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Implementation of information technology-based smart schools at state vocational high school 1 Manado, North Sulawesi: Indonesia

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Abstract

The purpose of this thesis research is to find out in depth and comprehensively how the application of information technology-based smart schools is applied in vocational high schools. The implementation of information technology-based schools or what is now echoed by the central government is "School Digitalization" in driving schools or centers of excellence, using qualitative methods to examine in depth the stages of implementation in the design, implementation and evaluation of the implementation of technology-based schools. this information. The thing that is of concern is of course digital education services by schools, both in the school administration process and the teaching and learning process between educators and students first during the COVID-19 pandemic. School innovation is very much needed in the development of digital education services. It is also the concern of researchers in implementing learning towards 21st century education, 4C; creative innovation, critical thinking, collaboration and communication as well as learning systems (TPACK) Technology Pedagogic Content Knowledge in learning strategies. Learning methods; (PjBL) project-based learning and (PBL) problem-based learning are also of concern to researchers because to look smart schools, of course, look at the results where graduate students must have intelligence above average in their respective expertise programs, of course in learning, there needs to be a new paradigm in learning, namely student-centered learning. From the results of this study, there are also findings that are inhibiting factors so that the implementation of planning and implementation as well as evaluation of this information technology-based school program. In this case, briefly, namely; budget, information technology team work programs, teacher competency development training, teacher digital supervision and of course the perspectives and ways of thinking of managerial staff and management leaders in implementing information technology in education units. Mastery of information technology is not only for students but also educators and education staff must master even in the transfer of knowledge, it is needed. Information technology is a development and innovation, so a vocational school whose vision is to follow the development of the surrounding community by responding to future job challenges. then of course SMK must have a gradual program that has been well-systematic in terms of developing this digital-based education service.

Keywords: Smart school, vocational school, information technology

1. Introduction

The Indonesian nation has a population of approximately 270.20 million people based on the results of the census by the National Statistics Agency in 2020, this is still looking for the right direction of education policies in the development of education in Indonesia. Based on the Programmer for International Student Assessment report, 03 December 2019, (PISA, 2018) shows that the ability of Indonesian students in reading, mathematics and natural knowledge is below average, as stated by the Organization for economic co-operation and development, OECD; www.oecd.org, web release report. On the litbang.kemdikbud.go.id/pisa page, there are several important sections, which are of concern to us education observers and policy makers, does our education system need to be revised so far, or does it really need to be completely overhauled, in the sense of whether "Educational Reform" is a necessity.

If we are still complacent with conventional education, it is not impossible, our country will fall further and will be far behind other countries. In competition in this era of globalization, Of course, education will play a very important role. So that education should not only be made an obligation to be fulfilled, but, in accordance with the mandate of the 1945

Constitution as conveyed by the founding fathers of this nation that their noble ideals are to make every Indonesian human being a complete person. Education is very important and a priority, especially in the era of the second administration of President Joko Widodo is the development of superior human resources with the tagline "SDM Unggul Indonesia Maju" of course this is a challenge in the field of education because it will prepare graduates who will later solve problems that exist in the future are more complex and multi-faceted problems. In accordance with Education for All or education for all as an effort to translate the 1945 Constitution. The function of education as stated in Law no. 20 of 2003 concerning the National Education System Chapter II Article 3 aims to develop the ability of science and technology as well as transfer of exemplary, personality and character as well as national civilization with dignity and integrity in order to educate the nation's life, also aims to develop the potential of students to become human beings who have faith and fear of God Almighty, have good morals, are healthy, capable, creative, independent and become democratic and responsible citizens. One form of the function of national education can be seen from the presence and justice of the government towards education services for all students. The implementation of education services must be equitable and sovereign, as the slogan of Mas Menteri Nadiem Makarim, which we know as "Learning Independence".

The education unit is an institution in the form of formal education, students will certainly progress through transfer to knowledge, as well as exemplary character, and will shape students better at all levels. a model of formal education unit that can be competitive and comparative so that when compared to educational institutions in other countries, educational institutions in Indonesia can also contribute equally in the eyes of the world and also contribute to building intelligence globally to increase the level of education of humans which will have an impact as well as the standard of human life itself. Education units must immediately take an important role as a form of moral responsibility by creating and preparing students to be able to compete in facing global challenges. On the other hand, of course, it can be seen from the geographical position of Indonesia as an archipelagic country consisting of various ethnic groups, religions, and races. Humans can be realized in a complete manner, to achieve the goal of superior human beings, of course starting from the education unit, especially vocational high schools which will become the "backbone" of the country's backbone in carrying out sustainable development. The purpose of this study is to analyze and define in detail and clearly about:

1. Implementation of Smart Schools in Vocational High Schools.
2. The factors that support the information technology-based Smart School at SMK Negeri 1 Manado.
3. Factors that inhibit information technology-based smart schools at SMK Negeri 1 Manado.
4. Efforts have been made to overcome obstacles to the implementation of Information Technology-Based Smart Schools at SMK Negeri 1 Manado.

2. Literature Review

2.1 Smart School Concept

According to Abullah (2011, 68), the word school comes from Latin, namely *skhhole*, *scola*, *scolae* or *skhola* which

means free time or free time. School is an activity that occurs in free time for children in the midst of their main activity, namely playing and spending time enjoying childhood and adolescence. Activities in spare time are learning how to count, reading letters and getting to know about morals (character) and aesthetics (art). To assist in school activities, children are accompanied by experts and understand child psychology, thus providing the greatest opportunity for children to create their own world through various lessons. Abullah, (2011:88) also states that in its development at this time the word school has changed its essence into a building or institution for learning and teaching or a place to give and receive lessons. Schools are led by principals and school principals are also assisted by their representatives and teachers as educational staff, as well as infrastructure at a school has an important role in the implementation of the educational process.

According to Howard Gardner, in the *Frame of Mind* (1983) ^[13] Intelligence has the ability to solve problems, to find the answers to specific questions, and to learn new materials quickly and efficiently. Intelligence is the ability to solve problems, to get specific answers, and to learn new material quickly and efficiently. Howard Gardner's idea of multiple intelligences, is one of the most important and promising developmental concepts in education today. The statement that "If the IQ is high, then the person will be successful in learning and ultimately successful in real life", is not always true. Experts and researchers are increasingly active in re-examining what is meant and how to measure intelligence, and they are of the view that intelligence cannot be measured through scholastic ability alone. The many forms of intelligence (multiple intelligences) that have become the potential of students, certainly provide greater opportunities to develop intelligence abilities. All these intelligences can function optimally, to identify and develop a broad spectrum of abilities within each student in order to produce effective forms of learning. Therefore, educational learning is related to how (how to) make students learn easily and are motivated by their own will to learn what (what to) is actualized in the curriculum as the needs (needs) of students and taught with intelligence-based learning methods to achieve maximum learning outcomes.

The application of The Intelligent School concept is a smart school concept that is implemented in learning and administrative activities that have been integrated digitally. To implement the smart school concept, school administrators need to understand the nine principles of intelligence which include: Ethical Intelligence, Spiritual Intelligence, Contextual Intelligence, Operational Intelligence, Emotional Intelligence, Collegial Intelligence, Reflective Intelligence, Emotional Intelligence, Collegial Intelligence, Reflective Intelligence, Pedagogic Intelligence, and Systemic Intelligence. Barbara, MacGilchrist, (2004) ^[8]. The concept of a smart school is generated from empirical studies on school effectiveness (school effectiveness). Several experts in the world of education reveal and define, among others; According to Grant, A.E, & Meadows J.H; (2008.ed 06) on the perspective of Grant Umbrella can explain the concept of this smart school where the use of computer software and hardware by private users forms a group of individuals who serve the interests of society. The Education Unit, as well as a social institution, is also affected by the development of technology and communication. This organization then forms the information and communication system in society.

This perspective is a synthesis of thought from Rogers, (1986) who defines a hardware-based technology society where individuals collect, process and exchange information with each other. The factors that determine the application of communication technology are enabling factors, limiting factors, motivating factors, and inhibiting factors. According to Chaefer, the term Smart School also creates a new class gap that occurs in the lower class community, who cannot enjoy internet access and services. Around the world, the digital divide can be seen in developing countries. Rural residents, minority groups and groups of people with low incomes are those who receive the least exposure to technology. (Chaefer, 2012) ^[9].

According to Prof. Dr. Henny N. Tambingon, M.Pd (2021, Vol.18 No. 2) in the title: "The Relationship of Self-Efficacy, Job Satisfaction, and Emotional Intelligence with Teacher Work Commitment" in the Journal of Education & Learning, said that teachers who have self-efficacy, empathy, job satisfaction and emotional intelligence understand the feelings of others and pay attention to the needs of employees will easily adjust behavior that is in line with the feelings of subordinates in carrying out tasks effectively. High emotional intelligence and good work performance will make the atmosphere in the institution feel comfortable. With a comfortable atmosphere, educators can carry out their duties well. This also certainly confirms the delivery of several experts as well that the emotional

intelligence of an educator will certainly bring intelligence to his students.

According to Prof. Dr. Herry Sumual, M.Pd, about the influence of students' interest, motivation and IQ on their learning outcomes. In his research which was analyzed using the path paradigm. Shows that interest, IQ and motivation have a significant and positive effect on learning outcomes and interest in learning motivation. However, there is no significant effect of IQ on learning, this is explained in his scientific journal about "How to Improve Interest, IQ, and Motivation of Vocational Students?" Of course, this also confirms according to the explanation from Prof. Herry Sumual that students in Vocational Schools must choose their expertise program according to the interests and talents of each student.

The Generation of Creators should have four values which are usually called the 4Cs: creative & innovation, critical thinking, collaboration, and communication. Which is the skill of the 21st Century. This is how the future Indonesian children coveted the founding fathers and we too, of course. Moreover, by thinking hard to make formulations in such a way as to achieve the 4Cs, they will truly become the next superior generation who are foreign in the world, let alone we will get a demographic bonus, then of course these 4Cs must be immediately implemented and implemented in all lines of education units in a structured, systematic manner. Can be seen as in the image below.



Fig 1: 21st Century Learning Schemes 4C

In the US-based Partnership for 21st Century Skills at the American Management Association in 2012 source: <http://www.amanet.org/assets/1/6/2012-critical-skills-survey.pdf> page 2 it is intended that education should there is:

First, creative & innovation. Students and educators must have unlimited imagination to explore ideas for renewal of a creator, a burning spirit to innovate, and have the courage to change the world. Second, communication, students and educators must have good communication in explaining; ideas, as well as collaborating as well as endless curiosity so as to convey critical thoughts constructively and politely in accordance with the culture of the Indonesian nation. Third, collaboration. Students and educators must respect diversity, see every problem with a multidisciplinary approach, and solve problems with collaboration and teamwork so that comprehensive solutions can be realized. Fourth, critical thinking. Students and educators must think critically in responding to any problems around them and always try to find solutions to solve them.

2.2 Information technology base concept

The concept of information technology is generated from empirical research on this. Some experts also reveal several definitions, including: According to Tata Sutabri (2014:3)

^[33] is as follows: "information technology is a technology used to process data, including processing, obtaining, compiling, storing, manipulating data in various ways to produce quality information, namely relevant, accurate information. And timely manner, which is used for personal, business, and government purposes and is strategic information for decision making."

According to Azhar Susanto, (2013:12) ^[7] information technology is: "a study, design, implementation, development, support or management of computer-based information systems, especially in computer hardware and software applications. According to Prasajo, L. D., & Riyanto, (2011:4) ^[27] information technology is defined as science in the field of computer-based information and its development is very rapid. According to Strassman in Jogiyanto, *et al*, (2011: 207 ed2) ^[24] states that information technology is an information technology strategy that is used for all business processes of the organization, even being able to change the dynamics of the organization's external environment, such as changing market structures, changing competitive forces and changing business value chains. Organization. For this reason, organizations should understand the approach and model of business-information technology alignment, as well as be able to measure the alignment model used so that business and information

technology synergies produce real value for the organization.

According to Abdul Kadir & Terra CH. Triwahyuni, (2013:2)^[2] information technology is a set of tools that help you work with information and perform tasks related to information processing. According to Hamzah B. Uno & Nina Lamtenggo, (2011; cet2)^[22] also stated that information technology is a technology used to process data. Processing includes processing, obtaining, compiling, manipulating data in various ways to produce quality information, namely information that is relevant, accurate and timely.

Information Technology is a tool related to data processing/management to make information and the process of delivering data/information in digitization within the boundaries of space and time Richardus, Eko Indrajit, (2011:10)^[19] Information technology is a; is a device, both hardware and software that can be used to process and manipulate data, including processing, compiling, preparing and storing in various ways to produce quality and real-time information quickly, of course, by someone called brain ware. Relevant and accurate at a time that will be used for personal, business and educational purposes and is very strategic information for quick and accurate decision

3. Research Method

Existing research is used to obtain data and to achieve the goal, the method used by data researchers is descriptive qualitative method, namely by describing or describing the state of the situation during observations, interviews, documents and conducting research data collection, then performs an analysis so that the data obtained a conclusion. This type of research conducts primary and secondary data collection randomly and measurably. The research site of the Manado 1 Vocational High School. Scout Street No. 106 Sario Subdistrict, Manado City, North Sulawesi Province, This research was carried out over a period of six months July 2021 - December 2021.

Sources of data used to compile this research sourced from key persons (key persons). The role of key people in research is the main thing, because the information they provide is the main capital for researchers in obtaining data and research materials. The key people referred to are the principal, vice principal for curriculum, vice principal for manpower, vice principal for facilities & infrastructure, deputy principal for public relations/industrial cooperation, deputy principal for student affairs, teachers of adaptive subjects, normative subject teachers, productive subject teachers, students and parents.

This study aims to find sources of data that are important only in the object of research so that what is sought in the form of information, facts and data is indeed focused on the root of the problem and of course will combine all these problems in general and specifically and will combine them into important data and information. This study also seeks to obtain information from individuals, especially in this case the Principal in designing and making management systems based on information technology and digitalization of learning, as well as management staff in running the system at SMK Negeri 1 Manado. Research data obtained through observation, interviews and document studies.

Qualitative data analysis can be carried out if empirical data has been obtained in the form of a collection of tangible words, not a series of numbers and cannot be arranged in

categories/classification structures. Data can be collected in various ways (Observation, Interview, Document Study, and Literature Review) and usually must be processed before it is ready for use, qualitative analysis still uses words that are usually arranged into an expanded text, and does not use mathematical calculations or statistics as an analytical tool. Analytical activities consist of three streams of activities that occur simultaneously, namely data reduction, data presentation, and conclusion drawing/verification

4. Result and discussion

Researchers divide into 4 parts in the formulation of the problem in order to focus more on solving problems that occur in the application of information technology-based smart schools.

1. Implementation of Smart Schools in Vocational High School 1 Manado;

The first stage includes:

- a) Determine the school's vision, mission and goals.
- b) Designing School Programs
- c) Define the IT Developer TEAM.
- d) Designing Work Program/Budget
- e) Designing Information Technology Based Infrastructure.
- f) Define Designing and creating learning applications, educational services.

At this stage there are those that have been running according to the implementation stages but also some have not gone according to the implementation stages, namely at point d). Programs/budgets are still present in each unit that has not yet been included in the Information Technology Development Team. Point e). And point d). Also in the infrastructure design stage, both hardware and software, there is no standard and appropriate form for school needs.

The second stage includes:

- a) Implementing the system with 50% training for educators and teaching staff.
- b) transfer to knowledge to the IT TEAM through a third party technology-based school development.
- c) Do In House Training. In this second stage, it has been carried out according to the program and is running well but there are also obstacles in Point b). 3rd party cooperation

The third and fourth stages;

- a) evaluation and changes in the adjustment of the ability of educators/educational personnel
- b) Monitoring and evaluating
- c) Perform maintenance on equipment, upgrade systems and update applications.

At this stage, a comprehensive study of the application of this information technology-based smart school has not been carried out in the form of a report so that management can decide on a continuation program in 2022.

2. Supporting factors for smart schools based on information technology at SMK Negeri 1 Manado; the SWOT analysis has also described the supporting factors which are the strengths of the school in implementing information technology-based schools;

- a) 55% of educators have professional certificates, 17% of educators are masters in their respective fields and all

- educators have bachelor's degrees, 40% of educators have the rank/class of middle teacher.
- b) is a SWOT analysis table of Schools on the governance of education services. This is also seen; an IT TEAM has been formed which seeks to make an acceleration or acceleration of Information Technology-Based Schools.
 - c) has a very adequate server infrastructure to be used in the implementation of the network infrastructure needed to implement digital-based learning (Intranet).
 - d) The number of students, which is approximately ± 1500 students, even though they come from various economic levels and their respective competence abilities, is also a supporting factor in the development of information technology-based schools.
 - e) Many human resources in this school have assessor certificates as well as National Facilitators, Instructors and even Civil Service Teachers who can also be a force in the implementation of this school.
 - f) The joint commitment and cohesiveness of the TEAM in implementing this program shows that this school has earned the trust of the government, starting from revitalization schools, schools of excellence centers and there are also several government programs that are always well implemented.
3. The inhibiting factors of information technology-based smart schools at SMK Negeri 1 Manado.
 - a) The BOS Fund budget is often late so that sometimes the program doesn't run well at the beginning of the year.
 - b) the preparation of the Teaching Module has not been digitally integrated
 - c) TPACK Technology Pedagogic Content Knowledge has not been seen in learning tools.
 - d) Distance learning (online) is hampered by the government's assistance for Internet Quota. d). the will of educators >55 years old, in developing competency skills in the field of information technology, is no longer willing.
 - e) The curriculum used consists of 2 curricula.
 - f) Acceptance of the results of student activities or so-called report cards is still manual.
 - g) Implementation of Project Based Learning and Problem Based Learning has not been understood in general f). Supervision of teachers is also not digital yet.
 - h) Educational services in the administration of governance have yet to be seen as services based on digitization.
 - i) digitizing school data in education services; SK Division of Tasks, Schedules and important information that can actually be integrated in one cloud.
 - j) The use of a good and integrated LMS that makes it easier to supervise and control all educators and students in multi-mode learning (daring, offline & hybrid).
 4. Efforts are being made in overcoming obstacles to the implementation of information technology - based smart schools.

The development of Information Technology in managerial study schools in the form of evaluation reports are as follows;

- a) analyzing the current system,
- b) identifying new system requirements,

- c) selecting the right technology for the development of learning innovations,
- d) requiring a supporting infrastructure,
- e) requiring adequate IT user resources,
- f) calculating costs to be incurred for IT development and
- g) designing the architecture of information technology development.

The application of information technology-based smart schools in the field of education will contribute to the development of technology in learning. The implementation of daily learning often encounters a combination of audio/data, video/data, audio/-video, and internet technologies. Internet/Intranet is an inexpensive information technology where interaction occurs between two or more people. The capabilities and characteristics of the internet/intranet enable the process of distance learning (e-Learning) to be more effective and efficient so that better results can be obtained.

Responding to future learning challenges then; information technology-based blended learning strategy every student can access the learning materials provided by the LMS Management System Learning. Students can interact with the teacher or with other students without having to be present in class or present virtual. Online learning materials, allowing anyone to access these materials without being limited by distance and time, which is a trend now called the digital classroom Metaverse.

Implementation and there are still many problems that exist in the implementation of Smart School based on Information Technology. The e-learning system cannot also describe the overall implementation of Smart School Digital. In this education unit, because it is not just online and offline learning, but the administration of existing education and learning services, TPACK Technology Pedagogic Content Knowledge must also be seen in the teaching and learning process, as well as applying Project Based Learning and Problem Based Learning methods.

Digital literacy for educators/education staff and students is a priority program. how educators use information technology is not just using examples of Microsoft Office applications or installing an operating system on computer/mobile devices but how an educator designs, makes teaching materials that can be accessed, created but even if they can be developed, managed digitally and displayed in an attractive and interactive way. Because educators must also be content creators or originators of ideas that are more renewable, up to date, and have more mastery of course well and can apply them in the teaching and learning process, not just copy and paste in books, the internet or with their peers. Information Technology-Based School Management is not only a "tool" to achieve goals that are supported by infrastructure, but policies and visions as well as school design Priority Programs towards Information technology-based School Digitization, according to this researcher are also the main support in its implementation.

5. Conclusion

From the description above, the conclusions of this study are: the RoadMap of SMK Negeri 1 Manado which has been created as a Vocational School for the Center of Excellence, one of the programs is also the digitization of schools both in learning and educational services. Of course, this has a

very significant impact on students and this is one indicator of intelligence that grows from not only students but also all stakeholders in the school including educators/education staff so that expectations can be realized. Of course, this is connected with the 21st century learning objectives, namely: creative & innovation, communication, collaboration, critical thinking. This can be built well because there is a school digitization program which is a breakthrough for school programs and habituation, for school principals and all educators/educational staff as well as students. in using, developing and of course being able to create materials or content and even information technology tools that can help them.

In the application of information technology in schools, it is divided into two parts as related and interdependent parts, namely; First on managerial or administrative services and second on learning or teaching and learning processes both online and offline implemented by schools and of course teacher administration. So the integration of the first part and the second part is very important because this must go together and one part should not be left behind or ahead of the other part and the school principal as a policy direction maker plays an important role.

The learning model must be applied in smart schools, namely Problem Solving Based Learning, Project Based Learning, with the application of TPACK in it. This can also be interpreted as a form of learning shift that was originally centered on the teacher to shift to students. Technology Pedagogic Content Knowledge is a modern solution, let alone answering the challenges of learning now in the midst of the covid'19 pandemic. Creating a pleasant learning atmosphere so that one of the Center for Excellence Vocational School programs is also achieved, creating Student Wellbeing, namely how the learning atmosphere is not so rigid, learning is fun and educators use technology as a tool to help educators transfer knowledge and technology itself. Students use information technology properly and responsibly so that the goals of students are also in utilizing information technology and the values of the Pancasila student profile so that their character and behavior have been reflected in the use of information technology itself. Educators must also have a moral responsibility in developing themselves in the use of information technology in educational units. The hope of a smart school based on information technology is not just a slogan or tagline but is indeed built by an integrated system as a whole at SMK Negeri 1 Manado.

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