

The Effect of Internet of Things Implementation on Inclusive Practices in High School

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Abstract—The purpose of this study is to determine the application of IoT (internet of Things) for the practice of inclusion in secondary schools (SMA) in Bogor. The research method used was a quasi-experimental research design with a control group design pretest random pretest. The research sample was students of class X A as a control class and class X B as an experimental class in one inclusive secondary school in the city of Bogor with a random sampling technique. The average score of the pretest in the experimental class was lower than the control class. After implementing IoT in the learning process, the experimental class obtained an inclusive practice index higher than the control class. This shows that the application of the internet of things can have a positive impact on the inclusive school learning process.

Keywords—internet of things; inclusion practices; inclusion indexes

I. INTRODUCTION

Current trends in educational development lead to inclusion, democratic education and fulfilling human rights. Education for all children in practice confronts schools with complexity and diversity. Rapid technological development can help students with disabilities in learning achievement. Adaptation of technology in helping students with disabilities is known as assistive technology both in the low-tech and high-tech categories. In 1999, technological developments began introducing IOT (internet of things) which aimed to expand the benefits of internet connectivity that is continuously connected to data sharing and remote controls for object identification, sensors and connection capabilities as a basis for service development so as to provide great benefits to aspects of life. IoT which results in an interaction between machines that are automatically connected (without human intervention and at any distance) and the Internet becomes a link between the two machine interactions, while humans are in charge as directors and supervisors for the operation of the tool, it can actually be implemented in the whole process of education of students with disabilities that demand complexity. Within this framework, IoT is implemented in senior high schools to see the effect and impact of IoT on increasing inclusive practices in schools.

IoT implementation is used to use visual cameras inside and outside the class that are connected to the data server. This

data server aims to serve teachers to improve inclusion practices, namely: orchestrating learning and mobilizing resources [1].

The Internet of Things (IoT) refers to global communication networks that connect physical and virtual objects that can be addressed through the identification of intelligent communication. This concept was discovered by Kevin Ashton in 1999 which is about connecting the internet and physical things in the world through increasing Radio-Frequency Identification (RFID) and sensor technology [2]. At present, IoT has potential prospects to be utilized in many industries or fields that require integration between modern technology and the concept / framework of knowledge. The IoT concept has been implemented in corporate services such as logistics and health care, futuristic applications (gadgets or advanced technology), and can even be implemented in an inclusive education system [3]. IoT contributes as a tool to develop a better education system [4,5].

Based on Booth and Ainscow, the inclusion index consists of three pillars, namely: culture, regulation, and implementation. Inclusive implementation consists of orchestrating learning and mobilizing resources [1]. Students are encouraged to be actively involved in all aspects of their education, which refers to their knowledge and experience outside of school. Staff identify material resources and resources within each other, students, parents / caregivers and local communities who can be mobilized to support learning and participation. Therefore, in this study, the impact of IoT will be measured using the inclusion index in the implementation dimension.

II. METHODOLOGY

This research place is two inclusive schools located in the Bogor area. The school is a school that has more and more complex students with disabilities compared to the surrounding schools, because this school has received recognition as an exclusive school by the local government. The method in this study uses quasi-experimental, experimental design is a randomized pretest-posttest control group design. Initial design, the researchers randomly selected the experimental group and the control group, then pretested the two groups. Furthermore, both groups were given a different learning approach and ended with a post-test. Test equipment on pretest

and posttest is the same. The research design can be seen in the following table.

TABLE I. DESIGN OF PRETEST AND POSTTEST GROUPS

Class	Pretest	Approach	Posttest
<i>Experiment</i>	O ₁	X ₁	O ₂
<i>Control</i>	O ₁	X ₂	O ₂

Information:

X1 = CCTV + IoT

O1=Pretest

X2 = CCTV

O2 = Posttest

III. RESULTS AND DISCUSSION

Researchers found that the internet of things (IoT) had a significant influence on increasing inclusion index numbers in the implementation index, especially in assessment and intervention activities for students with disabilities. The researcher also found that the use of IoT in inclusive schools was able to make assessment and intervention activities for students faster, more accurate, more comprehensive.

The dimensions of the practice of inclusion in the inclusion index in a school are a result of the cultural dimensions and regulations of inclusion that have been interwoven well in the school [6]. Orchestrating learning and mobilizing resources are indicators of assessment of whether the practice of inclusion in a school has gone well or vice versa [7], the learning process is a manifestation of the dimensions of practice of inclusion. There are fundamental steps that must be carried out before the start of learning in class, namely: assessing children with disabilities, from the assessment results an individual learning program is prepared, this requires modification in the curriculum, learning program, intervention, until evaluation of these students [8-10]. There are three fundamental elements in the implementation of learning in inclusive classes, namely: collaboration, assessment and assistive technology [11-14]. All the basic elements that have been mentioned, when applied by the teacher and the collaborator team there must be monitoring and analysis of activities effectively and efficiently.

Previous studies have examined the use of the internet of things and CCTV which aims to measure the intensity of togetherness of teachers and children with autism spectrum disorder (ASD). In short, the preliminary study shows IoT system capabilities that can be used to monitor the children's interactions with acceptable accuracy. Until now the tool is still developing the data processing system for run-time detection of anomalies in interactions and behavior patterns, so feedback can be given to teachers and parents to interact in real time. A number of nerves network and other classifier training mechanisms explored for this purpose [4]. In this study, besides the subject being multiplied, children's diversity was also expanded, namely all children with disabilities in one class with their diversity.

The results showed that the experimental class using the internet of things and CCTV, it was known that participants' interactions with disabilities with teachers, collaborative teams, and peers, besides the dimensions of inclusion practices in the inclusion index, can be identified and analyzed.

TABLE II. IOT ANALYSIS OF ORCHESTRATING LEARNING

Orchestrating Learning	IoT Analysis
Teaching is planned with the learning of all students in mind.	
Lessons encourage the participation of all students	V
Lessons develop an understanding of difference	
Students are actively involved in their own learning	V
Students learn collaboratively	V
Assessment contributes to the achievements of all students.	V
Classroom discipline is based on mutual respect	
Teachers plan, teach and review in partnership	
Teachers are concerned to support the learning and participation of all students.	V
Teaching assistants support the learning and participation of all students	V
Homework contributes to the learning of all	V
All students take part in activities outside the classroom.	V

TABLE III. IOT ANALYSIS OF MOBILIZING RESOURCES

Mobilizing Resources	IoT Analysis
Student difference is used as a resource for teaching and learning	V
Staff expertise is fully utilized.	V

The internet of things and CCTV can be observed and analyzed in a website-based application or on Android v 8.1. This research is still very open to be developed, such as the use of artificial intelligence in assistive technology as an effort to continuously improve quality of the inclusive education system.

IV. CONCLUSION

In the end this research shows and proves that IoT technology strongly supports the improvement of the implementation of inclusion practices based on the index of inclusion practices in orchestrating learning and mobilizing resources. In the end, this research shows and proves that IoT technology strongly supports the increased application of inclusive practices based on the index of practice inclusion in orchestrating learning and mobilizing resources. Researchers will develop this IoT application in order to reach all scope of being into orchestrating learning, so that the dimensions of implementation of inclusive practices can be comprehensively addressed.

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