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ANALYSIS OF DISTRIBUTED DEEP-LEARNING BASED DIGITAL LEARNING MEDIA USING THIN CLIENT DEVICES FOR INCLUSION VOCATIONAL SCHOOL STUDENTS

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Abstract

The purpose of this research is to demonstrate how digital learning media based on Distributed Deep Learning using Thin Client devices for students with special needs. The method was the exploration of reputable sources with the advantages and contributions of digital learning media. Digital Learning Media developed to help students with special needs in inclusive learning and teaching methods that are specifically supported electronically. Thin Client Network is an integrated processor integrated in the software using the method of organization of personal computer resources in the network. So, the personal computer owned by the user/client only requires an interface module and I/O devices monitor, keyboard, mouse, and other peripheral devices connected to the server. The results obtained can be implemented for students with special needs as an effective learning medium with the ability for centralized system data communication where most of the computing process is carried out in the device. Computing capabilities simply use the local network via Wi-Fi and Bluetooth communication and allow it to be used offline. This digital learning model will later facilitate learning for student with speech impaired and deaf so they can make mobility features and it is accessible, so students can take advantage of their knowledge and improve their skills.

Keywords: Digital learning media, Distributed deep-learning, Inclusion, Systematic literature review, Thin client, Vocational.

1. Introduction

The adoption of an inclusive education framework depends on several reasons. This includes changing attitudes, policies, and infrastructure. Teachers themselves are an important component to ensure the quality of inclusion of students in the school environment. The challenge for teachers who accept students with special needs is to adjust learning with a resolution that takes advantage of advances in digital technology. Education with digital technology based on web-based Distributed Deep-learning, computer-based learning, virtual-based learning, and machine learning is a combination of learning and knowledge management [1]. This digital learning model is an important tool that plays a role in facilitating the learning of students with hearing and speech impairments, where students can take advantage of their knowledge and improve their skills. They are able to make mobility features and learning can be accessible [2, 3].

Distributed deep-learning is used in web-based learning, computer-based learning, virtual-based learning and digital technology, virtual classroom with all devices, material text and video Sign language dictionary, Computers and communication devices sign language interpreters Signature images, sign language educational content videos, and sign language learning videos. The method uses two types of sign language, one-handed sign language (with and without voice) and dual hand sign language (with and without voice) for deaf students in deep- learning [4-6].

Digital Learning media developed are Thin Client Devices based on Distributed Deep-Learning which include computers and electronically supported learning and teaching methods. Thin Client Network is an integrated processor integrated in a software using the method of organization of personal computer resources in a network. So, personal computers owned by the user/client only need an interface module and I/O devices (monitor, keyboard, mouse, and other peripheral devices) connected to the server. Thin Client Network (diskless pc/workstation, dumb terminal) is a network environment, where the client functions as a terminal that accesses data and applications from the server computer. Data processing is conducted centrally by the server. While the client only processes the input from the keyboard, mouse, and the output is in the form of a display or image because the whole process is carried out by the server. The main server provides applications and other resources for many terminals. The terminal (client) only needs to operate the mouse, keyboard, and monitor. The client can run various applications installed on the server. Thin Client Server Computing (TCSC) is a computer network concept that emphasizes the computing process on the client side with minimal performance. In the TCSC concept, consisting of Server and Client, the client side is also called the Thin Client because it can run many applications installed on the server with specifications below the client standard [7-9].

This paper seeks to present how the implementation of digital learning media based on Distributed Deep learning is used for students with special needs. Specific questions explored include the advantages and contributions of digital learning media Deep-Learning as well as how learning strategies are applied to vocational education.

The main novelty is:

- Digital learning media based on Distributed Deep learning
- Special for student with special needs
- Thin Client Devices

2. Research Methods

This study uses a literature review method by analysing various relevant data sources. Articles obtained come from relevant international journals from various conferences. Articles that are reviewed in the period 2016 - 2020 for a period of 5 years. The steps in the systematic literature review method are as follows:

i. The first step is identifying objectives to determine the use of deep-learning-based digital learning for students with special needs.

ii. Researchers conducted a different article selection protocol. The keywords are "Distributed deep learning", "education", "vocational", "inclusive" and "thin client." Selection of articles considers the suitability of the theme and predetermined goals. Then, the collected articles obtained are selected according to the theme and purpose of the review. In the selection of related articles, there are 16 search results articles using Scopus.

iii. Extraction

iv. This step aims to extract information from articles that have been selected in the previous process by creating research matrix. This research matrix contains information related to the title, author, theme, keywords, and research conclusions. The selected articles then examined in more detail about the benefits, effects on the use of vocational education for students with special needs.

v. Execution

vi. The final step is the process of combining data and facts found when creating an assessment matrix, then the results write as articles and analysed with the intended purpose.

3. Result and Discussion

3.1. Thin client network technology

In the current era of technological development, IT-based devices have become one of the basic needs in supporting daily activities. The variants of the device are also increasingly distributed in the market. Starting from those that offer portability and are mobile such as smartphones, tables, netbooks, laptops, to high-performance and static ones such as Personal Computers. Especially for Personal Computers, this device is commonly used to carry out various activities such as making reports, engineering animation and programs, performing simulations and modeling, surfing the internet, watching videos, and playing games. We can find this device in many places, from offices to home. Thin Client Network is a method of organization of personal computer resources in a network by utilizing a processing system that is integrated in an integrated manner on a server. So, personal computers owned by the user/client only need an interface module and I/O devices (monitor, keyboard, mouse, and other peripheral devices) connected to the server.

The emergence and rapid spread of interest in and use of cloud computing as an accessible and extensible computing facility, as needed, anywhere, is deeply connected to the development of smart mobile devices including smartphones and tablets. Together, these technologies have the potential to leave no one behind when it comes to small and personal computing applications or large organizations, and regardless of geographic boundaries and economic conditions. However, many technical challenges still hinder the realization of dreams with the responsiveness

and quality required from the user's point of view. In this paper, we examine user requirements for access to the cloud via thin clients, mobile phones, and mobile devices. Providing these requirements, we characterize some of the necessary research developments especially in the device architecture field [8].

3.2. Benefits of using a thin client

Thin Client Solution is a solution to empower multiple hardware with low specifications and a Main computer with high specifications to run computation processes by utilizing the software's capabilities to create multiple virtual clients that can be operated simultaneously. Most of the calculation process is done by the central computer, the client computer only displays it.

Thin Client is not designed to meet multimedia and gaming needs. The Thin Client is designed to allow efficiency and complete use of the computational capabilities of the server computer, which currently has sufficient power to supply normal computing requirements and on the other hand reduces the overall cost of usage, maintenance and device investment compared to a fat client solution.

After seeing the design and goals of the thin client network, we can conclude that the Thin Client is suitable for a system whose main load is applications: Internet browsers, Messaging, Office, and small-scale image processing [10].

Furthermore, there are advantages and limitations in implementing a Thin Client network. The advantages include:

i. Flexibility, thin client networks are much more flexible and simpler in providing and developing a variety of applications.

ii. Ease of administration and management, to update (software) and hardware, is done centrally on the server computer, so the maintenance will be much simple.

iii. Cost and Time, using thin client networks tends to last a long time because to upgrade software and hardware is only operated on the server. The upgrade is carried out on the server so that the server's ability to increase or have high performance in providing services to the client [11].

Besides, the drawbacks include:

i. Network Resilience Thin Client requires high reliability and high-performance server and network infrastructure. Users (users) do not have freedom in the network. Any network failure or setback will hinder the productivity of all users.

ii. If the Main PC is damaged, the Thin client will not function all, but this can be fixed rapidly or provide a backup device.

3.3. Thin client based on distributed deep learning

Thin Client based on Distributed Deep learning is one part of various kinds of machine learning methods that use artificial neural networks (ANN). Types of learning in deep learning can be supervised, semi-supervised, and unsupervised. Artificial Neural Networks, commonly abbreviated as ANN, are the most magical part of deep learning. This ANN simulates the work of our brain, which is composed of a network of nerves called neurons. Just like the human brain system,

in this artificial neural network the machine receives information at points called nodes which are collected on one layer and then forwarded and processed to the next layer called hidden layers [7, 10-12].

Figures 1 and 2 are the block diagrams for Distributed Deep Learning-based Systems and Thin Client. Thin client devices are used as learning media aids. The thin client device is a mini expert system that functions as a helper and even substitutes for interactive teaching teachers. Students with special needs especially those who are deaf, and mute can use the ability to type text or use sign language on a thin client device based on distributed deep learning to find out about the desired subject matter [13].

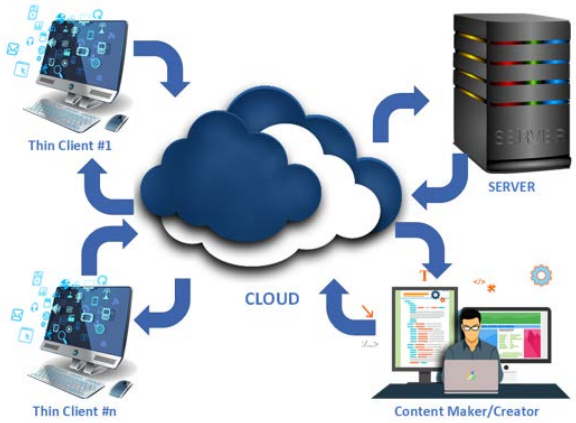

Fig. 1. Block diagram of distributed deep learning based thin client system.

Fig. 2. Block diagram of contents of the thin client.

4. Conclusion

Digital Learning Media is developed to help students with special needs in inclusive setting classroom and learning methods that are specifically supported electronically. Personal Computers owned by the students only need a module

interface and I/O monitor, keyboard, mouse, and other peripherals connected to the server. Thin Client Devices as Digital Learning Media Based on Distributed Deep-Learning for students with special needs in vocational schools can be utilized effectively as digital learning media because the data used for communication with small central systems, the majority of computing processes are carried out in devices, have local network computing capabilities through Wi-Fi and Bluetooth communication and allows offline use.

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