

# ASSTECH APPLICATION BASED E-LEARNING SYSTEM TO IMPROVE THE QUALITY OF 21ST CENTURY INCLUSIVE EDUCATION

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## **Abstract**

This study aims to describe digital optimization E-learning system based on "ASSTECH" to improve the quality of 21st century Inclusive education. E-Learning system is an effort digital to facilitate the learning process and strengthening values in each subject to students who have special needs. In the context of inclusive education, E-learning systems based on Asstech adjusted to the characteristics and needs of students, such as JAWS functions to change text into sound, i-CHAT to help strengthen hearing, websites and other learning media designed for students with special needs. This study uses a qualitative approach that seeks to obtain and collect and process, analyze and define data qualitative. The qualitative approach in this research various library sources such as prociding papers, journals, newspapers or magazines, reference books and so on which are then constructed as a critical thinking framework so that this approach is expected able to provide accurate about E-Learning Based Learning Technology "Asstech" in improving the quality of 21st century inclusive education.

**Keywords:** *e-learning system; ASSTECH; inclusive education.*

## **A. INTRODUCTION**

Law No. 20 of 2003 concerning the National Education System explains that "Education is a conscious and planned effort to create an atmosphere of learning

and learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble character , as well as the skills needed by himself, society, nation and

country"<sup>1</sup> Inclusive education is a form of implementation of the National Education System Law as well as an effort to equalize education for all (education for all) as the formulation of global policies issued by UNESCO on education for all (Education for All) since the 1990s. that education must touch and be felt by all walks of life without recognizing racial, ethnic, cultural, national, linguistic and even religious differences, therefore every difference that students have should be a positive energy for the successful implementation of inclusive education (specifically) so that the presence of students those with special needs do not become obstacles to the learning process and communication and interaction between diverse learners in an educational unit.

Therefore, the inclusive education system that must be developed is education for all (education for all) which is held in an innovative, dynamic, uplifting and progressing manner and adjusts to the phases of the psychological development of students. So that inclusive education can also be understood as a form of educational reformulation that emphasizes anti-discrimination, bullying, anarchism and based on the principles of justice and equality. Thus it can be understood that inclusive education is an ongoing learning process along with the level of psychological development and limitations of the students which contain transformative creative efforts to find the best solution for educational obstacles experienced by students. In the implementation of inclusive education, it takes special teachers (PGSLB) who have expertise and specific skills and competencies that are able to transform scientific discipline and strengthen noble values through strengthening and empowering various learning technologies that continue to develop massively.

Strengthening internet-based learning technology (e-learning) is one of the

innovative steps to describe tangled threads in learning / inclusive education as well as making it easier to achieve goals and even improve the quality of inclusive education in general. In an inclusive education system there are four main components namely Physical Environment, Teaching Procedures, Teaching Content and Use of Adaptive Equipment. One of the most important components in learning that must be considered is the use of tools / media that are appropriate to the needs of the child (Use of Adaptive Equipment). The intended tools / media are all things that are the result of both simple technology (low technology) and modern / sophisticated technology (high technology) that can be used as learning technology in improving the quality of inclusive education (assistive technology)

The presence of various internet-based learning technologies (e-learning) has become a new moment for the implementation of education, especially those that accommodate students with special needs. E-learning is another term for electronic learning, which is a learning process that uses electronic media as a learning system. E-learning is a form of implementation of the development of information and communication technology that is currently developing very quickly and without limits (unlimited). So that the strengthening of learning technology (e-learning) based on Asstech is expected to be able to facilitate the process of knowledge transformation (knowledge) as well as the development of skills (skills) of students especially those with special needs.

## B. RESEARCH METHOD

The approach used in this study is a qualitative approach that seeks to obtain and collect and process and even analyze and define data qualitatively.<sup>2</sup> In this

1 Undang-undang no. 20 tahun 2003

2 Bachtiar, W. *Metodologi Penelitian Ilmu Dak-*

research, the writer conducted a literature study, which is a research study whose data is sourced from library materials such as scientific books, magazines, journals, newspapers and even other documents in the form of websites (internet) that contain the required information. The collected data is then classified and analyzed based on content analysis techniques, which is a data analysis that is carried out carefully, objectively and systematically.<sup>3</sup> The data analysis process uses varied inductive and deductive logic, as is commonly used in qualitative research. On the other hand this study also uses analysis and data processing of the results of observations, interviews and documentation through data reduction, presentation and conclusion (verification) activities.

Test the validity and validity of the data and check the validity of the data is done by triangulation techniques<sup>4</sup> Therefore the validity of a data must be able to reveal and clarify the data with actual facts in the field. So that this research approach is expected to be able to describe at the same time find new perspectives that are comprehensive and whole about strengthening learning technology based on "asstech" in improving the quality of 21st century inclusive education

### C. RESEARCH RESULTS AND DISCUSSION

1. Perspectives on Learning Technology in Inclusive Education
  - a. Analysis of Learning Technology

The rapid development of science and technology today has changed the paradigm

of learning from conventional learning to digital learning. The use of digital learning media is no longer as something new or even strange but has been widely used and actualized in the learning system in this country. The use of information technology in the learning process is more popular with the term e-learning. E-Learning system is a form of application of information technology advancements in the field of education, so that in the learning process using and utilizing digital technology based on applications or hardware (hardware) as a medium / learning aid. The implementation of e-learning based on asstech is proven to ease the task of educators in delivering subjects both to normal students and those with special needs such as the blind, the hearing impaired, the hearing impaired, mentally disabled, low learning or others. According to Hamalik that the use of learning technology can arouse desire, interest and motivation to learn and even provide psychological effects that are extraordinary.<sup>5</sup>

E-learning is an abbreviation of electronic learning, namely the learning process that uses electronic media, especially the internet as a learning system. E-learning is a product of the development of information and communication technology today, especially in the field of education. According to Gilbert & Jones e-learning is the delivery of learning material through an electronic media such as the Internet, intranet / extranet, satellite broadcast, audio / video tape, interactive TV, CD-ROM, and computer-based training (CBT).<sup>6</sup> Whereas in the formulation of the Australian

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wah. Cet.ke-1. *Wacana Ilmu*, Logos Jakarta. 1997. H. 17

- 3 Muhadjir, N. *Metodologi Penelitian Kualitatif*. Edisi ke-4, Cet. ke-1. Rake Sarasin, Yogyakarta, 2000. H. 38
- 4 Sudarwan Danim, *Menjadi Peneliti Kualitatif*, (Bandung:Pustaka Setia, 2002), hlm 26

- 5 Oemar Hamalik. (1986), *Metode Belajar dan Kesulitan-kesulitan Belajar*, .Bandung: Tarsito, h. 17
- 6 Gilbert, S. and Jones, S. (2001) "E-learning is e-nourmous: Training over the Internet has become the fastest growing workplace performance improvement tool---and utilities are using it in several ways", *Electric Perspective*, Vol. 26 No.3, May/June, pp.66-82.

National Training Authority (ANTA) in Hartley explained that e-learning is covering applications and processes that use various electronic media such as the internet, audio / video tape, interactive TV and CD-ROM to send learning materials more flexibly.<sup>7</sup> In line with the above opinion Jaya Kumar C. Newspaper explained that e-learning as a form of learning that uses electronic circuits (LAN, WAN, or internet) to convey the contents of learning, interaction, or guidance.<sup>8</sup> Then Rosenberg emphasizes more that e-learning refers to the use of internet technology to deliver a series of solutions that can enhance knowledge and skills.<sup>9</sup> Darin E. Hartley stated that Elearning is a type of teaching and learning that enables the delivery of teaching materials to students using the Internet media, or other computer network media.<sup>10</sup>

Based on some of the opinions above, it can be concluded that e-learning is a learning process that in its implementation uses electronic media as a tool (learning technology) to facilitate the process of delivering subject matter so that it can achieve educational goals more easily, effectively and efficiently.

#### b. Description of Inclusive Education

Minister of National Education Regulation (Permendiknas) number 70 of 2009 explains that inclusive education is an education system that provides services and opportunities for all students who

have disabilities and limitations or have special needs to attend learning in a school environment so that they can develop according to their level and developmental phase in general.<sup>11</sup> Zaenal Alimin Inclusive Education is education specifically organized for children who experience learning disabilities and other developmental obstacles caused by the special needs of both permanent and temporary nature.<sup>12</sup>

In the 2003 Unesco formulation, it was formulated that inclusive education is an educational service specifically for children with special needs to learn and develop together in accordance with their limited conditions.<sup>13</sup> Whereas in the formulation of the AGRA Seminar and South African Policy inclusive education includes a more detailed understanding of:

- 1) Broader than formal education which includes formal and non-formal education, education at home and the community
- 2) Give an opportunity for every child to learn
- 3) Enables the structure, system and methodology of education to meet the needs of all children
- 4) Respect for differences and limitations that each child has (age, gender, ethnicity, language, disability and HIV / AIDS status and so on)
- 5) As a dynamic educational process in accordance with the development of the culture and context of the surrounding community
- 6) As part of a broader strategy of inclusive

7 Darin E. Hartley, *Selling e-Learning*, American Society for Training and Development, 2001

8 Jaya Kumar C. Koran (2002), *Aplikasi 'E-Learning' Dalam Pengajaran Dan Pembelajaran Di Sekolah-Sekolah Malaysia: Cadangan Pelaksanaan Pada Senario Masa Kini*, Pasukan Projek Rintis Sekolah Bestari Bahagian Teknologi Pendidikan, Kementerian Pendidikan Malaysia, h. 26

9 Rosenberg, M. , *E-learning: Strategies for delivering knowledge in the digital age*, McGraw-Hill, New York, 2001, h. 73

10 G. Darin E. Hartley, *Selling e-Learning*, American Society for Training and Development, 200, h. 12

11 Kustawan Dedy dan Hermawan Budi, (2013), *Model Implementasi Pendidikan Inklusif Ramah Anak*, Jakarta: PT Luxima Metro Media.

12 Alimin, Zaenal, 2011, *mengembangkan Inklusifitas dalam Pendidikan*, Makalah, Jakarta : Plan Indonesia.

13 Nuraeni, 2014, *pendidikan Inklusif di Lembaga PAUD*, Jurnal Kependidikan Edisi, Desember, Vol, 13.

socialization efforts.<sup>14</sup>

From some of the opinions above, it can be concluded that inclusive education is an educational service that is specific to students who have limitations and special needs regardless of physical, psychological, intellectual, social, emotional, even language or other limitations so that they remain together can study and develop normally. Therefore inclusive education must be implemented based on the paradigm of: Children / Students (Psychology review)

- 1) All children have strengths, intelligence and limitations
  - a. All children need support and facilities for learning
  - b. All children have the right to achieve success in their respective lives
- 2) Education
  - a. Perspectives on education have a broader meaning than just the meaning of formal schooling
  - b. A fun, adaptive, flexible and even responsive educational system
  - c. Supporting environment and educational community (child friendly)
  - d. The quality of schools that continues to increase and effective and efficient implementation
  - e. A comprehensive and humanist school approach
- 3) Diversity
  - a. Eliminating exclusive forms of discrimination and social disposition
  - b. Diversity is the main inspiration for progress
  - c. Inclusive education will inspire people to respect and respect

<sup>14</sup> Smith, David. (2006). *Inklusi, Sekolah yang Ramah untuk Semua*. (Terjemahan). Bandung: Penerbit Nuansa

differences

## 2. 21st Century Education between Prospects and Challenges

The main characteristic of the 21st Century is the more unification of science and technology, so that the synergy of the two becomes increasingly unstoppable. Related to the use of information and communication technology (ICT) in the world of education, has resulted in the increasingly fused dimension of "space and time" which has been a determining factor for the speed and success of human mastery of science and technology. This phenomenon is actually a separate prospect in the 21st Century, it is demanded to be able to create an education system that can participate in the formation of the quality of human resources as agents of social change that can participate and participate in building a knowledge-aware social order that is "human 21st century. Various efforts in the context of improving the quality of education continue to be made in accordance with the demands of the development of the era of digital technology that continues to develop. Therefore the phenomenon of digitizing education in the 21st century should be constructed as a momentum to work and innovate in the process of implementing progressive inclusive education.

The various challenges of 21st century education (in particular) progressive inclusive education are as follows:

### a. *Globalization in Education*

Globalization arises due to the expansion of advanced industrial countries that have succeeded in producing high-value and needs-based technology by integrating the potential of appropriate infrastructure and technology, so that it can be understood that the phenomenon of globalization initially occurred in the

economic and industrial world. The process of industrial and economic globalization that developed massively since the 2.0 to 4.0 era has now penetrated the globalization and even the digitalization of the world of education. so that the technology of learning (education) is also experiencing extraordinary developments and requires science engineering and technology that is more friendly and public-based (community and school residents). This is where the importance of the development and empowerment of studies, seminars, workshops and even research (Project research) conducted professionally and continuously.

b. *Culture and Nation Character*

In the opening of the Constitution it was stated that one of the goals of the formation of the Indonesian state government was to "advance public welfare, and educate the nation's life. This paradigm was then actualized in law number 20 of 2003 concerning the national education system, namely the formation of Indonesian people who have spiritual power, scientific excellence and moral and social shifts. Therefore educational objectives must be formulated in scientific concepts and perspectives that are integrated in curriculum units and their level of achievement can even be measured and even formulated and detailed in the development and strengthening of technology and learning media.

c. *Virtualization to the Cyber Society*

The development of internet technology has reached a fantastic level of progress that is not even hindered by any power, so that it allows everyone to interact virtually either individually or in groups. The phenomenon of digitizing technology in the form of unlimited internet connections causes the rapid flow of its development beyond the limits of human intellectuality in general. The emergence of cyber skills with internet control through the Cyber Physical System

(CPS) and the Internet of Things and Services (IoT and IoS) as its main foothold has been able to reduce the building of human thought (meandset) in general which later became popular with the term Disruption society era.

Disruption society as the real change and global word system in the 4.0 era continues to develop massively and change the life style (life style) of humans. The presence of the internet and the ease of accessing it have caused social interaction and communication models to be unlimited by geographical, spatial and time (unlimited) even physical activity in the real world began to shift and be replaced by digital activities that occur in cyberspace (virtual) so it does not rarely noise in cyberspace becomes a trending topic that is integrated with the real world.

3. Perspectives on As Tech (assistive technology)

According to the United States' Technology-Related Assistance for Persons with Disabilities Act *assistive technology devices..are any item, place of equipment or product system, whether acquired commercially of the shelf modified, or customized, that is used to increse, maintain, or improve functional capabilities of individuals with disabilities.*<sup>15</sup> Sementara itu Wobschall dan Lakin menjelaskan bahwa *assistive technology is just a subset of tools used by human being, providing in ways and places that are needed by relatively few people with significant impairment in `normal' physical, sensory, or cognitive abilities.*"<sup>16</sup> Thus Assistive technology is essentially all kinds of objects or tools that are modified or directly

15 Skjoren, D. Miriam. (2001). Education-Special Needs Education An introduction. Oslo: Unifub

16 Dahl, T. I., Bals, M., & Turi, A. L. (2005). Are students' beliefs about knowledge and learning associated with their reported use of learning strategies? *British Journal of Educational Psychology*, 75(2), 257-273

used to improve or maintain the ability of disabled students, so that learning media and technology used must be adjusted to the limitations and needs of each student.

Learning media or technology must have appropriate use and renewable value so that it is easily utilized by students, especially those with special needs. The asstech-based e-learning system process in inclusive education is one of the learning strategies implemented to facilitate students with special needs in accessing and receiving even understanding the subject matter. This technology is referred to as "Assistive Technology".<sup>17</sup>

#### 4. Strengthening Asstech-based E-Learning System in Improving the Quality of Inclusive Education (Reflections on research results)

Asstech-based e-Learning system is an effort to improve the quality of inclusive education by maximizing the function of technology-based learning media in the form of software and hardware. Thus it can be concluded that the presence of technology-based learning tools / media is needed, to facilitate students to capture and understand the contents and subject matter. Improved learning technologies in inclusive education are as follows:

##### a. *Blind Students*

These students need tools that can modify the reading text into Braille writing. Because blind people have limitations in the sense of sight, the learning process must emphasize the use of other senses, the sense of touch and the sense of hearing. Therefore the principle that must be considered in providing teaching to blind students is that the media used must be tactual and sound, such as the use of braille writing, embossed

images, model objects and tangible objects. while the media that is voiced is a tape recorder and Screen Reader software including JAWS, Thunder, which is used to convert text on the monitor screen into sound.

##### b. *Deaf students*

Deaf students are individuals who have obstacles in terms of hearing both permanent and not permanent. Deaf classifications based on the level of hearing loss are: (1) Very mild hearing loss (27-40dB), (2) Mild hearing loss (41-55dB), (3) Moderate hearing loss (56-70dB), (4) Hearing loss weight (71-90dB), (5) Extreme hearing loss / deafness (above 91dB) experienced by someone sometimes also causes obstacles in speaking so they are called speech impaired. The way to communicate with this sufferer must be by using sign language.

Lately in schools - schools that are implementing inclusive education systems are being developed total communication systems namely how to communicate involving verbal language, sign language and body language, because people with hearing impairment tend to have difficulty understanding the concept of something abstract. Thus, E-learning for deaf students is certainly different from students with other special needs. therefore learning for deaf students must use cues as media interfaces either exhibited in the form of video (information over video) or only symbols containing certain expression images so that they can be understood as special cues that continue to be taught and implanted in a sustainable manner . So that e-learning itself must be interesting, it can be observed clearly (eye chat) considering that the main sensory tool for deaf students is their sense of sight.

In 2010, TELKOMRDC in collaboration with the Indonesian National Federation for the Deaf Welfare (FNKTRI) made an extraordinary breakthrough related to

17 Learning.Hermawan, Budi. (2003). *Pedoman Implementasi Pendidikan Inklusif*. Bandung: Dinas Pendidikan Nasional Jawa Barat.

efforts to provide facilities for deaf students to carry out their activities especially in the learning process. Trobosan is in the form of an application and portal named I-CHAT (I Can Hear and Talk). This application is designed with two models offline and online. In the form of online the user must install the program on his computer while in online mode the user can run this application by accessing the i-CHAT site. in <http://www.i-chat.web.id>.

I-Chat (I Can Hear and Talk) is an application that serves as a tool for deaf children in the capture or acquisition of language.<sup>18</sup>

c. *Deaf Students*

Tunadaksa is an individual who has a movement disorder caused by neuromuscular abnormalities and bone structures that are congenital, sick or due to accidents, including cerebral palsy, amputation, polio, shadow which gives painstaking and patient guidance so as to enable many students to move to function themselves in 1 (one) learning media component such as a mouse controlled by virtual software. For example, if the fingers can still function even if it is not perfect then by clicking on the N-Type students will be able to type certain letters or characters without pressing the button on the available keyboard

d. *Tunagrahita and Tuna Laras students*

Mental retardation is an individual who has intelligence that is significantly below average and is accompanied by an inability to adapt behaviors that arise during development. Therefore the learning process for mentally retarded students is more focused on the ability to develop themselves and socialization. The application that is usually used for mentally disabled students

is SIDoBi, an application that can provide guidance slowly to students to understand the subject matter.

While Tunalaras are individuals who experience obstacles in controlling emotions and social control. This individual usually shows deviant behavior that is not in accordance with the norms and rules that apply around him. Tunalaras can be caused by internal factors (genity) and external (environment). The media used in this study are media / technology that is possible to control emotional control and social behavior, such as interesting animated videos with soft voices to give direction, and psychological influence.

e. *Learners Learning Difficulties*

Are individuals who have disorders of one or more basic psychological abilities that include understanding and using language, speaking and writing that can affect the ability to think, read, count, speak due to impaired perception, brain injury, minimal brain dysfunction, dyslexia, and aphasia development. Individuals who have learning difficulties usually have an average or above average IQ, experience motor-perception-motor disturbances, impaired movement coordination, impaired orientation direction and space and delay in the development of concepts.<sup>19</sup> Here are some software / software that can be used for students who experience delays in thinking and others

1) *Number Navigator*

A software that can help students who experience fine motor disturbances to perform arithmetic operations in rows and columns, without the need to work on a spreadsheet<sup>20</sup>

2) *Graph Calc :*

A kind of GUI version of the calculator

18 Rahman, Muhammad. (2015). Penggunaan Media I-CHAT dalam Meningkatkan Kemampuan Penyusunan Struktur Kalimat pada Anak Tunarungu Kelas 1 SMALB di SLB-B N Cicendo. *Skripsi*. Universitas Pendidikan Indonesia.

19 [do2learn.com](http://do2learn.com)

20 <http://www.oatsoft.org/Software/NumberNavigator>

that can be run on Windows. This device can help students with fine motor problems so they are not skilled in using ordinary calculators<sup>21</sup>

3) Empower Program (EFOFEX):

A software that can be used by science teachers and students who need to draw mathematical diagrams, mathematical formulas, graphs of physical and chemical functions, statistical charts, geometric diagrams, network diagrams, circles, venn diagrams and tree diagrams.<sup>22</sup>

4) VOCAROO :

A free service for making voice recordings without the need to install a program on a computer.<sup>23</sup>

5) Natural Reader :

A device that can be used to convert text into sound. Files that can be converted are documents, pdfs, web pages and e-mails. The results of the conversion can be saved in the form of MP3, WAV and can be run on a CD player or iPod.<sup>24</sup>

6) Strategy Tutor :

A tool designed to help students and teachers in reading and researching through the internet. This tool becomes very important for students who have difficulty in gathering and coordinating various kinds of information originating from the internet.<sup>25</sup>

7) Do To Learn - Facial Expression :

This website contains links with many resources that can be used for students who have different limitations. On this website there is also a facial expression game, which allows users to experiment with various facial expressions with different emotions. This will be very

useful for people with Autism Spectrum Disorders.<sup>26</sup>

The effectiveness of the use of learning technology for students with special needs is highly dependent on maximizing the limitations that each student has. Therefore the use and development and even strengthening of this asstech-based learning technology must be based on "needs assessment", namely the deepening of the limitations of each student condition. On the other hand, the strengthening of learning technology must be carried out continuously (unlimited) so that students with special needs will transform into a skilled generation that is strong and able to adapt and even compete with the development of world civilization in the 21st century.

#### D. CONCLUSIONS

1. Children with special needs, integrated education, and inclusive are a series of components that cannot be separated. On the basis of equality and orientation towards the achievement of shared education goals (education for all), students with special needs whether divided into normal schools in general or special schools (SLB) need special tools including information technology. Through assistive technology, they are expected to be able to participate in learning as other children in the inclusive class.
2. The term Assisive Technology refers broadly to any technology that can develop the abilities of children with special needs who face learning obstacles so that they can participate in learning. Therefore, a variety of materials, services, systems and equipment can be considered as assistive technology, if it helps children with special needs in

21 [www.graphcalc.com/download.shtml](http://www.graphcalc.com/download.shtml)

22 [www.efofex.com](http://www.efofex.com)

23 <http://vocaroo.com>

24 <http://naturalreaders.com>

25 <http://cst.cast.org/cst/auth-login>

26 <http://dotolearn.com>

learning. For example, material such as books recorded on tapes, services such as note-takers and tutors, systems such as braille, and equipment such as large-button calculators and computers can be considered assistive technology.

3. Inclusive education is not only an extraordinary educational responsibility, but also a joint responsibility of the education unit, government, parents and even the community. Therefore, improving the quality of both PGSLB teachers and general teachers who are specifically trained for inclusive learning must always be improved in accordance with the very rapid development of science and technology.

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