

Inclusive University Management with Technology Basis: A Case Study of Visual Impairment Students at Information Technology Study in University of Pamulang (UNPAM)

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ABSTRACT. This study focuses on inclusive university management with technology basis. A case study of visual impairment students at Information Technology study in University of Pamulang (UNPAM). They've equal opportunity to study at higher education. No one of them graduated from IT study program in Indonesia. The objective of this research are to analyse management systems which implemented by UNPAM to support inclusive higher education, to analyse learning method base on technology which implemented by university to support inclusive higher education, to analyse learning method challenges which facing by visual impairment IT study program students and lecture, to analyse solutions for inclusive higher education learning method challenges at UNPAM. The researcher used descriptive qualitative research method with case study approach. The result of this research are; 1) strong leadership and management of PLD UNPAM is important to implement inclusive university, 2) inclusive university should well implement of assistive technology in learning program for visually impaired students, especially in IT major, 3) strong logical thinking, math knowledge, motivation and good attitude are important requirements to be a student in IT major for visually impaired students, 4) learning method solution to implement inclusive university, especially for visually impaired student in IT study program can be classify to 5 categories solution which should be managed, implemented and controlled by PLD UNPAM are; readiness of visually impaired students to study, lecture, teaching strategy, assistive technology, and strong PLD UNPAM management.

Keywords: Management System, Inclusive Education, University of Pamulang Technology.

1. INTRODUCTION

Inclusive education is an educational system which enables special needs students [1], including blinds or visually impairment people, to attend the nearest public schools with other students. Inclusive education aims to achieve two things: first, to give the same opportunity in accessing education for people in general, and second, to fulfil an education system which respect students diversities. Moreover, inclusive education is not limited to the basic levels education, higher level of education, such as university, is expected to do the same thing [2].

International Council for Education of People with Visual Impairment (ICEVI) is a global association of individuals and organizations that promotes equal access to appropriate education for all visually impairment children and youth so that they may achieve their full potential [3].

World Blind Union, 2019, in pertuni website; an estimated 253 million people live with vision impairment [3]. There are an estimated 3.75 Billion people in Indonesia are visual impairment. Government need to focus on the learning program to support them [4].

Inclusive education planning for Indonesia in 2019-2024, Government will implement education for everyone in Indonesia. The effective way are developing the ideology and inclusive education concept. Education is one of priority in Indonesia development since Independent day of Indonesia which written in "Pembukaan Undang-Undang Dasar 1945 pada pasal 31" (Indonesia Constitution 1945, article "31"). Indonesia guaranteed all people in Indonesia have a right and responsibilities for basic education and government have a responsibility to accommodate and facilitate without any discrimination) [5] [6].

This plan was bringing a fresh for disability people in Indonesia to have an equal education opportunity. Although this planning will cover in basic education first, but it's a good start to prepare disability people to be ready to enter the higher education at university, especially for visual impairment people who dream study in IT (information technology) or science study program in university. They will able to study at science major in senior high school level. As we know that, this is one of pre- requisite to enter the science study in university.

None of visual impairment student graduated from science or information technology major from university in Indonesia. Universities in Indonesia commonly accepting them in social and language major which it isn't interactive with science and math study (Aria Indrawati, Indonesia Head of Visual Impairment Association / Pertuni, Persatuan Tuna Netra Indonesia). There are challenge in learning methodology, how to deliver the science and information technology study to visual impairment students.

University of Pamulang was a first university in Indonesia which accepted visual impairment student to study at university, in information technology (IT) study program, started August 1st, 2017. PLD UNPAM (Disability Service Centre) established to facilitate this program. In short term plan, PLD UNPAM focused on visual impairment study program, due to we've an urgent demand which should be accommodated. Furthermore, we should able to facilitate another disability type of students.

Currently we've 17 students in various disability type, visual impairment, deaf and physically disability. We've three visual impairment students who study in IT program. They are in 7th semester right now. This is pilot project for Indonesia to implement inclusive university for visual impairment student in Information technology.

Aria Indrawati, August 2017, expected this pilot project will be as a model for Indonesia which encouraging and attracting Government and Universities in Indonesia to implement the same concept as Inclusive university for visual impairment in IT study. UNPAM should build a strong management to make this inclusive program well implemented, especially in planning, organizing, actuating and controlling, therefore it can be cloned to another universities in Indonesia.

The objective of this research are; 1) to analyze management systems (planning, organizing, actuating and controlling) which implemented by Pamulang University (UNPAM) to support inclusive higher education, 2) to analyse learning method base on technology which implemented by Pamulang University (UNPAM) to support inclusive higher education, 3) to analyse learning method challenges which facing by visual impairment IT study program students and lectures in IT Study Program Pamulang University (UNPAM), 4) to analyse solutions for inclusive higher education learning method challenges at Pamulang University.

2. METHODS

Researcher will use descriptive qualitative research method with case study approached. Case study approached, due to in-depth study of well-defined case or phenomenon using multiple data sources, like observation, interview and documentation [7].

Data sample used purposive approached. Purposive approach techniques used base on special considerations, [8] therefore that the selected sample with some consideration.

Data collection technique will use observation, interview process and documents study [9]. The sample data of this research are Disability Service Centre of Pamulang University (PLD UNPAM) management team (3 key person) and Head of PLD, 2 key lecture who teach visual impairment students in IT Program, 3 (three) visually impaired students in IT study program, Mitra Netra Foundation Director and Pertuni Director (Visual Impairment Indonesia Association). Data Validity method will use triangulation data method. Data processing technique will use Miles and Huberman theory, which implementing the three concurrent flow of activity; 1) data condensation, 2) data display, dan, 3) conclusion drawing or verification [10].

Observation recorded by researcher, base on field experience record [9]. The interview technique, researcher conducted "semi-structured interview" by direct conversation, telephone or video call technique. The interview time duration 15-60 minutes per person. Selection of interviewee is base on purposive interviewee. It conducted in one group interview or in one on one interview base on convenience time [11].

In order to identify management systems in PLD University Pamulang, researcher used documents

study method to collect the data and information. Documents resources are : PLD UNPAM organization data, journal and books which focus on management, inclusive education and visually impaired learning technique method [9].

Researcher used data source triangulation type to test validity of data in this research, which data triangulation entails obtaining data from different sources, or at different times or under different conditions [9]. Resources used data from multiple sources; visually impaired students in IT major, Head and Management of PLD UNPAM, lecture, Mitra Netra Foundation and Pertuni (Visual Impairment Indonesia Association).

Field research conducted at University of Pamulang, PLD (Disability Service Centre) , starting January 2020 up to August 2020. Research schedule detailed by researcher in GANTT Chart method [12].

3. RESULT AND DISCUSSION

PLD (Disability Service Centre) UNPAM established on August 1, 2017, base on Rector's Decree No: 507/A/O/UNPAM/VIII/2017. This organization was in part of Pamulang University. It's non profit organization which support all disabilities students at Pamulang University. PLD UNPAM address at Jl. Raya Puspipetek, Buaran, Kec. Pamulang, Kota Tangerang Selatan, Banten 15310. The owner of Pamulang University, Dr. H. Darsono dedicated 1(one) of a great room for PLD UNPAM office at Pamulang University, it was located at UNPAM Viktor.

MOU with one of Multinational Company triggered this organization, to support inclusive university, hand by hand with Mitra Netra Foundation and Pertuni (Visual Impairment Indonesia Association) and Blind Coding ID Communities.

There are 3 visually impaired students who studying in IT study program. They are totally darkness of the visual fields or we can called with totally blind. Low vision categories, if student still can see object with some level of degree [13].

Base on this mapping of visually impaired students, PLD UNPAM should facilitated the learning program which support students with totally blind type. It can't be solved only to use magnifiers tools. It should be supported by tactile method and assistive technology method.

Result and discussion demonstrated 4 analysis; 1) management systems analysis on POAC (planning,

organizing, actuating and controlling) [14] which implemented by Pamulang University, 2) learning method base on technology which implemented by Pamulang University to support inclusive higher education, 3) learning method challenges which facing by visual impairment student in IT study program and 4) solutions for inclusive higher education learning method challenges in Pamulang university.

Strong Management systems is a key success in organization to achieve PLD UNPAM Goals. Assigned a right person in organization is one of the important decision in first step. Management is the accomplishing of predetermined objectives through the efforts of other people.

9 elements of planning are physical, functional, objective, budget, standard, program, policy, procedure, and method are well planned. Infrastructure available to support students, there are facilities requirements which should be provided by university to start as an inclusive university for visually impaired student [15], but it's not as mandatory, it's depend on situation, like laptop, it can be provided by students. Current facilities are; scanner machine, desktop with NVDA systems (Non Visual Desktop Access), Laptop, NVDA (Non Visual Desktop Access) software license, Math Type software license for windows program, Digital Library (e-pub) access.

Leader organized PLD UNPAM, to arrange as to constitute in independent parts, each having a special function or relation with respect to the whole. Organization structure well implemented. Authority and responsibility base on capability and team skill. There are 5 (five) divisions; 1) secretariat division, 2) development and program division, 3) counselling and training division, 4) funding and cooperation division, 5) entrepreneurship and volunteer division.

Actuating of PLD's leader is setting all members of the group to want to achieve and to strive to achieve the objective willingly and keeping with the managerial planning and organizing efforts. 6 elements of actuating are leadership, communications, incentive, supervision and discipline.

Controlling can be defined as the process of determining what is to be accomplished, that is the standard, what is being accomplished, that is the performance, evaluation the performance and if necessary applying corrective measure to that

performance takes place according to plans, that is, in conformity with standard [14]. PLD UNPAM using 5 (five) elements control; 1) inventory control, 2) operational control, 3) maintenance control, 4) quality control, and 5) cost control. Head of PLD controlled all PLD activities and operational through quarterly report by each division and half year team meeting review session.

PLD UNPAM implementing inclusive university by referring to Law 8/2016, Article 42 paragraph 8 and article 43 paragraph 2 and 4, government regulation 13/2020, which concerning reasonable accommodation for student with disabilities. Reasonable accommodation with modification and adjustment necessary to ensure their feel comfort and to ensure implementation of all human rights and fundamental freedoms for Persons with disabilities on an equal basis. Equal basis in inclusive university is a key to threatened them in the learning program and social program. It's mean that they have a same chance with other students in class. It isn't meaning that we need to have a special class for them [16]. Researcher found a thought from some lecture at UNPAM in the beginning of implementation of inclusive university, they requested to have a special class for visually impaired student in UNPAM.

It's a wrong paradigm of inclusive university concept. It's not correct. The supporting method is important to help student during class with or without the help of functional seeing abilities [17]. Learning method for visual impairment student divided in 2 type of classes, class room class and online learning class. To teach visually impaired students, PLD UNPAM implemented 3 methods: 1) teaching strategy, 2) visual aids and assistive technology, and 3) create comfortable learning environment.

Teaching strategy by UNPAM's lecture should; clearly explain any visuals, give an oral or soft copy file instruction/assignment, provide tactile learning experiences, address all students by name, give visually impaired or blind students additional time to complete work, treat all of students equally, consider the curriculum.

Visual aids and assistive technology for visual impairment student in the class are; student can record lessons, lecture provide braille textbooks and handouts (if needed), lecture should allow them to use of smart scanners and readers, lecture should encourage the use of page magnifiers, lecture should

write with dark colors on the whiteboard.

Providing a comfortable learning environment for visual impairment student in the class [18], to reach the objective of class learning. Comfortable learning environment at UNPAM are lecture give instruction to students to seat close to the front, Lecture and PLD UNPAM should manage lighting and glare, lecture and PLD UNPAM should check a large walkways between furniture in the class, PLD UNPAM should arrange a consistent classroom furniture and public room direction sign, PLD Team or lecture should clearly explain where classroom supplies are located.

Online learning implemented at University Pamulang, it about 8 meetings of 18 meetings. All visual impairment students should familiar to use on line learning UNPAM website. Student can access to URL provided by UNPAM: <https://e-learningc.unpam.ac.id/>. Online learning website UNPAM is accessible page for visual impairment students. They can access it by using NVDA software (Non Desktop Visual Access). Lecture post material from 1st meeting to 18th meeting in this website, in word, pdf and ppt file type, including presentation style using video recording. Some of lecture shared course material in live meeting by using Zoom or Google meet application. Lecture delivery material in forum section, by posted a question or cases to be discussed in forum, by replying by student with answer in text type (as mandatory) or answer question in another media like video and speech recording (optional). Student can download course material from UNPAM e-learning website, read and learn it before answer a forum discussion, answer a quiz and an assignment.

Technology which used for IT classes, there are some of assistive technology can be used for visually impaired students, like NVDA application, Serotek System Access (Windows), Apple VoiceOver (OS X), ORCA (Linux), BRLTTY (Linux), Emacspeak (Linux), WebAnywhere (All OSs, Web browsers), Spoken Web (Internet Explorer), ChromeVox (Google Chrome), ChromeVis (Google Chrome). In this research, researcher explained and analyzed NVDA software and MathType Software which used by students at UNPAM University. PLD UNPAM used NVDA Software, it is a free, open source, portable screen reader for Microsoft windows. The project was started by Michael Curran. Student can access all information in word, ppt, pdf and website

style of information by converting all text to speech. Using this software accommodate student to have a communication through mobile phone, like to send a message in WhatsApp application, social media like facebook. PLD UNPAM used math type software, for math and science lesson. This software design Science educational for visually impaired student. Classroom materials, tests and other documents containing mathematical content will be clearly spoken by computers. Software license about USD 200, it's unlimited access for students and lecture. There are 2 options license for window and Mac. Lecture can type a math equation in this software application, this equation can be converted in standard equation in word file. This equation is accessible format for visually impaired students. Students can use this software application to type math equation in latex format and converted to standard math equation, therefore can be read by lecture.

Learning method challenges for visual impairment students in IT major for class room type are 1) lack of lecture's awareness to accommodate visually impaired student in the class [19], 2) lecture wasn't verbalize as much as possible and to provide tactile experience when possible, 3) test adaptation is another concern for visually impaired students. Students will use laptop to access exam questions from lecture, they will type an answer in word or excel file to send to lecture's email or save in flash disk. Some lectures rejected to let them use laptop, due to website and google access can make them easier to connect and find an answer, 4) lecture rejected to give them an additional time in exam session, due to another concern of class time is very tight to continue to another class scheduled, 5) lecture provided class material in hardcopy, 6) lecture provided class material in image (for example photo, screen shoot), which can't read by NVDA software, 7) lecture provided test material in hardcopy, especially for math test, 8) lack of buddy or volunteer to assist them in the class, 9) lack of lecture who willing to give an extra time to student in our of class time; 10) lack of books which refer to study in university can be accessed in soft copy file or e-pub library, 11) lack of math lecture who train with appropriate math teaching technique for visually impaired students, 12) lack of facilities to optimize learning program (for example: electronic magnifier, goe board, abacus), 13) lack of technology to

accommodate student who prefer use braille to answer math or science exam and graph, 14) lack of technology to convert image, picture and graph to accessible format for visually impaired students, 15) different Indonesia's Braille standard with another Braille's format with another countries create a new challenges in software application which convert equation to braille, Indonesia need application which convert normal equation to braille and vise versa, 16) lack of student in logical knowledge, 17) lack of basic math knowledge of visually impaired student, due to some of them studied at SLB (Special need school) [20] [21] or if they studied at inclusive high school, lack of math teacher who appropriate knowledge and competence to deliver math study to visually impaired student, 18) lack of lecture , volunteer and shadow lecture effort to assist visually impaired student, 19) communication challenge between student and lecture.

Online learning process challenges for visual impairment students at IT major, especially in Covid-19 pandemic period are 1) lack of enough time to learn a lesson and completed class forum assignment,

2) a lot of task given by lecture with tight time, 3) overlapping forum and exam assignment time in same day or time, 4) lack of comprehensive explanation from lecture, 5) Lack of more verbalize learning method from lecture, 6) math equation, graph and course material provided in image format which can't be read by NVDA application and pdf scanner machine, 7) lack of communication between student and lecture, 8) Lack of internet facilities, 9) Lack of access to book course referenced by lecture.

Observation and interview resulted from 3 of visually impaired students who as a pilot project to study in IT major at University, researcher founded that their academic score (IPK) range around 3.2 to 3.6, which is a great result in cum laude level. Currently they are in 7th semester. They already studied for 49 courses (1st to 6th semester). Researcher reviewed from score result report from 3 of visually impaired students, there are 12 courses which most challenges and have a low score result are 1) basic physics, 2) informatica logic, 3) calculus 1 and 2, 4) physic practicum, 5) operation systems, 6) mobile

programming, 7) graphic computer, 8) data basis, 9) research methodology, 10) Operational research technique, 11) Automata and language theory, 12) computer graphic. 12 of 49 courses are

challenges, it's about 24% courses. The course challenge with math and course which relate to image, and plot process. These courses delivered in social distancing period, therefore online learning delivery method for these courses. These courses challenges weren't only because lecture provide class material in image format, graph, and plot courses, but some of challenges come from communication issue between students and lecture, tight time and overlapping to complete assignment and exam.

Solution for learning method challenges for visually impaired students who study in IT major are :

1) students, important focus in admission new student process, there are assessment to identify about student logical and math knowledge; students attitude and emotional; resilient students and high motivation to study at university; communication skill to help student in communication way with lecture, class mate, and university management; proactive students; computer skill; windows application skill; word, excel and power point skill; file documentation application skill (pdf , zip, merge, compressing file); website access skill; math type literacy skill; 2) lectures, to develop readiness lecture to teach visually impaired student in the class, and well accommodation in learning process. 3) Teaching strategy, to develop readiness learning program for visually impaired students, 4) Assistive technology, to implement readiness of assistive technology to support learning program for visually impaired students, 5) Managements, strong support from PLD UNPAM management.

Visually impaired students in IT study program can get success in their study, in the 1st stage are if they have a strong logical thinking, math knowledge, resilient, good attitude and morale, good communication and good motivation to study, 2nd stage of following support to complete their success are strong support from lecture, shadow lecture, volunteer/budy, and PLD UNPAM, 3rd stage of their success are strong support of assistive technology, 4th stage is strong support of university environment. Their disabilities wasn't an obstacle to be a success student in IT study program.

4. CONCLUSION

Researcher concluded this study to some of following conclusion are; strong leadership and management of PLD UNPAM is important to implement inclusive University; inclusive university

should well implement of assistive technology in learning program for visually impaired students, especially in IT major; strong logical thinking, math knowledge, motivation and good attitude are important requirements to be a student in IT major for visually impaired students; learning method solution in UNPAM University to implement inclusive university, especially for visually impaired student in IT study program can be classified to 5 categories solution which should be managed, implemented and controlled by PLD UNPAM are; readiness of visually impaired students to study, lecture, teaching strategy, assistive technology, and strong PLD UNPAM management.

Researcher found below suggestion for next research are; quantitative research; methodology of the next research and perfect research result; research other visually impaired students who studied in IT major in another university (if any) to be a sample research to get a real Indonesia's students population and sample and generate a result which a significant contribution to nation; research other visually impaired students who studied in IT major in another university in ASEAN countries to be a sample research to get a big contribution to ASEAN and especially for nation; research entrepreneurship of visually impaired students to generate more young entrepreneur of Indonesia which contribute to economic growth of Indonesia.

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