



Teachers' Perception in Integrating Information and Communication Technology for Effective Learning

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Abstract. Technology is a 21st-century human masterpiece that has fundamentally altered many facets of life, including education. ICT-based media must be used in order to make learning more efficient and enjoyable. 30 teachers were chosen at random to participate in this survey study. The results are: The quality of learning has successfully improved as a result of the use of information and communication technology in learning activities. Because technology has made it simpler for teachers to impart information and for students to receive it from their teachers, the use of ICT-based media in learning activities is particularly effective. The indicator is when students become more engaged and enjoyable in their engagement.

Keywords: ICT in education · integration of ICT · effective learning

1 Introduction

The increasing public demand for education and the advancement of Science and Technology (IPTEK), makes education no longer managed in a traditional way because it is not in accordance with the needs and demands of the community [1]. To meet these great expectations, appropriate efforts and strategies are needed, including the use of media that is in accordance with the times. One of the media that really needs to be considered is Information and Communication Technology-based media.

Information and communication technology is a human masterpiece to realize all the needs of society. Technology is a creative human product to facilitate and streamline activities. Many factors have contributed to the advancement of the world of education, including the effectiveness of learning. Optimizing the use of information and communication technology (ICT) in education and learning is one of the variables that affects the rate of development in the educational sector. According to [2], "Preservice instructors will help the educational system satisfy this goal by effectively engaging and teaching generation Z students. ICT resources must be a minimum need for school systems, and curricula must be developed to support a collaborative, learner-centered environment

that students can relate to and respond to [3]. The use of ICT in education is no longer considered an option, but has become an absolute necessity that must be owned and utilized by educational institutions to improve the quality of education service delivery. The application of technology in the world of education as a tool for delivering learning materials is a necessity in order to improve the quality of learning, so that the objectives of the learning process are achieved.

The development of computers, electronic communications, and other multimedia tools provided a wide range of sensory stimuli. Teachers need revolutionary efforts in learning, such as the use of elearning or a Learning Management System (LMS) to improve the quality and efficacy of the teaching and learning process in schools [2]. Because with the use of technology students can see, remember, do and understand. Animations, simulations, and software to teach a variety of subjects can create virtual reality and experiences for learners [4].

In keeping with the transition in learning patterns from traditional face-to-face education to open and mediated education, the impact of the application of information and communication technology in the field of education is becoming more and more apparent [5, 6]. [7, 8] Although the use of information technology does not always result in higher-quality learning [9], it has a significant impact on teachers' teaching methods and students' learning preferences. As part of their attempts to stay current, educational practitioners must act fast on this. Information and Communication Technology and other important educational components such as content and pedagogy are formed into a single unit in integrating ICT in learning so that the learning process and results are more [10].

In Indonesia, the growth of ICT has also changed the paradigm of the educational system in a number of ways, including (a) the transition from a teacher/lecturer/institution-centered system to one that is student/student/student oriented. (b) the expansion and rising acceptance of open/distance learning. (C) the breadth of available learning resources. In the context of global competition, (d) the demand for international quality standards, and (e) the growing demand for lifelong learning. A global learning environment that is connected to a network and places students in the middle of the learning process, surrounded by numerous learning resources and electronic learning services, has been created through the application of communication and information technology. Because of this, the traditional educational system need to be welcoming to newcomers [11].

Conventional learning approaches are thought to be less successful, according to Alhamuddin [12], and ideas of brainpower, intelligence, and creativity have expanded quickly alongside advancements in technology and communication. The inadequacies and weaknesses in the traditional educational system are strengthened as a result of these developments. The instructor plays a key part in the learning process in the conventional system since the transfer of knowledge is carried out using traditional and manual media, such as blackboards, drawings, books, and the like. Actually, successful learning happens when the teacher uses learning tools that are appropriate for the circumstances and the subject being studied [13].

According to Ruseffendi [14], traditional education typically focuses on teacher-centered instruction, memorization over comprehension, numeracy abilities over other skills, and results over process.. Meanwhile, Djamarah and Zain [15] argue that the

conventional learning model has advantages and disadvantages. The advantages of the conventional learning model are that it does not require a long time because it only explains the material and can be followed by many students so that the time required is more efficient than group learning, it is easy to prepare and implement it, and the teacher is easy to master the class. While the weaknesses of conventional learning models are that students become passive, learning is dominated by the teacher and does not receive much feedback or tends to be in the same direction, and students do not understand the material presented by the teacher.

Effectiveness in learning activities is largely determined by the teacher's approach in delivering teaching materials to students. According to Kyriacou [16] effective learning can be formulated as successful learning, as desired by the teacher. There are three main variables that are useful for making distinctions about effective learning, namely: (1) context variables, referring to all the characteristics of the context of learning activities, usually in the form of classroom-based learning, which may have a certain impact on the success of learning activities, (2) variables process, refers to what actually takes place in the classroom and discusses the perceptions, strategies, and behaviors of teachers and students, and the characteristics of the learning tasks and activities themselves, and how they interact with each other, (3) product variables, refers to on all the educational outcomes that teachers desire and on which they base their lesson planning from the criteria they use to assess effectiveness.

Utilizing media that meets students' learning needs is one attempt made to develop an effective learning process. Additionally, the media used must be up-to-date in order to create an effective learning experience. Utilizing information and communication technology to improve learning effectiveness is one of them. Technology is not just the application of knowledge, but also the improvement of processes and facilities that enable a generation to use the knowledge of previous generations as a basis for action. [15] ICT is frequently solely utilized in education, particularly in Indonesia, to support administrative tasks in schools, much to how typewriters have been replaced. In fact, many modern schools that have computer labs with a sufficient number of computers exclusively employ currently available ICT tools to teach their pupils information technology skills like internet training and office equipment, just like a computer course class generally. By incorporating them into the current curriculum, information and communication technology (ICT) tools should be used even more to enhance the quality of learning in the classroom [17].

2 Methodology

This study used a survey methodology. The purpose of the survey was to gather information about how teachers incorporate ICT into their lesson plans. Survey research is the process of gathering data from a sample of people by asking them questions. [18] The population of this research is the teachers who teach at several high schools at Sukabumi City. 30 teachers chose randomly/sampling. Each teacher was given a questionnaire in the form of a google form to facilitate data collection and analysis. This perception referred to in this study includes aspects of cognition that generate ideas, concepts and understanding of an object, aspects of affection related to emotional evaluation in the

form of feelings of pleasure or displeasure with an object and aspects of connotation in the form of a tendency to behave or act towards an object as learning outcomes with the use of communication and Information Technology. The purpose of this study was to determine the perception of integrating of Information and Communication Technology in learning activities.

2.1 Literature Review

1) *Concept of Teaching and Learning*

Learning is essentially a process of interaction with all situations that exist around individual students. Learning is also seen as all processes that lead to the achievement of goals and the process of doing through various experiences created by the teacher. According to [19], learning is a process of seeing, observing and understanding something [20]. Learning is interpreted as a process of changing behavior caused by experience. This is basically a very basic functional definition of learning in that learning is seen as a function that maps experience into behavior. Learning as an activity indicated by changes in behavior as a result of experience [21]. Learning is an instant change in the heart (soul) of a student based on the knowledge he already has towards new changes.

Learning comes from English, namely Instruction. Learning has two important elements, namely learning and teaching [22]. The two terms are fused into teaching and learning activities, hereinafter referred to as learning activities. Learning is a deliberate activity carried out by participants in order to change their abilities. By learning, children who were previously unable to do something, become able to do it [23].

Learning is frequently associated with teaching [5]. Article 20 of the National Education Standards (SNP) regarding "process standards" states that "Learning process planning includes syllabus and learning implementation plans (RPP), teaching materials, teaching methods, learning resources, and assessment of learning outcomes." This is evident in the Government Regulation of the Republic of Indonesia, number 19 of 2005 [6].

Learning is a process of interaction between students, educators, and learning resources in a learning environment, according to Law Number 20 of 2003 concerning National Education System Article 1 Paragraph 20. The teaching and learning process can involve five different kinds of interactions: 1) Interactions between teachers and students; 2) Interactions between classmates; 3) Interactions between students and resource people; 4) Interactions between students and purposefully created learning resources; and 5) Interactions between students and educators and the surrounding social and natural environment [24].

2) *Media in Learning Activities*

In learning activities, the role of the media is very important in an effort to improve the quality of learning [19]. According to Mujiono (1994) in the teaching and learning process there are 4 (four) important components that influence the success of student learning, namely teaching materials, learning atmosphere, media and learning resources, and educators as subject subjects. These components are very important in the learning process, so that the weakening of one or more components can hinder the achievement of

optimal learning goals [25]. Four roles of learning media, particularly visual media, were proposed by Levie & Lentz (1982) in Arsyad [26], namely: 1) Attention function; 2) Affective function; 3) Cognitive Function; and 4) Compensatory function. Learning aids can help educators/teachers to transmit knowledge in impressive ways, give diversity to classroom teaching and make learning more effective. Ahsan Akhtar Naz and Rafaqat Ali Akba concluded that media provides teachers with a powerful way to make their teaching effective to achieve specific classroom goals [27].

3) Information and Communication Technology as a Learning Aid

Technology has been applied in a variety of ways and for a variety of goals throughout the last ten years. The nature of how technology is utilized in the classroom has significantly changed as new technologies have developed and have frequently replaced or been used in conjunction with older technologies. It's crucial to remember that during this decade, not all computer use in classrooms was directed at teaching. Educators who envision a more student-centered curriculum and learning environment do attempt to use computers in different ways among subjects other than computer subjects.

[27] created a conceptual framework for how teachers use the internet and physical resources in their instruction. According to the research, teachers can utilize the internet by customizing it to fit their own teaching methods. The use of computers by teachers is divided into three main categories, [16] state the following: 1) for educational purposes (to disseminate information, offer diversity, and encourage teacher confidence); 2) administrative goals (to produce documents for the workplace and guarantee the secure preservation of data and student information); and 3) personal purposes (to make use of the teacher's free time). Meanwhile, Omur (2008) in Jyoti Bhalla (2013) conducted research in Turkey, which investigated the ways and frequency of using elementary school science teachers. The results show that increasing science teacher computer literacy appears to increase science teacher computer use and consequently increase the integration of computer applications as teaching tools. The Internet, email, and Compact Disc (CD) educational software are found to be frequently used in classrooms.

Information and communication technology (ICT) based on media can aid in improving schools because of its vast potential, which includes (1). Expanding learning options, boosting productivity, enhancing learning and teaching quality, facilitating skill development, promoting sustainable lifelong learning, improving policy planning and management, and addressing the digital divide.

4) The Importance of ICT in Learning

The employment of information and communication technology (ICT) in the teaching and learning process is not a viable option.; rather, it is a medium where different methods, approaches, and pedagogical philosophies can be appld. This claim demonstrates how the way and the reasons behind ICT integration and implementation affect its efficacy. ICT serves a variety of roles in the learning process, including those of a learning aid and an information source for enhancing learning procedures and results. Additionally, the instructional framework (the basis for learning) has altered. There will be a change in the way teachers offer lesson materials to pupils as a result of the usage of ICT. Additionally, students will encounter many types of learning in accordance with their surroundings, where learning can take place whenever and wherever it is appropriate:

Table 1. MANY TYPE OF LEARNING

From:	To:s
Teacher-Centred Instruction	Students-Centred Instruction
Stimulation of a single sense	Multisensory Stimulation
One-way Progression	Multipath Progression
Single Media	Multimedia
Isolated Work	Collaborative Work
Information Delivery	Information Exchange
Passive Learning	Active/Inquiry-Based Learning
Factual Thinking	Critical Thinking
Knowledge-Based Decision Making	Informed Decision Making
Reactive Response	Proactive and Planned Act
Isolated	Authentic
Artificial Content	Real World Context
Studying Once a Life	Life Long Learning
Ivory Towers	Competitive Market
Single Mode Institution	Multiple Mode Institution
Broad Scope Institution	Profiled Institution
Isolated Institution	Cooperating Institution
Single Unit Curricula	Inter-Unit Curricula
Broad Basic Studies	Just-In-Time basic Studies
Curricula Oriented Degrees	Knowledge Certificates
Term Oriented Learning	Learning on Demand
Learning Curricula	Learning Spaces

As a teacher's tool, some examples of applications include: (1) student evaluation tool (student evaluation system), (2), Reference source of teaching materials (Knowledge reference), (3) Evaluation of student performance (student evaluation performance), (4) case simulation (case simulation system), (5) Multimedia learning (multimedia instructional system), (6) animation of events (event animation), (7) communication between teachers (inter teacher communication). As a tool for interaction between students and teachers, in this case ICT acts as a tool to streamline and increase the level of interaction between students and teachers. In addition to direct interaction (direct interaction), also virtual interaction (virtual interaction). Virtual interaction has advantages because it can occur anywhere and anytime "anytime anywhere" can overcome the limitations of space and time, the internet is a suitable medium for this purpose. Examples of ICT applications as interaction aids include: 1). Teacher-student, 2). Study group collaboration

(workshop system), 3). Integrated classroom management (integration course system) (Table 1).

As a student tool, the main role of students is to learn “learning”, learning requires quite a lot of materials and tools, ICT has a strategic role to help these problems. Examples of ICT applications as student learning aids are; 1). Interactive book (interactive story book), 2). Self-learning system, 3). Practice questions (courses practicing), 4). Multimedia for learning, 5). Learning simulation (simulation tools), 6). Tools student work (productivity tools), 7). Communication between students (intra communication tool [28]).

Based on the results in the the Table 2, teacher perceptions focus data on teachers as educators, perceptions as motivators, perceptions as facilitators, and perceptions as mentors. Based on the findings that the researchers did, the teacher’s perception of the integration of ICT in learning obtained the following results: 1) Teachers’ understanding of the use of ICT in learning activities was very good. The majority of respondents understand and can use ICT in planning and implementing learning. Regarding the facilities owned by the schools where the respondents teach, their responses are quite varied. Some schools do not have adequate ICT facilities to support the application of ICT in learning. However, several other respondents stated that their workplaces were not equipped with adequate facilities.

The respondents gave positive responses regarding the role of ICT in supporting and facilitating learning activities. In addition to integrated ICT, learning can make it easier for teachers in the learning process, but also make it easier for teachers and students to find learning resources that can help teachers and students improve the scientific competencies being studied. The effectiveness of learning is also felt by teachers when they use ICT-based media. On the student side, the integration of ICT in learning has a positive impact on building learning activities in the classroom.

The majority of respondents (60%) admitted that learning activities that did not integrate ICT resulted in learning activities not running optimally according to the expectations of teachers and students. Furthermore, regarding the use of ICT which takes more time during preparation than teachers who do not use ICT-based media, 77% of respondents strongly disagree and disagree, and only 13% say they agree. Meanwhile, 17% admit that learning can run well without using ICT, 83% strongly disagree and do not relate to the questionnaire item. Responding to the question item: do you not feel a significant impact when ICT is applied in learning activities, 100% of respondents do not agree with the question item.

From the data display, the researcher concluded that: 1) The availability of ICT facilities has not been evenly distributed in the schools from which the teachers who were respondents in this study were assigned; 2) A number of questions were asked regarding the effectiveness, impact, benefits, and influence of ICT in teaching and learning activities, the majority of respondents agreed that the integration of ICT in teaching and learning activities had a positive impact on the learning process and outcomes of students; 3) although some respondents admitted that the use of ICT is time- consuming, but the majority of respondents agreed that the integration of ICT causes teaching and learning activities to be more effective, students are more active, easy to find learning resources, fun and can also increase students’ learning motivation.

Table 2. SURVEY OF TEACHER PERCEPTIONS OF THE INTEGRATION ICT IN LEARNING AT SEVERAL HIGH SCHOOLS IN SUKABUMI CITY

NO	ITEM	SD %	D %	A %	SA %
01	I understand how to use ICT in learning activities	0	0	7	93
02	I can operate multiple learning platforms	0	0	20	80
03	The school where I teach provides adequate ICT-based learning facilities	0	23	27	50
04	I believe that mastering the computer facilitates my activities as a teacher.	0	0	23	77
05	I find it easier to teach using ICT-based	0	7	20	73
06	I believe that ICT makes learning activities more effective.	0	0	10	90
07	I believe that ICT-supported teaching makes learning easier for students to understand.	0	7	17	77
08	The use of ICT helps teachers to improve learning activities with more updated materials.	0	0	20	80
09	I believe the use of ICT improves the quality of teaching.	0	10	20	70
10	I believe the use of ICT helps to make it easier to prepare teaching resources and materials.	0	3	13	83
11	The use of ICT allows students to be more active and involved in lessons.	0	10	23	67
12	I have more time to meet student needs if ICT is used in teaching.	0	23	27	50
13	I believe that teaching can run effectively without the use of ICT.	60	27	13	0
14	I witness a different class atmosphere (fun, motivating and inspiring) when I use ICT-based media in the classroom	0	7	23	70
15	The use of ICT in teaching and learning has made it easier for students to understand the material I convey	0	3	40	57
16	I think the use of ICT in teaching is a waste of time.	53	33	13	0
17	I think my students learn well without the aid of ICT.	33	50	17	0
18	Management cannot be applied properly if ICT is used in teaching.	60	33	7	0
19	Students do not feel a significant impact in teaching and learning when ICT is used in teaching.	67	33	0	0
20	Students look normal when ICT is used in teaching and learning activities.	33	33	33	0

From the data above, it shows a very positive response regarding the effectiveness of learning by integrating ICT in learning. Of the 10 questions asked by the researcher, the percentage of positive responses (agree and strongly agree) was very high. The integration of ICT which has an impact on creativity, student involvement in learning, problem solving, collaborative, interactive, fun, and builds student confidence reaches 100%. Although there is a “Agree” response, the number of respondents who answered strongly “Strongly Agree” is very dominant, reaching an average of 81%. While those who answered “Agree” reached an average of 19%. The two response categories are in a positive area, so it can be concluded that the integration of ICT in learning is very good (Fig. 1).

These findings are consistent with earlier studies by experts who came to the conclusion that the use of ICT in education increases teacher and student activity effectiveness. The findings of Syeed Nour Ul Amin’s study, “Using ICT for Education and Learning Effectively by Leveraging Global Knowledge, Research, and Experience: ICT as a Force for Change in Education,” are similarly in agreement with this. Syed asserts that the application of ICT in education improves research, instruction, and learning. ICTs have the potential to impact educational services and provide access to a range of requirements.

Additionally, ICT will provide learning flexibility so that students can access education without being constrained by limitations like distance, time, or location. This may impact both how kids learn and how teachers instruct. This will provide a stimulating environment for learning and teaching that appears to have a significant impact on the educational process by opening up new opportunities for both students and teachers. These options may affect how well students perform and succeed.

The study’s findings are supported by data from the Organization for Economic Co-operation and Development (2005). ICT can be used in a variety of general ways, including the following: a) Can be used to educate students for life skills, such as word processing, communication, email, etc., as well as to teach them the abilities they’ll need for higher education and as a lifelong learning process. Through external networks, b) can



Fig. 1. Learning effectiveness

promote teacher development; c) can provide access to information and communication outside of the classroom; d) can assist and perhaps change the process of teaching and learning to make it more successful, efficient, and pleasant.

Despite the fact that Fenta's findings show that teachers want very much to use ICT in the classroom, there are several obstacles in their way. The main challenges are a lack of resources, a lack of proficiency, and a lack of confidence. Competence and accessibility have been discovered to be crucial elements of technology integration in schools due to a lack of confidence. Teachers need access to ICT resources, including gear and software, adequate professional development, enough time, and technical support.

3 Conclusion

Information and communication technology has been successfully used into classroom activities to enhance educational quality. The use of ICT-based media in learning activities is very effective, because it has made it easier for teachers to convey material and make it easier for students to receive teaching materials from their teachers. The indicator is that student participation becomes more active, more fun, easier to understand, inspires, can develop critical, creative, collaborative thinking skills and better learning outcomes. For instructors and students alike, using ICT in the classroom is nothing new or unexpected. They really understand how to use ICT in learning, starting from planning, implementation and evaluation. Although not all schools have adequate facilities, the ICT-assisted learning process is routinely carried out with some adjustments in it. The integration of ICT in schools is successful and has great benefits, both for teachers and students. ICT especially used in the learning activity, is more practical than non-ICT.

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