THE ROLE OF DIGITAL DEEP LEARNING IN TRANSFORMING DISTANCE EDUCATION

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Abstract

Deep Learning in the context of education refers to a learning approach that aims to encourage deep and meaningful understanding, not just memorization or superficial understanding. Deep Learning is related to the relationship of new knowledge with experiences or information already owned. Focus on understanding core concepts, not memorization. Encourage students to think critically, creatively, and reflectively, Apply knowledge in new or complex contexts, and use active learning strategies such as discussions, problem-solving, or collaborative projects. The purpose of this study is to describe Digital-Based Deep Learning. Research methods of literature studies (Library Research). Data collection techniques through print and non-print documentation relevant to the problem, such as journals, articles, books, and the latest research results. Several other sources are considered to be related to the issues discussed in this study. This study uses data analysis of reduction, management, grouping, interpretation, and drawing conclusions or organizing the results of the data obtained in the study. This literature study shows that with the application of deep Learning with digitization facilities, it is possible to find and master the existing ones and create and utilize new knowledge to improve the expected quality of expertise. For literacy in the digital era, teachers must have digital competence as one solution to learning challenges in the digital era. The implication is that digital-based deep Learning has representation in improving the quality of learning both in primary and secondary education and higher education.

Keywords: Digitalization, Deeplearning, Distance, technology, Competency

1 INTRODUCTION

National education is an education system that aims to educate the nation's life and develop the potential of students to become human beings with faith, piety, noble character, health, knowledge, creativity, independence, and democratic and responsible citizens. The essence of national education reflects the nation's identity, cultural values, and goals in building superior human resources. Freire, P. (1970) explained that education must free people from ignorance and oppression. He criticized the banking education system, where students are only considered a repository of information without understanding and criticizing reality. Education must be dialogical and empower people to think critically.

Education is one of the fields that has an essential role in shaping an intelligent, wise, and characterful generation (Rachmadyanti, 2017). The Law on the National Educator System has a representation of improving the quality of human resources to keep up with the development

and progress of the times, which can be done by improving the quality of education. When humans are born into the world, they have been equipped with several potentials that must be actualized. The actualizing potential is deliberately called the educational process that education is a forum to shape a person's behavior, potential, and character. Sukring, 2016). Efforts to improve the progress of a nation can be made by improving the quality of education, starting with educational goals. Quality education aims to develop one's potential, including intellectual intelligence and an upbeat personality

The role of digital information and communication technology has changed almost every aspect of life, including in the world of education. Technological advances have brought profound changes in the learning paradigm, encouraging the use of innovative and interactive learning media to increase the effectiveness of learning in the challenges of the times. Education must adapt to these changes, accommodating the demands of a digital society increasingly relying on technology.

Information and communication technology is causing the digital world to penetrate the domain of education and skills, with technology gradually being used to convey education, knowledge, and skills in new and innovative ways. This penetration is combined with future changes in work modes and patterns, which are influenced by the current climate of economic uncertainty and policy changes in the field of education. The increasing use of digital technology is rapidly changing in the workplace, impacting the need for new skills (Junaidi, Satria, & Wahyuni, 2021).

The era of digitalization spurs a person or learner to follow the movement of the digital revolution, whose existence is inevitable, to improve oneself and the quality of one's work. The digital revolution has become a need for this growing academic and non-academic society; more and more students are following the needs and interests not only in the education or learning sector in schools but also in the socio-cultural, legal, and religious quality development and market packages. In addition to digital Learning involving highly advanced technological media, defenders of digital existence can provide flexibility, allowing them to learn when and where at their own pace without worrying about schedules or time to do activities.

Mister Nuel, (2014:1) explained that the 21st century is the digital age. In this digital era, most aspects of society have adapted to technology, including the education sector. The internet and connected smartphones make everything easily accessible at the palm of your hand, including

learning. The world of education, specifically teachers as the implementers of learning, faces significant challenges.

The needs of students in this era are different from students in previous eras. Today, students are enthusiastic about digital and technology1 Teachers in the digital age are now facing different challenges. They have students who incidentally are the digital generation who have been familiar with internet technology since birth. With this new era, teachers must adapt and be professional in the fast-paced era of technology and information, so the skills that a teacher must have in the digital era are very important to support learning that is increasingly rapid with the advancement of the times.

Information and communication technology has significantly changed education and other areas of life. The digital era has opened up new opportunities and challenges for traditional learning systems relying on conventional face-to-face methods to become digital-based (online) Learning (Arisanti & Qolbiyah, 2022). Using digital technology in teaching and Learning offers several advantages, such as unlimited space and time. Learning can be done anytime and anywhere, and educational materials become interactive, such as educational videos, online modules, educational game simulations, and discussions through virtual classes (Hendra et al., 2023). The digital era has played a key role in facilitating access to knowledge and Learning that is more dynamic, interesting, and adaptive to explore, collaborate, and achieve maximum potential in terms of time and way of Learning.

The development of digital Learning opens the door to a bright future where everyone has an equal opportunity to receive a high-quality, physical and social, barrier-free education encompassing a wide range of concepts, principles, and essential components of digital learning.

Technological advances allow teachers and students to communicate effectively through several communication networks through several social networks/digitization platforms (Nasbey, 2023). Information and Communication Technology have similar terms: information distribution, storage, and processing. Information technology is related to data processing, processing, and dissemination, as well as communication equipment. Meanwhile, communication technology is related to tools, equipment, and media that support a person's communication. In the world of education, digital Learning is a digital processing system that

can facilitate learners to learn several forms of subject matter (Arisanti & Qolbiyah, 2022), such as text, visual, audio, and motion

Sri Sunarti, (2024:84). Digital learning transformation is a shift from traditional to digital learning by utilizing digital technologies such as the internet and applications. This transformation involves more than just integrating technology into traditional learning processes, but also overhauling educational systems, methods, and practices to make them more relevant, effective, and inclusive in the digital age.

Key elements of digital learning transformation include: the use of technology as a primary tool with online learning platforms such as Google Classroom, Moodle, Blackboard, and so on; accessibility and flexibility, meaning it can be done anytime and anywhere, according to time; building adaptive, personalized learning; enhancing interactive and immersive content such as video or animation; and fostering critical thinking collaboration to solve realistic problems. ((https://aptika.kominfo.go.id/2021/01/empat-pilar-literasi-untuk-dukung-transformasi-Jurnal Perspektif Vol. 17, No. 1, Juni 2024

Digital Learning is a type of teaching and Learning that combines information and communication technologies to create educational materials, including interconnected hardware components and text/message transmission capabilities, graphics, video, or audio). Several forms of support can improve skills and foster critical thinking and problem-solving skills by working together and communicating.

Arisanti & Qolbiyah (2022) and Hendra et al. (2023) mentioned that the form of digital learning materials, namely (1) e-books, (2) educational videos, (3) learning programs (Khan Academy, Duolingo, and Quizlet, etc.), (4) educational simulations and games, (5) webinars and video conferences, (6) augmented reality (AR) and virtual reality (VR), (7) online learning materials (Mmood, Google Classroom and Khan Academy, etc.). Carr, Nicholas. (2008)& Shirky, Clay. (2008). Digital devices have the potential to automate tasks, process data quickly, and make correspondence more effective, so that work can be completed faster and more efficiently. With digital devices, users can search for information from around the world in seconds via the internet and search engines.

Biggs and Tang (2011), Marton and Säljö (1976), Hattie John (2009) & Perkins D. (1992) explain that deep learning spurs learners to understand what is being learned, understand core

concepts, evaluate, analyze, and synthesize ideas, and explore the concept of hootesis tests, develop new concepts that are relevant to real life.

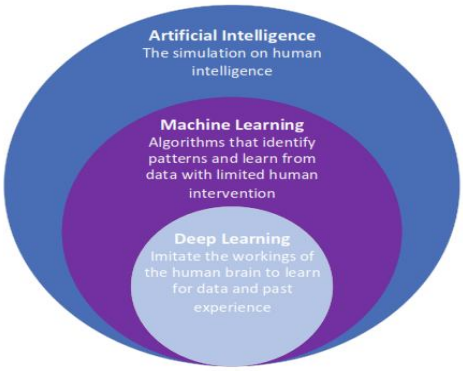
Furthermore, it was explained that deep Learning involves the process of practical Learning, the creation of new knowledge, the use of new knowledge, the key to future skills, and proactive disposition. By collaborating with several parties, deep Learning allows humans to know and understand their talents, potentials, interests, strengths, and weaknesses. Deep Learning also seeks to build aspects of creativity, skills, and leadership in Learning. Therefore, deep Learning is one of the essential strategies for shaping students' character as learners. Deep Learning involves hands-on Learning, producing and applying new information, developing essential future skills, and developing a proactive mindset.

Ian Goodfellow, Yoshua Bengio and Aaron Courville (2016). Deep learning has historical dynamics and potential that reflect a philosophical paradigm that is not the same as the uncertain development of learning. Deep learning has a complex meaning due to the reality of existing and increasingly advanced course formats. Deep learning strategies have evolved in line with the availability of supporting hardware and software facilities. Deep learning has become part of the solution to increasingly sophisticated application problems, with dynamic accuracy advancing without time constraints.

John D. K. (2019) It is important to note that deep learning is a subfield of artificial intelligence that focuses on creating large neural network models capable of making accurate data-driven decisions. Deep learning is particularly well-suited for contexts where the data is complex and where large datasets are available.

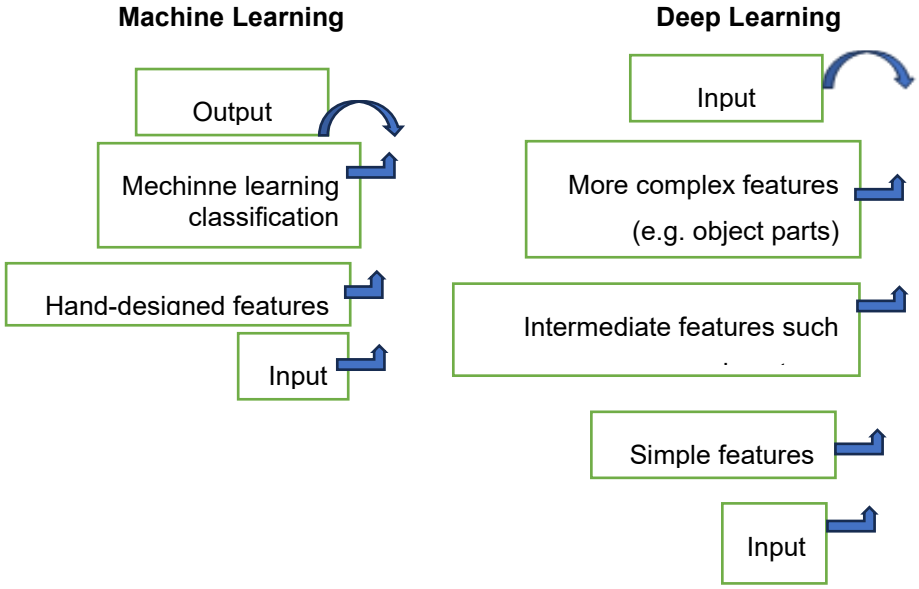
K. Martin S., T. Vedha V., Chiung C. Ho, and Lawrence E. H. (2017:50). Deep learning is part of a more complex terminology in machine learning methods based on the interconnection of facts obtained from adequate human competence. The use of deep learning is advancing in line with the progress and implementation of deep learning methods. Deep learning by large companies utilises the facilities of Facebook, Google, Microsoft, and Amazon. Its implementation can predict a variety of useful results and activities in various applications.

Figure 1. Cycle 1. AI,ML,dan DL



Then we can see the deep learning approach using automatically learned representation hierarchies

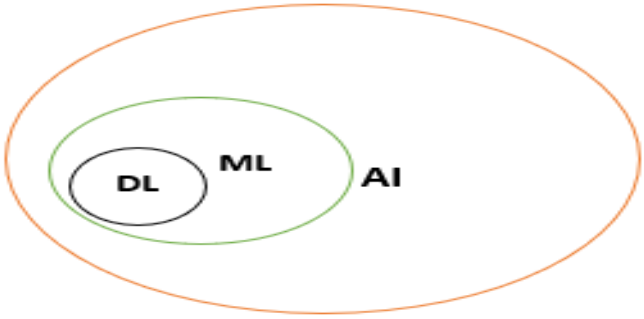
Figure 2. Illustracition Hierarchis Deep Learning



Deep learning and machine learning are subfields of artificial intelligence illustrating the relationship between artificial intelligence, machine learning, and deep learning. In deep learning, successive layers of representation can be learned through submodels, which are organised in the form of layers stacked on top of each other.

Next, we can see the relationship between learning, artificial intelligence, and deep learning as shown in the following figure.

Figure 3. The relationship between AI, ML, and DL



Enhanced computing resources to process large amounts of data and train much larger models, and automatic feature extraction. Artificial neural network terminology.

The implication is that deep Learning can help one understand that Learning is a need for oneself in the future. This model is also expected to solve several problems in the educational environment, such as morality, character, and motivation to learn and be creative. Another implication of deep learning is that the learning environment must be comfortable for students to expose their own misunderstandings, change their minds, and take intellectual risks.

2 METHODOLOGY

Study methods or literature studies based on relevant literature such as accredited journals, and up-to-date books, as well as research results relevant to flipped classrooms and open and distance learning. The source of the indexed journal library is obtained through the Google Scholar facility (Zed M. 2014: 4). Next, the researcher re-analyzes the information obtained, then observes, reduces, synthesizes, and makes conclusions or organizes the results of the data obtained.

3 FINDINGS AND DISCUSSION

3.1 History of Deep Learning

The history of deep learning (DL) is part of a long journey in the field of artificial intelligence (AI) and machine learning (ML). Deep learning is, simply put, an approach in machine learning that utilises multi-layered artificial neural networks to learn from representative data.

The history of the birth of deep Learning is rooted in the development of artificial intelligence, artificial neural networks, and machine learning since the middle of the 20th century the

Beginning of the Concept of Neural Networks (1940s-1960s). McCulloch, W. S., & Pitts, W. (1943). developed a mathematical model of artificial neurons, which became the basis for modern neural networks. Rosenblatt F. (1958) created the perceptron, the first neural network model that could learn from data. However, the book Perceptrons by Minsky, M., & Papert, S. (1969) shows the limitations of perceptrons, which have hindered the development of neural networks for decades. In the Modern Deep Learning Era (2000s - Present), Geoffrey Hinton, Yann LeCun, Yoshua Bengio, and Jürgen Schmidhuber (2015) introduced Deep Belief Networks (DBN), opening the era of deep Learning. (2012): Hinton and his team won the ImageNet Challenge with Alex Net, which proved the excellence of deep Learning in computer vision. Ian Goodfellow (2014) introduced Generative Adversarial Networks (GAN) to generate realistic images and data, and Google released Transformer (Attention is All You Need), paving the way for models such as GPT and BERT in NLP (2017).

The leading figure in deep learning is Geoffrey Hinton (2006): He published a paper on Deep Belief Networks. This moment marked the beginning of the widespread use of multi-layered neural networks, which would later become known as ‘deep learning’. Then, three other major figures, Yann LeCun, Yoshua Bengio, and Geoffrey Hinton (2015), promoted the development of Convolutional Neural Networks (CNN), Recurrent Neural Networks (RNN), and Graphics Processing Unit (GPU) optimisation in network training.

Deep learning and artificial intelligence are showing rapid development, and 2025 will be no different. These developments are shaping a much smarter future, with artificial intelligence becoming a major force behind innovation in all sectors of the economy. Deep learning is setting new standards for everything from real-time reasoning models to more powerful neural networks. Breakthroughs in deep learning by 2025 will not only be smarter, but also more sensitive. Multimodal models combine text, voice, image, and even live video inputs..(https://codedataflow.com/deep-learning-breakthroughs-in-2025/?utm_source=chatgpt.com.

Fullan and Langworthy (2014) explained three aspects of achieving deep Learning: the latest economic system, leadership, and pedagogy. That shows that system support and collaboration between the three are needed. The latest economic system can provide adequate income for the Indonesian nation. The newest leadership means a leader who can transform the situation quickly and precisely, while the latest pedagogical is in the form of interaction or good

relationships between students as learners and teachers as people who learn and, besides that, can use technology in the learning process.

Deep Learning can be carried out well and run smoothly with these three aspects. Meanwhile, to achieve deep Learning, Fullan and Langworthy (2014) need a learning partnership between students and teachers, restructuring the learning process towards knowledge creation and using digital goals tools, as well as resources that enable and accelerate the deep learning process. These steps can support the success of deep Learning by shaping students' character as learners and helping students understand their potential, talents, interests, strengths, and weaknesses.

The deep learning process values all the potential that students have. Each student has a uniqueness and affinity in directing themselves, and teachers have the authority to direct and learn from students.

Ohlsson, S. (2011) & Kelleher, J. D. (2019). Deep learning is a subfield of artificial intelligence that focuses on creating large neural network models that can generate rules based on data accuracy. Deep learning is particularly well suited to contexts where the data is complex and where large data sets are available. Deep learning is a learning process that cannot consist solely of experience, but can gather experiences, discover patterns, and project those patterns into the future.

Carr, Nicholas. (2008)& Shirky, Clay. (2008). Digital devices have the potential to automate tasks, process data quickly, and enable more effective communication, so that work can be completed faster and more efficiently. With digital devices, users can search for information from around the world in seconds via the internet and search engines.

Fullan and Langworthy (2014) state that achieving deep Learning involves three key components: the latest pedagogy, leadership, and economic system. The Indonesian people can live adequately with the latest economic structure. The latest pedagogy is in the form of interaction or positive relationships between students as learners and teachers as teachers, in addition to utilizing technology in the learning process.

Three elements are needed to apply and implement deep learning effectively. Fullan and Langworthy (2014) explain that deep learning can only be achieved through collaborative learning between teachers and students, designing the learning process to focus on knowledge creation, and using digital resources that represent and accelerate the deep learning process

3.2 Discussion

Based on the study of several literature sources, journals, articles, books, and research results relevant to digital-based deep learning can be shown as a rhyme.

Pramono, S. (2023) found that deep learning can provide potential insights into improving the detection and response to cyberattacks in critical industrial control system environments. By continuing to focus on developing more advanced techniques and models, it can build resilient and adaptive systems to increasingly complex cyber threats. Cross-disciplinary collaboration between cybersecurity, industrial control, and artificial intelligence will be key in meeting these challenges and achieving a secure and reliable industrial environment.

Khoerul Anwar M.Kh. (2017:97). Concludes that deep learning to shape the character of students or learners as teachers helps guide students to understand themselves and improve their understanding of their strengths, weaknesses and affinities;

Prensky, M. (2010), Cuban, L. (2001)& Castells, M. (2004). With digitalisation, teachers are no longer the sole source of information. They must transform into learning facilitators who guide students in using technology to build their own understanding. Digitalisation has highlighted the gap between schools that have access to technology and those that do not. This affects students' learning opportunities and demands attention from stakeholders. Education in the digital age requires close cooperation between schools, the government and the private sector to provide infrastructure and training.

Irawan, I., Merakati, I., Sudarso, H., Roswati, R., Wiliyanti, V., & Rukiyanto, B. A. (2024). The research suggests that universities provide equal access to technology and digital literacy training to support the success of collaborative Learning. This research provides important insights for educational institutions in designing more inclusive and effective technology implementation strategies for collaborative Learning in higher education.

Marlina, H., Sa'adah, H. M. R., Aszahra, L., Dewi, R., & Alpian, Y. (2024) concluded that digital learning media that primary and secondary education students can use learn the Canva application WhatsApp groups and Google Classroom which are supported by animations, learning videos, PowerPoint, as well as digital comics and flipbooks.

Hadi, S., & Diantoro, F. A. (2024) shows that it should be used to analyse data, maximise processes, strengthen regulations, learning and novelty knowledge. ChatGPT must be used

responsibly based on strong ethical values, and there needs to be a policy from professional institutions that regulates certain conditions so as not to violate professional ethics in accounting and business practices.

Oktavian, R., & Aldya, R. F. (2020) The results of the study show that 76.07% choose a combination of online Learning, so it is critical to innovate in the form of integration with the environment referring to the digital components of the learning ecosystem from Hammond that can accommodate students' learning styles, flexibility, and learning experiences so that they can bring out positive feelings.

Khusniyah, N. L., & Hakim, L. (2019) The study's results showed a difference in students' comprehension ability to understand English texts before and after using web blogs. In this case, online Learning assisted by web blogs has a positive influence on improving students' English reading skills.

Biggs and Tang (2011), Marton and Säljö (1976), Hattie John (2009), Perkins D. (1992) & Li Deng & Dong Yu (2014:205) mention that deep learning learners seek to understand the meaning of what is learned, the core concepts and implications of what is learned, involving the process of reflection, evaluation, analysis, and synthesis of ideas in support of active Learning. Encourages to know what and why regarding exploration, hypothesis testing, and developing new insights in the real world. Deep Learning has a long history, is rich in perspectives, and has dynamic progress from time to time.

Moh. Khoerul Anwar (2017) & Mutawadia, M., Jawil, J., & Al Farisi, S. (2023) shows that deep learning seeks to improve students' understanding of strengths and weaknesses, data collection on information and the formation of self-confidence among members of the student learning group. Conclude that deep learning helps students improve flexible understanding of their own learning styles, providing opportunities to clarify their strengths, weaknesses, and interests better.

4 CONCLUSION

Based on the description above, it can be concluded that deep learning with digital platform facilities is very strategic because it provides an understanding of artificial intelligence, artificial neural networks, and machine learning. Deep Learning can involve strategic tools such as ChatGPT, e-books, educational videos, webinars, video conferencing, moodle, google PowerPoint, classroom, hybrid learning, and e-learning. The development of critical thinking

and synthesis areas can grow and increase along with the availability of opportunities to actively study and understand what and how reflectively, evaluatively, exploratory, and proof of what has been learned. The relevant research results also show that digital-based deep learning involvement positively and significantly improves learning quality. The implication is that deep learning with digital platforms benefits students, teachers, or teaching staff in both primary and secondary education and higher education.

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