Learning Media of Currency Introduction for Children with Light Special Needs

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Abstract

Application of Information Technology and Communication (ICT) has no longer been uncommon and has reached almost every aspect of human lives, including education and learning aspects. The learning media in this study is targeted at children with special needs. It is constructed based on the standard curriculum for mathematics, especially the topics related to numbers, measurement and currency to achieve the standard competency of being able to use currency in daily lives. Subject of this research is a group of children with special needs. These children with special needs can be identified by their range of IQ score between 50 and 70. These learning media are constructed by using Construct 2. It is a software used for building learning media without writing any source code. The learning media is tested intensively to children with special needs, with the teachers assistance in every learning section. Indicator to be measured is the ability of these children in a simulated situation. In that situation, these children are required to buy the things they want by mentioning the name of the things correctly, pointing out the value of note, executing the payment process by pointing the notes with bigger or equal values to the things' price tags, and learning the change to be accepted after the payment process. The intensity and repetition adjusted to suit the requirements of children with special needs, the media supports the teachers in visualizing of currency introduction learning topic to their students.

Keywords: learning media, currency introduction, intellectual disability

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Introduction

Application of Information Technology and Communication (ICT) has no longer been uncommon and has reached almost every aspect of human lives, including education and learning aspects. Utilization of ICT has become a principal need for supporting the effectiveness and quality of education process. Benefitting from ICT can support creativity and accuracy in developing and utilizing learning media.

According to Kemp & Dayton, learning media has eight important roles: (1) allow the learning to be passed on to be more standard; (2) learning can be more interesting; (3) to learn could be more interactive; (4) time required for learning is possible to be shortened; (5) quality of learning can be improved; (6) learning may be executed once wanted or needed; (7) positive attitude of students towards learning and its process should be able to be enhanced; (8) teachers who teach by using media can bring positive changes (Kemp & Dayton, 1980). For the purpose of promoting these roles, learning media that is correctly targeted should be the main concern.

Another argument about roles of learning media, presented by Heinich is that learning media holds an important role and it becomes one of decisive factors of successful learning activities (Heinich, 1996). Learning media also has practical values in the form of abilities or skills for: (1) turning an abstract concept to be a concrete one, for example human circulatory system; (2) carrying objects that are difficult or dangerous to be brought into learning environment, such as wild animals; (3) displaying objects which are too big to be carried into the class (i.e. temple, traditional market); (4) presenting objects that cannot be seen by using naked eyes, for example microorganism; (5) enabling students to be interacting with their environments (Arief et al., 2002).

Development of learning media is not only needed by common schools, but also by special schools for children with learning disabilities (a.k.a Sekolah Luar Biasa / SLB). SLB is an organization unit that operates in education for the purpose of assisting students with physical and/or intellectual disabilities to be able to develop their attitudes, knowledge and skills, as individuals or members of society in creating mutual relationships with social and cultural environments, with nature, as well as developing abilities at work or attending more advanced education. There is a classification of students or children with special needs in SLB, which has been structured in Government Policy. This classification includes the blind, deaf, physical disabled, mentally-disabled with lower and medium levels of disability, and social misfits. This classification is based on physical, mentally, or behavior abnormalities of the children. Subject in this paper is the group of mentally-disabled with lower level of disability one with range of IQ between 50 -70 (Daniel et al.,2012)(Yustinus, 2006).

Given the previous discussion on introduction section, a question to be answered by the research can be formulated as how to construct a learning media that can be favored by and be suitable for students SLB by benefitting from the use of information technology. This research has been successful in constructing and testing a set of learning media for students of SLB. This learning media contains software application for learning topic of introduction Rupiah (IDR) currency order to create a more interactive and conducive class. By using this application, it is expected that

children with lower level of can be prepared to learn how to live independently in society, especially in the comprehension area of using currency in daily activities.

Children with Light Special Needs and Learning Media

Lots of terminologies which are used for referring to mentally-disabled children, such as: *mental retardation, mental handicapped, mental defektif.* As it has been progressing, it is often to be recognized with the other terms like *intellectual disability* or *developmental disability. American Association of Mental Retardation (AAMR)*, which is also known today as *American Assosiation of Intellectual Developmental Disability (AAIDD)*, defines (Daniel et al.,2012) *"Intellectual disability is a disability characterized by significant limitations both in intellectual functioning and in adaptive behavior as expressed in conceptual, social, and practical adaptive skills."*

AAMD (*American Association of Mental Defeciency)* states that mentally-disabled children demonstrate significantly under average of intellectual functionality with the lack of adaptive behavior, happening during the growth/development face Kauffman, 2006. Mentally-disabled children have two important aspects, including intellectual functionality and adaptive skills (Yustinus, 2006). Both of these aspects influence how retarded their developments are and how limited the skill developments can be, which also imply on quality of education to be provided. Mentally-disabled children in with the lower level of disability may still have the ability to develop themselves, also the other abilities which are semi skills as well as ability to socialize in simple ways.

Mentally-disabled children in the lower level of disability are the children who face obstacles in intellectual aspect and social adaptation behaviors, although they have the abilities to grow (Daniel et al.,2012) in academic, social adaptation and work skills (Amin, 1995). Even so, mentally-disabled children can still be optimally educated under specific programs or assistances that suits to their characteristics. One learning, that prepares mentally-disabled children with lower level of disability to be able to live independently in society, is understanding of how to use money in day-to-day activities.

Various learning sources can be utilized for assisting students in understanding learning topics. The most favorite one is computer games (Ghada et al., 2012). Computer games can be used for helping children who have difficulties in learning by benefitting from serious games in learning (Ghada et al., 2012) (Marion & Barbara, 2012) (David et al., 2011). There are some principles that have to be understood in developing learning media in game basis (Marion & Barbara, 2012), such as: all required information should be available in various formats including text, audio, and graphic; the use of contrast colors to avoid minimizing user abilities; games must be able to present interesting and delightful aspects to users; and, supporting learning with integrated learning components in the games.

Learning to understand how to use money in daily lives is given to the mentally-disabled children with lower level of disability for the mathematics subject, with basic competencies to be achieved cover students' abilities to calculate how much spending in shopping and how to use money for paying. For mentally-disabled children with lower level of disability, direct learning by visiting a store or market is not a right

way, regarding the limitations in their ability to adapt socially (Heinich, 1996). For that reason, learning media is developed to facilitate learning process before they finally can live independently in society. The constructed learning media is introduction to some types of fruits (banana, apple, orange, etc.) and each of them has certain price. Mentally-disabled children with lower level of disability learn to shop as they wish and pay certain amount of money based on the nominal displayed on the media screen. Students also learn to know and count the change they should receive.

Methods of Approach

Execution method, that is chosen to improve the learning process of students in SLB, is constructed by focusing on some priorities and it offers the method of approach as follow.

1) Observation of requirements of children with special needs in learning, characteristics and limitations owned by children with special needs.
2) Selection of subject that will be the focus of software application development. Learning process of students of SLB is to prepare themselves to be able to live more independently in the future once they become adults. This research has discovered the possibility to develop learning media for specific subjects and this learning media can be constructed by benefitting from ICT. One of requirements of children with special needs is to learn how to identify the currency and to spend money.
3) Creation of matrix for comparing standard competencies to be achieved to teaching material to be given, as well as construction of user interface design of the learning media.
4) Development of software application for learning media is done by using kinect, keyboard, mouse as input device.

Result and Discussion

In constructing this learning media, there are topics to be concerned, such as supporting tools for constructing the media, design development/development plan, development of learning media, and utilization of software application in learning process.

Supporting tools for learning instrument construction

In constructing learning media in game basis, there are some tools required to build the game, including software and hardware. Following are tools to be used for developing the game.

- Library phaser.io, this library is chosen as it can be modified and coded easily and directly connected to javascript code.
- Text editor (IDE) that will be used is IDE Webstrom. It is a product from jetbrain and is selected because it has good file structure and easy refactoring feature.
- Photoshop CS 3 tool is used for editing assets in the form of picture files for items (fruits), roles, and properties in the game.

- Titanium recorder (.apk), this application is run on Android platform. Function of this tool is for recording sounds. This application is used for creating sound files in .wav format, which will be converted into .ogg format.
- Xampp 1.7.3, this web server is used for creating database and running the computer program with php extension.
- Mysql , it the database management system (DBMS) for this games application. This DBMS is used for recording player data which contains items, students, scores.
- Google Chrome (Browser) is required for running the games and portal for item management for administrator.
- Kinnect mouse, used for replacing functionality of mouse on computer, is driven by Kinect controller. For installation process, SDK Kinnect 1.6 is required.
- Visual Studio 2010 or above is used for compiling Kinnect mouse tools.

Design Construction of Learning Media

Utilization of ICT in the form of software application for learning media makes use of hardware, such as: mouse, keyboard, kinect, in order to support learning activities for children with light special needs. By using benefitting from science and technology, it is expected that learning motivations and results of the students can be improved. Besides, it is also promoted to enahnce school quality in conducting education and teachings for preparing children with light special needs to become more independent in the future. How technology is put into use in the implemented software of learning media for learning topic of introduction to currency can be illustrated as follow.
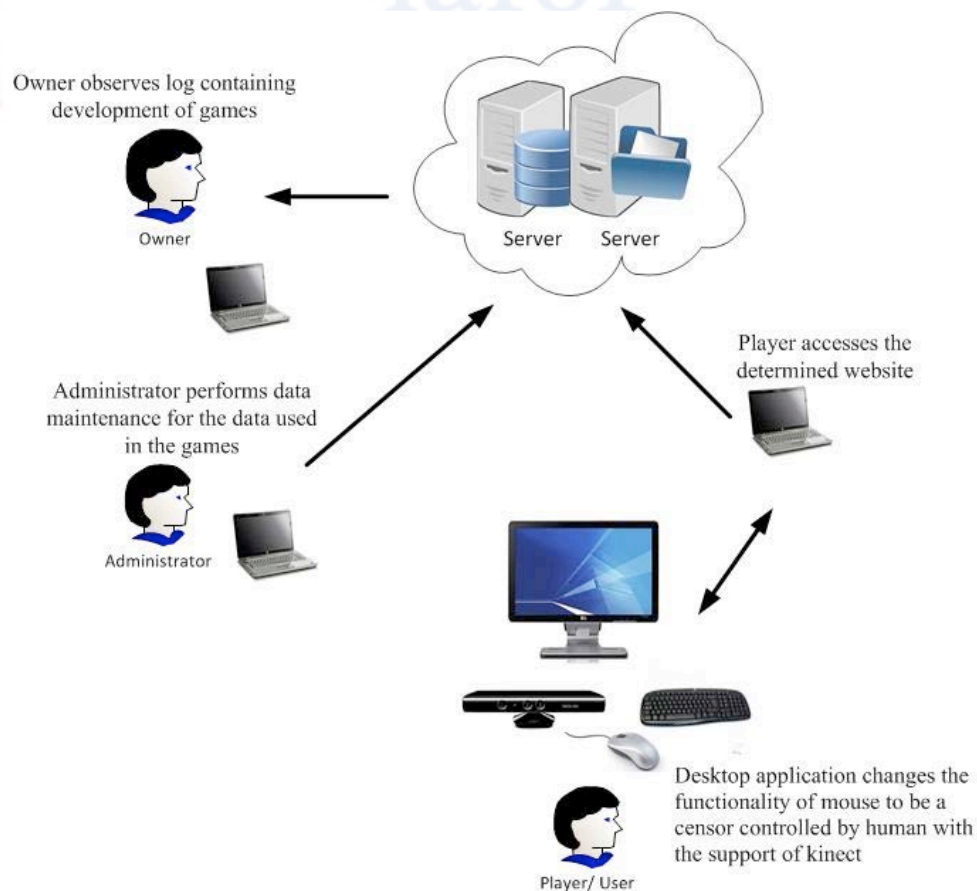

Figure 1. Design of Media System

There are three users in the constructed learning media, including: Owner (ICT team at school), Administrator (teacher of the subject), and Game Player (siswa). It should be noted that administrator and owner users can be performed by the same person in the case of schools have no ICT team. Those three types of users hold the following functionalities.

1. Administrator user can perform data maintenance used for the games. The data holds information about items, picture and sound files.
2. Owner user can perform similar functionalities as administrator, but this user can also access the report of observations.
3. Player user can play the games.

Also, there are features on administrator website that can be used by administrator and owner.

1. Maintenance of data master that contains information, such as: students, objects/items to be sold, types of bank notes and coins to be used.
2. Types of bank notes and coins to be used can be inputted as: pictures, figures, and sound.
3. Nominal of bank notes and coins to be used have the minimum of hundreds and the maximum of hundred-thousand in rupiah. It is because developers see that no objects that are sold in grocery stores have nominal beyond one million rupiahs. However, it is okay to use unlimited pricing nominal in the game.
4. Types of objects/items to be used can be inputted as: pictures, figures, and sound.
5. Result report of the games which have been played by students is presented in the form of observation results.

Moreover, there are features on web application that can be played by game players.

1. Introduction to names, pictures and sound of offered objects to be bought.
2. There are three levels in the game, consisting of Easy, Intermediate, and Advance.
   a. Easy: User performs a transaction for buying one object and paying with exact amount of money without any change.
   b. Intermediate: User performs a transaction for buying an object ad paying with less or more nominal of bank notes and coins. If user pays more than price of the object, change will be received in Rupiah unit. If user pays less than the nominal of the price tag, application will inform and request the user to add more bank notes or coins to be paid.
   c. Advance: User buys many objects and can pay with more or less nominal of bank notes and coins. If user pays more than the total prices of the objects, the user will receive change in Rupiah unit. If the paid nominal is less than the total prices, then application will notify that the nominal is less than the actual prices and request the user to add more nominal to be paid.

Construction of Learning Instrument Application

In order to make learning topics easier to be processed, this media provides menu for inputting picture files of objects (fruits), recording files that describing referred objects. Similar menu is also used for inputting picture and sound files for currency

required for learning process. The following picture is display example of menu for inputting picture and sound files.
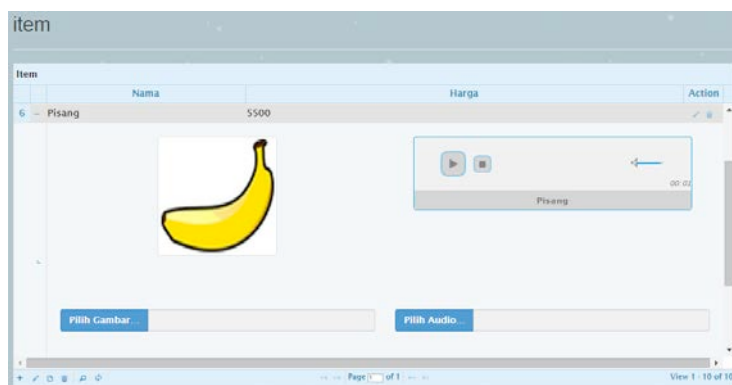

Figure 2. Menu for Inputting Picture and Sound Files

In learning that benefit from this media, users will be grouped into three levels based on their abilities. The levels include *beginner, intermediate* and *advance.* Each level is different in the degree of difficulties in executing learning sessions. Differences in basic game rules on each level can be listed as follow.

Table 1. User Level

User Level	Number of Chosen Objects	Display Price	Display Change
Beginner	1	V	-
Intermediate	1	V	V
Advance	Can be more than 1	V	V

There is also menu in application that can be used for transaction processes of buying objects or payments.

(a)   (b)   (c)

Figure 3. Menu for transaction processes

In Figure 3 point a, there are options of objects (fruits) based on learning material that has been prepared before. Students choose fruits they want. Application will then present information of prices. Each object / fruit has different price. On the next menu, application will provide bank notes and coins that range from smallest nominal to the largest nominal that are currently still in use to date, according to the nominal that has to be paid (b, c). Students will learn to count the change nominal, and the result of this counting should be matched to the nominal written on the change of bank notes or coins. Learning activities of the students will be recorded and be saved on student database. Teacher can monitor development of student learning result through this learning media.

Utilization of Learning Instrument in Class

The next stage is utilization of learning media in class. Activities in this stage are implementation of system design which has been made previously into a software application. This application will be used as learning media for children with special needs in learning mathematics, especially the topic of identifying currency.

Learning media will be tested on four children with special needs, supported by intensive assistance by teachers on each learning session. Indicator that will be measured are: the ability to list name of each available fruit; ability to point out the nominal of each available bank note; ability to pay the selected fruits by pointing to the bank notes with greater or equal nominal than or to spending nominal, as well as learning to count change that should be received.

Based on the test, the average result of students' comprehension before using the learning media can be specified as follow.

Table 2. Learning Activities and Level of Learning Material Mastery
(baseline)

No	Activity	Mastery Level
1	Children take an object/ a fruit	Children can do it with limited help.
2	Children read the price	Children can do it with limited help.
3	Children write the price on worksheet	Children can do it with limited help.
4	Children pick up the available bank notes or coins for paying based on the written price	Some children can do it with limited help and still there may be others that cannot do it yet.

Given the preliminary conditions (as described in Table 2), students can then performing learning activities by utilizing the learning media, and the observation result of students can be presented as specified in Table 3.

Table 3. Learning Activities and Level of Learning Material Mastery
(intervention)

No	Activity	Mastery Level
1	Children take an object / a fruit	Children can do it on their own
2	Children read the price tag	Children can do it with a little help
3	Children write down the price on worksheet	Children can do it with a little help
4	Children pick up the available the available bank notes or coins for paying based on written price	Children can do it with a little help

Recording and measuring abilities of students is done by using learning media for money identification, recording in deeper level, and conducting oral test by teachers.

Conclusion

In regards to quality, providing all kids with education that has good quality, especially for the children with special needs, is a big challenge. Learning for children with special needs should be prepared well. Utilization of the constructed learning media can help children with special needs to recognize and to understand, as well as to use currency in their lives. Intensity of this media utilization is very supportive for teachers in providing visualization to their students more easily. Giving meanings and values to learning process for children with special needs is also comparably important. The meaning symbolized by illustration of fruit and currency can make it easier to children with special needs to recognize types of fruits, while they are learning to identifying Rupiah (IDR) currency and spending money visually.

References

Amin, M. (1995). *Ortopedagogik Anak Tunagrahita.* Jakarta : Dirjen Dikti Depdikbud PPTG.

Arief S. Sadiman dkk. (2002). *Media pendidikan*. Jakarta: Pustekkom Diknas & PT. Raja Grafindo Perkasa, p. 16-17.

Daniel P. Halahan, James M. Kauffman, Paige C. Pullen. (2012). *Exceptional Learners an Introduction to Special Education*. Pearson Education. New Jersey.

David Joseph Brown, James Ley, Lindsay Evett, Penny Standen (2011). *Can participating in games based learning improve mathematic skills in students with, intellectual disabilities?*. Proceedings of the 2011 IEEE 1st International Conference on Serious Games and, Applications for Health.

Ghada A. El Khayat, Tamer F. Mabrouk, Adel S. Elmaghraby. (2012). *Intelligent Serious Games System for Children with Learning Disabilities.* Proceeding of The 17th International Conference on Computer Games.

Heinich, R. (1996). *Instructional media and technologies for learning (5th ed)*. Englewood Cliffs, N J: A Simon & Schuster Company, p. 21.

Kauffman, K.A. (2006). *Inclusive Creative Movement and Dance*. Illiois: Human Kinetics.

Kemp, J. E. & Dayton, D. K. (1980). *Planning and producing instructional media (2 nd ed)* New York: Harper & Row Publishers Cambridge, p. 3.

Marion Hersh & Barbara Leporini. (2012). *Accessibility and Usability of Educational Gaming Environments for Disabled Students*. IEEE International Conference on Advanced Learning Technologies.

Yustinus Semiun (2006). *Kesehatan Mental*. Yogyakarta : Penerbit Kanisiun, pp. 255–277.