ICT learning becomes interesting. When viewed from interest, almost all respondents (89%) said that they were interested in using ICT in their learning. The result indicates that they had a good vision and perception of the use of ICT in learning. In general, respondents had understood the functions of ICT as a tool in learning. Even so, there were still some respondents who had not been able to distinguish ICT as a learning and ICT tool as a separate subject. ICT Competency Teaching: Power competency and confidence were the main determinants of effective class use by students. It seemed that giving teachers the opportunity to acquire ICT skills was very important to strengthen their beliefs about the value of ICT in the teaching and learning process.

Research also shows that many teachers had a positive attitude towards technology, but they do not consider themselves qualified to integrate ICT into their instructions. There were still (around 27%) teachers who lack ICT literacy, for example, the essential ability to operate computers. However, this group was generally senior teachers with less than ten years remaining. On the other hand, the findings indicated that most teachers with ICT knowledge had a more positive attitude towards the potential of ICT in education. Lack of proper training and experience was considered one of the main reasons why
teachers had negative attitudes toward computers and not using technology in their teaching. Lack of resources: an insufficient number of computers and lack of appropriate software can seriously limit what the teacher can do in the classroom. The quality of the available hardware was also a problem for the teacher. Some respondents also stated that the resources available in their schools were, in most cases, underutilized. In some cases, poor organizing will also cause obstacles for teachers to be interested in using ICT in their teaching. Having a personal computer at home was not guarantee the willingness of teachers to use ICT in their teaching. This survey showed that only a small (11.1%) ICT was used routinely to support their conventional instructions, although about 60% of teachers report ownership of a personal computer at home.

Lack of software needed: In general, there was a lack of software, especially the right learning software in schools. Likewise with electronic-based learning materials, such as question banks or learning media. Another factor according to them was the current learning media, in general, there was not much help explaining the subject matter of learning. The drawback was that the media was not detailed in visualization and sometimes the material was not complete (only a small part). On the other hand, teachers need time and knowledge to evaluate software and learning activities that will be used, to prepare new ICT-based activities and worksheets for students and so on. Also, the available software was not accompanied by a guide and some examples that were appropriate for use in the classroom.

Lack of time: currently there were still many teachers who had problems utilizing ICTs for learning. The problem was because the teacher's workload was too much, so they do not have time to develop creative teaching materials. Also, teacher unpreparedness to integrate ICT in learning because of the lack of teacher competence in utilizing ICT. Whereas, teacher competence in using ICT greatly influenced the potential for implementing ICT in learning. Lack of time results in negative attitudes for teachers and did not help them to engage in ICT-based activities. Integrating ICT in the classroom requires more effort and time than just regular teaching. Teachers needed more time to plan to learn, to design ICT-based learning activities, to found information on the Internet, to prepared accurate materials. In general, they had little time left after school hours to experiment with technology, share experiences with peers, and attend training programs.

Lack of technical support: Preparing for efficient ICT-based learning required that teachers had a certain level of technical skills and knowledge. In most cases, technical problems can be time-consuming and had a direct impact on teacher confidence in using ICT in their instructions. Almost all respondents "agree" that technical support is needed in their school. This support they need especially when something is wrong during their lesson, or there is equipment that is damaged. Lack of ongoing technical support and fear of equipment damage discourages teaching staff from using ICT in teaching.

5. Conclusion
Integration of ICT in education still requires serious effort. Although the factors of vision and perception of the teaching staff are good, some essential and fundamental factors are still found in this survey, among others, competency factors of teaching staff, lack of time, lack of technical support and lack of effective learning software.

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