

Simulation Learning Integrated with Smartphone as a Complementary Learning for Children with Special Needs (Mentally Disabled)

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Abstract—The existence of a smartphone (HP) has a special phenomenon for education especially for students. Presence that offers sophistication to be Able to access all information across the world with a very fast, easy and inexpensive. The process of media development will be equipped with software development method using the Software Development Life Cycle (SDLC) with Waterfall - based models. Learning simulation models integrated into smartphone in this case using a Blackberry Z10 can be used by students with disability as a means of learning activities with animation and interactive simulations, Thus through this medium may indirectly be a complement to the real learning. Smartphones are an excellent example of technology with the potential to enhance the teaching and learning experience of children with disabilities. The results of the simulation media expert assessment of learning models are integrated with a smartphone with a very good 4:47. Learning Simulation can be supportive (complimentary of the real Learning) in secondary schools, especially schools disability makes it more portable and more attractive.

IndexTerms—Simulation Learning, smartphone, Mentally Disabled

I. INTRODUCTION

Every citizen has the same opportunity to obtain education (UUD 1945 Pasal 31, Ayat 1), as well as in the National Education System Act No. 20 of 2003 the eleventh section of Article 32 states the government's obligation to hold Special Education, which is education for participants Students who have difficulty in following the learning process because of physical, emotional, mental, social, and / or have potential of special intelligence and talent. This shows that children with disabilities (children with special needs) are entitled to have equal opportunities with other children (normal children) in education. The application of inclusive education has a strong filosofis, juridical, pedagogical and empirical foundation. In the Law Number 20 Year 2003 also states that the implementation of education for children with special needs or have extraordinary intelligence held inclusively or in the form of special schools in this case SLB (Extraordinary School). Children with special needs usually attend special schools (SLB) in accordance with their specificity. SLB section A for the visually impaired, SLB part B for Deaf, SLB part C for mental disorders, SLB part D for body abnormally, SLB section E for tunalaras and SLB section G for double defect.

Children with special needs generally consist of children who experience delays and disruptions in their development so that special treatment is needed to improve the ability of children with special needs. After conducting a survey at several SLB in Makassar, it was found that the conventional delivery of materials from teachers resulted in an uncomfortable situation so that the students 'interest to study certain materials was very low, therefore a learning method was needed that could attract students' interest in following the lesson. Though children with special needs also have the potential of extraordinary knowledge (www.bpdiksus.org). One of their potentials is vocational skills. This is seen in the SLB Negeri Pembina Tk.1 South Sulawesi Province PKPLK centers (as partners), managing vocational education within the school. Therefore, the author tries to provide solutions by making learning tools based on ICT and Multimedia that aims for learning and training, is expected to increase the interest of SLB students on school subject matter and can facilitate vocational skills.

The use of media should be tailored to the characteristics of children especially for children with special needs definitely require a special device as well, one effective method used is through a constructivist approach. Digital media intended for blind children is of course different from the media used for hearing impaired, as well as for other children with special needs. Media as a teaching tool that also influences climate, condition and learning environment arranged and created by PLB (Pendidikan Luar Biasa) teachers. One example of media that can be used for the blind is screen reader software, to convert text into sound, while for the hearing impaired can utilize video for the learning media.

Indonesia is the world's largest market for mobile phone vendors. Average Indonesian people have more than one mobile phone per person. The use of mobile phones used by the public lot. It is not independent of several factors such as: cellular telephone network infrastructure that has been constructed in the entire country. In addition, the cost of use (for new temporary conversation costs) should be fairly cheap. And factors completeness of existing features in a mobile phone is its own attraction for people not to bring cell phones off wherever they go.

The Mobile Phone (HP) has a special phenomenon for education especially for students. Presence that offers sophistication to be able to access all information across the world with a very fast, easy and cheap. Hand Phone communication tool at this time had not a luxury, and almost most of high school students have. The existence of such a device can be perceived benefits to establish communication between friends and even between students and teachers or vice versa. In communities such objects are

not exclusive items, something unusual. When there is a prohibition to bring HP to school in high school, became something odd, because the age of high school students, is a critical period that is able to bring the child to a critical attitude towards himself and his environment (also the products of technology), and the public has been able to accept the presence of these technologies.

The use of information technology (IT) to support the academic activities of students into one of the alternatives in improving student achievement. Unfortunately, the use of information technology which has now become a medium of learning effective and widely used by students, it is rarely touched students with special needs. Students mental disorders generally have barriers to learning that includes constraints related to the problems of development: cognitive, motor and adaptive behavior. Difficulty learning for children with intellectual challenges occur because motor response the child does not develop into motor patterns, consequently retarded child's motor skills are low and occasionally less varied. Every child who needs more like mental retardation have the ability to move different, depending on the condition of the body. Though they have the same permissions, same potential and undifferentiated in receiving education. Looking at the above phenomenon, then designed a simulation study using smartphones to high school students with intellectual challenges.

Basic Concepts of Mobile Learning

The use of information and communication technology in the world of education continues to evolve in various ways and strategies, which in the discussion can be grouped into e-Learning system as a form of learning that utilizes electronic devices and digital media, as well as mobile learning (m-learning) as a form of learning The special use of mobile communication devices and technologies. The high rate of device development, the relatively easy rate of usage, and the increasingly affordable price of devices, rather than personal computer devices, are the driving forces that increasingly dominate the opportunities of using or implementing mobile learning as a new trend in learning, which forms a learning paradigm that can Done wherever and whenever

Mobile learning[1]as: "The intersection of mobile computing and e-learning: accessible resources wherever you are, powerful search capabilities, rich interaction, strong support for effective learning, and performance-based assessment E-Learning does not depend on location in time or space". Based on the definition, mobile learning is a learning model that utilizes information and communication technology. In the concept of learning mobile learning brings the open benefits of teaching materials that can be accessed at any time and interesting material visualization. The term M-Learning or Mobile Learning on the use of handheld devices such as PDAs, mobile phones, laptops and technology devices that will be widely used in teaching learning, in this case on mobile devices (mobile phones). The purpose of mobile learning development itself is the process of learning a long time, students / students can be more active in the learning process, it takes time because it is necessary in the learning process so students do not need to be required in the classroom only to collaborate tasks, which are sent through applications on mobile phones Will indirectly improve the quality of the learning process itself [2].

Children with Special Needs

In the world of education, special needs is a term for children with disabilities, which is not experienced by children in general. Children with special needs (children with special needs) are children with special characteristics that are different from children in general without always showing in mental, emotional or physical disability. Children with special needs (ABK) are children who have physical / mental deviation, mental, and social behavior characteristic. Special needs (ABK) also called children with disabilities is short for difference ability. The type and classification of ABK can be grouped as follows: a) Slow learner, is a child who has little intellectual potential below normal but not yet including mental disorders. In some cases they experience obstacles or delays in thinking, responding to social stimuli and adaptations, but still far better than mental disorders, slower than normal, b) Mental retardation, is a term used to refer to a child who has the ability Intellectuals below average. Mental retardation is also known as mental retardation or mental retardation because of the limitations of his intelligence resulting in him difficult to attend the education program in regular schools, therefore the child need a mental disorders education that has a special service that is tailored to the child's abilities; C) learning difficulties or learning disabilities is a term that refers to the diversity of the group experiencing the disorder in which the disorder is manifested in significant difficulties that may cause learning disruption; D) Body abnormality, a body abnormality means a state of being damaged or disrupted as a result of a disruption of shape or resistance to bone, muscle, and joint in its function thereby inhibiting the activities of the individual to perform normal activities; E) low vision, is someone who has far sight, but may still be able to see objects and objects that are at some specified distance. Low vision is someone who suffers from visual abnormalities in such a way but can still read large, bold letters using either visual aids or not. In Figure 1 the following will illustrate some types of special needs.

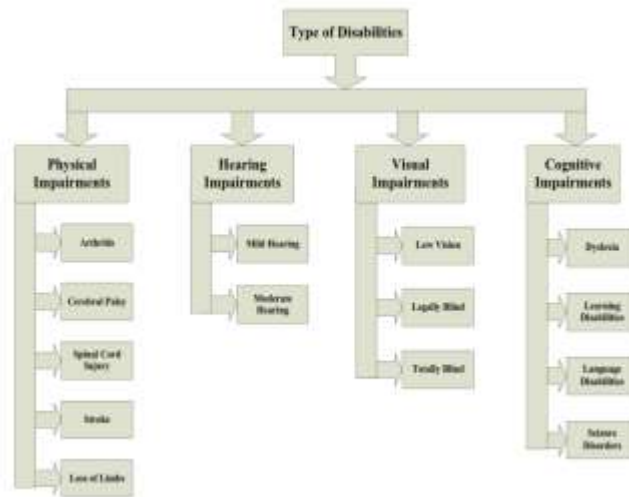


Fig 1: Species with special needs [3]

The role of Information and Communication Technology (ICT)

Information and Communication Technology (ICT) covers two aspects, namely Information Technology and Communication Technology. Information Technology, covering all matters relating to the process, use as a tool, manipulation, and information management. Communication technology is all matters relating to the use of tools to process and transfer data from one device to another. Information and communication technology in learning continues to develop along with the times. In the implementation of daily learning to utilize Information and Communication Technology (ICT) often encountered a combination of Audio / Data, Video / Data, Audio / Video, and Internet technology. The capabilities and characteristics of the internet enable the occurrence of distance learning (E-Learning) to be more effective and efficient so that can be obtained better results.

Children with special needs in using Information and Communication Technology tools to find, explore, analyze, and exchange information efficiently and effectively. Children with special needs experience difficulties based on the type of disability he suffered, so it becomes a consideration of how the use of information communication technology in the learning process. Technology has the potential to give freedom to many students in creating without restricting their disability in a way that enables them to reach their true potential[4] . Related to that advantage of using ICT is to improve the learning experience by offering a more personal environment, to "liberate students" from problems such as physical limitations[5].

II. MATERIAL AND METHODS

This research is the research and development which refers to the development of, further design development of the selected media is multimedia development model [6]. Because the major outcomes that will be generated in the form of a software research, then in the process of media development will be equipped with a special method of software development using the Software Development Life Cycle (SDLC) with Waterfall-based model.

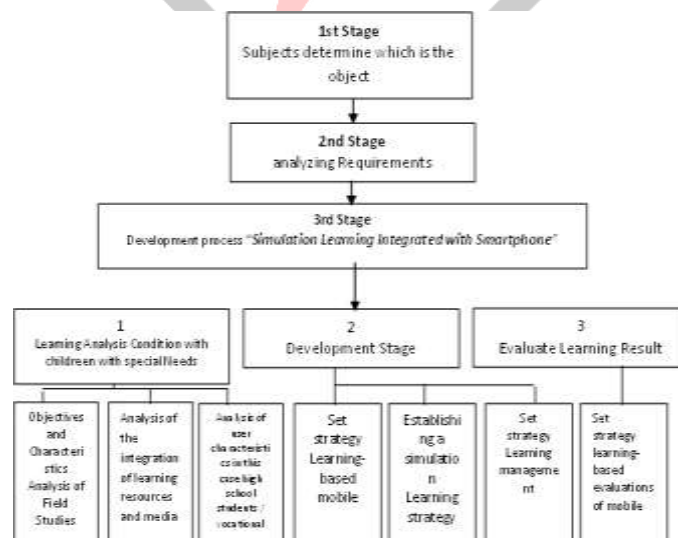


Fig 2: Development of Simulation Learning Integrated with Smartphone

Because the media developed in this study will result in the development of the final product in the form of software simulation program, then the third stage will be followed by the fourth stage of the design development adapted to the method is a method of software development SDLC (Software Development Life Cycle) with the Waterfall Model. The fifth stage is the last stage of the

design development of instructional media, which at this stage of software testing as a learning medium that includes: testing the media expert.

III. RESULT AND DISCUSSION

Smartphones are an excellent example of technology with the potential to enhance the teaching and learning experience of children with disabilities. In addition to serving as a means of communication, smartphones have the capability to run multiple applications that support and accompany students in their day-to-day activities. Assistive technology in this case smartphone technology for children needs to be Appropriate for them. This means that the products should meet children's needs and environmental conditions. It also means that they should be safe and durable, and, when applicable, they provide proper fit and support. Strategies for providing assistive technology need to consider the Principles of 5A & Q - availability, accessibility, affordability, adaptability, acceptability and quality[7].

Thus in developing applications based learning strived smartphone based on rules 5A and Q. The process of developing smartphone-based Simulation Learning in this study begins with some stage of the analysis [8]of the programming needs to be built, the support of the media, then after the completed software will be testing / debugging, packaging to the monitoring and evaluation.

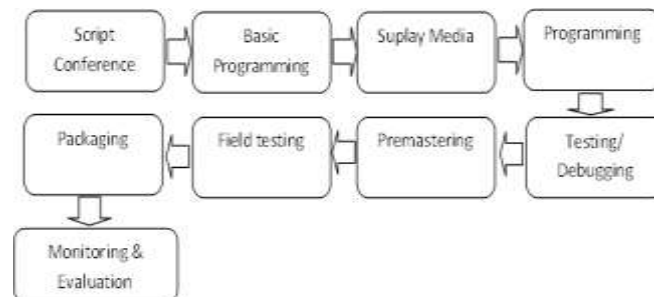


Fig 3: Development Stage, Production, and Implementation

Once the mobile learning program has been written and validation by media experts, the next stage is the stage of development / production. This development phase is based on expert advice from the media. Users come from the teachers and students who have been given a password and username. Design learning simulations adopting existing activities in the virtual lab include: modify, construct, inject, measure, and evaluate as shown in Figure 3above. In the activity students will make modifications to the media simulation what to do, then do the splicing of each component based on image sequence given in the area of "work screen", then the theory is proven through a series of tests that have been built. In Learning simulations are also facilitated with a measuring instrument for measuring the output circuit.

Learning simulation software built using Macromedia Flash Prof 8 to show the effects of animation and interactivity to medium build. Learning simulations that have been built further integrated with blackberry smartphone types. One way to use Adobe Air as shown in Figure 4.



Fig 4: Development of Simulation Learning Integrated with SmartphoneDesign of Simulation Learning via Smartphone



Fig 5: Integration Process into a Smartphone

Compilation to the bar requires ingredients such as: a) INTERNET; b) BlackBerry Graphical Aid; c) Java JDK version 1.7.0 / latest; d) Developer Cert Password, Code Signing Key, files (Client-PBDT-xxxxx.CSK and Clint-RDK-xxxxxx.csk) all obtained

when ORDER SIGN KEY; e) Application Icon 128x128 pixel resolution; f) Bar-descriptor.xml. The steps are as follows (Figure 5).



Fig 6: Compilation Process into .bar [15]

The next stage is to create a Debug Token. Debug tokens is done in order to install applications offline via computer. Debug token installation is done once and is valid for Blackberry devices for 10 days. But the important thing to do is to enable DevelopmentMode on the Blackberry device by going to settings and select the mode of development and change to ON. The first stage is done is to install the Blackberry Graphical Aid, then opened the token debug tab (Figure 6), so that will be generated files (.bar) as shown in Figure 7.



Fig 7: Debug Token Display

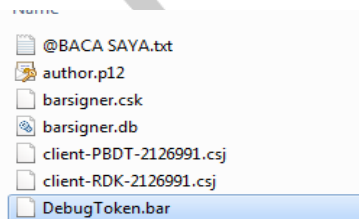


Fig 8: Debug Token Result

The last stage is to install debug token to smartphone blackberry (Figure 8). To install the file please find the location where you save the debug token.bar. The results are shown in Figure 9.

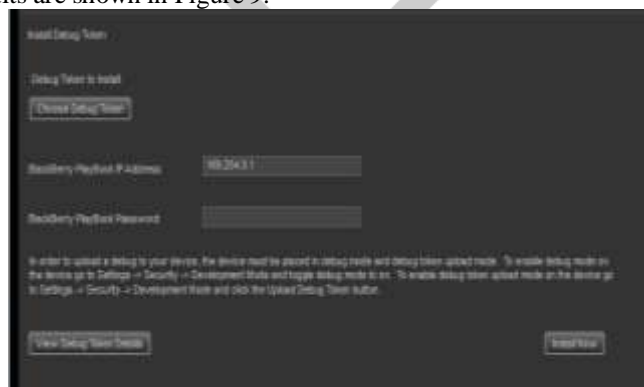


Fig 9: Installation Simulation Learning to Smartphones

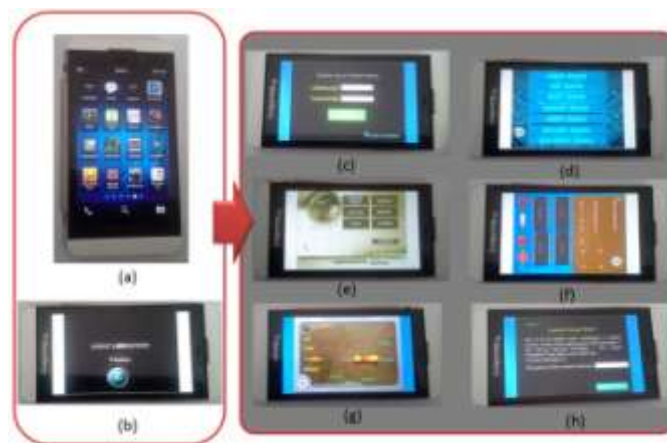


Fig 10: Simulation Learning Integrated via Smartphone. a) Menu Simulation Learning; b) Main Menu; c) Username & Password; d) Menu Learning; e) Menu Simulation Learning; f) “work screen” menu; g) tools and materials; h) exercises.

To see if a device developed is feasible to use eating required assessment by media experts. Furthermore, media experts Assessment results are shown in Table 1.

Table 1 Media Expert Assessment

NO.	ASPECT	Average Score
I.	Audio Visual	4,45
II.	Virtual Aspect	4,50
III.	Programming Aspect	4,41
IV	Integrated Via Smartphone	4,52
V	Availability Aspect	4,30
VI	Accessibility Aspect	4,21
VII	Affordability Aspect	4,35
VIII	Adaptability Aspect	4,45
IX	Acceptability Aspect	4,30
X	Quality Aspect	4,50
Average overall score		4,399

Based on the expert judgment of the display media (audio-visual) consisting of text clarity indicator, Language, Picture, Colour, Music, Layout, Animation, Simulation, Button, and the resolution obtained overall mean score of 4.45 or very good. The second assessment is a virtual aspect which consists of indicators Explanation Abstract Concepts and Complex, Real Application, Form Practicum, completeness, Animation Techniques and Images 3-D, Proof Theory, Methodology obtained a mean score of 4.50 or very good overall. The third assessment is a programming aspect which consist of indicators:Interaction, Navigation, Animation, Simulation, efficiency obtained overall mean score of 4.41 or better. The fourth Assessment assessment was obtained smartphone integration via the overall mean score of 4.52 or very good (Fig.11).

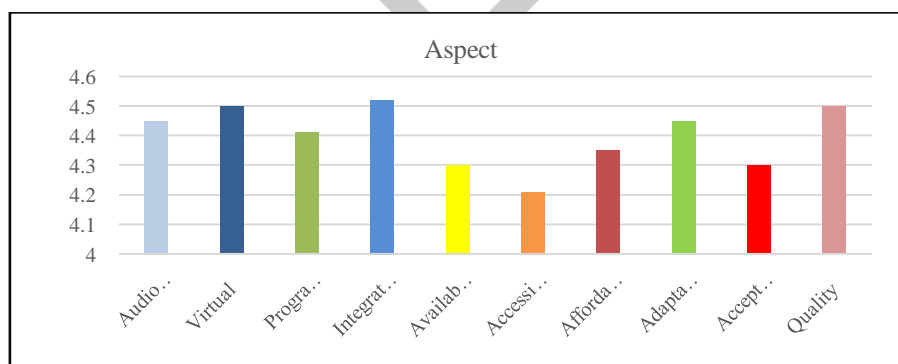


Fig 11: Graphics of Media Expert Assessment of the Learning simulation models integrated with smartphone

The characteristics of children with intellectual challenges in general: a. Learning capacity is very limited, especially for things that are abstract. b. In the association, they cannot take care of, maintain and lead themselves. c. Difficulty in concentrating d. Structure and functioning of the organism will generally be less than normal children. Media-based smartphone can cover flaws like that in the mentioned above that is able to facilitate several aspects including Availability aspect: Services and products are available in sufficient quantity as close as possible to children’s communities obtained overall mean score 4,30 or better.

Accessibility aspect conclude Services and products such as simulation learning are accessible to every child who needs them. Their delivery should be equitable to avoid discrepancies between genders, impairment groups, socioeconomic groups and geographic regions. Accessibility includes physical and cognitive access to services and information. Physical accessibility means that, for example, buildings are accessible, lighting is appropriate, signs are available in Braille, and noise levels are low. Cognitive accessibility means that verbal and written information and instructions are clear and simple, language and symbols are concrete rather than abstract, and products are intuitive and easy to use—all from the perspective of children obtained overall mean score 4,21.

Affordability Aspect - Services and products are affordable to the family of every child who needs them. Many of them will not afford assistive technology unless it is provided free of charge or subsidized obtained overall mean score 4,35. **Adaptability Aspect** - Simulation Learning are adapted and modified to ensure they are appropriate to the needs and requirements of individual children. They need to accommodate differences in terms of individual factors (for example, health condition, body structure, body function, capacity, gender, age, ethnicity and preference) as well as environmental factors (for example, physical environment, psychosocial environment, climate and culture). In addition, physical changes of children as they grow and develop need to be accommodated. How often a child should change an assistive Learning product depends on how fast he or she develops and grows, which will vary over time as well as between children. It is important to prevent new and secondary health problems such as pressure sores, pain, and deformities due to poorly adapted Learning media products. Based on the assesemen obtained overall mean 4,35 or very good.

Acceptability Aspect-Services and learning media (Simulation Learning integrated via smartphone) are acceptable to children and their families. This is facilitated by involving them in the provision process and by considering their needs, preferences and expectations. Factors such as efficiency, reliability, simplicity, safety, comfort and aesthetics should be taken into account to ensure that devices and related services are acceptable to children and their families. Although needs, preferences and expectations are individual, particularly regarding comfort and aesthetics, available designs should satisfy those of both girls and boys. Accessibility of the learning environment is necessary for using certain types of assistive technology and therefore influence the acceptability of a product. governments are responsible to ensure access to the physical environment, to transportation, to information and communications, and to other facilities and services open or provided to the public. This includes information and communication services[9].Based on the assesemen obtained overall mean 4,30 or Better.

Table 2 Assistive Technology [10]

Category	Product examples
Vision	Eyeglasses, magnifier, magnifying software for computer White cane, GPS-based navigation device Braille systems for reading and writing, screen reader for computer, talking book player, audio recorder and player Braille chess, balls that emit sound.
Hearing	Headphone, hearing aid Amplified telephone, hearing loop
Communication	Communication cards with texts, communication board with letters, symbols or pictures Electronic communication device with recorded or synthetic speech
Cognition	Task lists, picture schedule and calendar, picture based instructions Timer, manual or automatic reminder, smartphone with adapted task lists, schedules, calendars and audio recorder Adapted toys and games

Next the Quality aspect- Services and products are of an appropriate quality. Product quality can be measured through applicable technical standards or guidelines in terms of strength, durability, capacity, safety and comfort. If national standards have not been adopted, products would preferably comply with relevant international standards of the International Organization for Standardization (ISO). Based on the assesemen obtained overall mean score 4,50 or Very Good.

IV. CONCLUSION

Smartphones are an excellent example of technology with the potential to enhance the teaching and learning experience of children with disabilities. Integration of learning simulation methodology through smartphone devices is done through the existing architecture and organization of the virtual laboratory includes: modify, construct, inject, Measure, and Evaluate. The results of the simulation media expert assessment of learning models are integrated with a smartphone with a very good 4.47. Learning Simulation can play a supportive (complement of the real Learning) on a conventional learning in secondary schools, especially disability schools. It is integrated with a smartphone makes it more portable and more attractive.

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