

The Role of Deep Learning in Supporting Student Well-Being in Digital Education Environments: A Systematic Literature Review (SLR)

Desi Asmarita¹, Nisa Afrinauly Nabila²

¹Islamic Religious Education, STAI Solok Nan Indah, Padang, Indonesia

²Islamic Religious Education, Faculty of Tarbiyah and Teacher Training, Yogyakarta, Indonesia

*Corresponding author: desiasmarita28@email.com

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Abstract. Digital transformation in education has changed learners learning experiences while also presenting challenges to student well-being, such as declining motivation, engagement, and comfort, along with the emergence of learning fatigue. In this context, The Deep Learning approach emphasizes mindful, meaningful, and joyful learning. . This study aims to analyze the role of deep learning in supporting student well-being within digital education environments. The research employs a Systematic Literature Review (SLR) method following the PRISMA 2020 guidelines, through the stages of identification, screening, eligibility assessment, extraction, and synthesis of relevant literature. The findings show that mindful learning plays a role in enhancing learners' awareness, focus, reflection, and self-regulation; meaningful learning supports relevance, motivation, engagement, and understanding by connecting learning to real-life experiences; while joyful learning creates a fun, active, safe learning atmosphere that provides positive experiences. The integration of these three approaches demonstrates a complementary relationship in supporting the emotional, psychological, social, and academic dimensions of student well-being. Digital environments can serve as spaces that support the implementation of these three approaches through the use of interactive media, diverse learning resources, collaborative activities, and learning flexibility, with teachers continuing to play an important role in designing learning experiences that meet students' needs. Thus, deep learning through the mindful, meaningful, and joyful learning approaches can serve as a foundation for creating a more humanistic, relevant, enjoyable digital education oriented toward learners holistic well-being.

Keywords: Deep Learning, Student Well-Being, Systematic Literature Review.

INTRODUCTION

Digital transformation has brought significant changes to education systems in various countries [1]. Developments in information technology, online learning, Learning Management Systems (LMS), artificial intelligence, and various digital learning platforms have transformed the way students acquire knowledge and interact in the learning process [2]. Educational digitalization no longer functions merely as a medium for delivering material, but has become a learning ecosystem that requires students to possess critical thinking skills, creativity, collaboration, communication, and the ability to manage their own learning process independently.

On the other hand, the development of digital learning environments presents various challenges to student well-being [3]. Although technology can enhance flexibility and access to learning, various studies show that digital learning also has the potential to cause academic stress, learning burnout, social isolation, decreased motivation, and reduced student engagement if it is not designed with an appropriate pedagogical approach [4]. Therefore, the success of digital transformation in education is not only measured by academic achievement, but also by the ability of the learning system to support students' psychological, emotional, and social well-being.

The concept of student well-being has become one of the main focuses in modern educational research. Well-being is viewed as a condition in which students feel safe, comfortable, have positive social relationships, are able to develop, and possess good physical and psychological health throughout the learning process [5]. Various studies show that students with high levels of well-being tend to have better learning motivation, higher student engagement, better self-regulation abilities, and more optimal academic achievement compared to students with low levels of well-being.

In this study, the term Deep Learning refers to a pedagogical approach to deeper learning rather than deep learning technology in artificial intelligence [6]. Unlike surface learning, which is oriented toward rote memorization, Deep Learning emphasizes deep conceptual understanding, meaningful learning, reflection, problem-solving, collaboration, and the ability to apply knowledge to real-world situations [7]. In Indonesia, the implementation of Deep Learning is largely developed through three main characteristics, namely Mindful Learning, Meaningful Learning, and Joyful Learning, which seek to create a more student-centered learning experience [8].

Conceptually, the characteristics of Deep Learning are closely related to the factors that shape student well-being [9]. Meaningful learning can increase students' intrinsic motivation and sense of competence. Enjoyable learning can reduce academic pressure and increase learning satisfaction. Meanwhile, learning that encourages reflection and collaboration can strengthen social relationships, a sense of belonging to the learning environment, and students' self-regulation abilities [10]. Thus, Deep Learning not only contributes to improved learning outcomes, but also has the potential to create learning experiences that support student well-being in digital educational environments.

A number of previous studies have also shown a positive relationship between the quality of digital learning and student well-being. Properly designed integration of digital technology can increase enjoyment of learning, self-confidence, and students' positive learning experiences, although there remain challenges that need to be managed so as not to have a negative impact on their well-being [11]. In addition, Elinda et al. showed that the level of a school's digital development is positively correlated with students' subjective well-being, particularly when technology use is supported by a conducive learning environment and a positive school climate [12].

Nevertheless, research findings discussing the relationship between Deep Learning, digital learning environments, and student well-being remain scattered across various disciplines. Most research focuses more on the effectiveness of digital learning on learning outcomes, the use of educational technology, or students' mental health as separate topics. Meanwhile, studies that specifically synthesize how the Deep Learning approach can support student well-being within digital educational environments remain relatively limited. This gap indicates the need for a more comprehensive review to integrate existing research findings.

Based on these conditions, this study employs a Systematic Literature Review (SLR) approach to identify, analyze, and synthesize research findings regarding the role of Deep Learning in supporting student well-being in digital educational environments. Through a systematic literature synthesis, this study is expected to provide an overview of research trends, factors influencing the successful implementation of Deep Learning, the mechanisms through which this approach contributes to student well-being, and opportunities for future research. The results of this study are expected to serve as a conceptual foundation for the development of policies and digital learning practices that are oriented not only toward improved academic achievement, but also toward the creation of holistic student well-being.

METHODS

This study employs the Systematic Literature Review (SLR) method to identify, evaluate, and synthesize previous research on the role of deep learning in supporting student well-being within digital educational environments. The SLR method was chosen because it provides a systematic, transparent, and replicable procedure for identifying relevant studies, assessing their methodological quality, and synthesizing the available evidence [13]. The conduct and reporting of this review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines developed by [14]. Overall, the research process consisted of several stages, namely formulating the research question, conducting the literature search, screening articles, assessing eligibility, evaluating study quality, extracting data, and synthesizing findings.

Research Question and Scope of the Study

This study is directed at the following research question: How does deep learning contribute to supporting student well-being in digital educational environments? This question was formulated to identify how the deep learning approach is implemented in educational contexts and how its application contributes to various dimensions of student well-being. Relevant indicators include mental health, stress, anxiety, learning engagement, motivation, learning satisfaction, emotional condition, and overall learning experience.

Meanwhile, the digital educational environment encompasses online learning, e-learning, blended learning, technology-based learning, learning management systems, and various other forms of learning environments mediated by digital technology. In this study, deep learning refers to a pedagogical approach that promotes deeper understanding through mindful, meaningful, and joyful learning experiences. The

approach emphasizes learners' active engagement, reflection, contextual relevance, and positive learning experiences rather than merely focusing on academic achievement.

Literature Search Strategy

The literature search was conducted systematically through several major academic databases relevant to the fields of education, educational technology, artificial intelligence, computer science, and psychology. The databases used included Scopus, the Web of Science Core Collection, Google Scholar, Sinta, and others. The selection of these databases was based on their broad coverage of scientific publications in the fields of education, artificial intelligence, deep learning, learning technology, and student well-being.

The search strategy was developed using a combination of keywords representing the three main concepts of the study, namely deep learning, student well-being, and digital education environments. An example of the search string used is as follows:

("deep learning" OR "deep learning approach" OR "deeper learning" OR "deep learning pedagogy") AND ("student well-being" OR "student wellbeing" OR "well-being" OR "mental health" OR "psychological well-being" OR stress OR anxiety OR engagement OR motivation OR satisfaction) AND ("digital education" OR "digital learning" OR "online learning" OR "e-learning" OR "blended learning" OR "technology-enhanced learning")

This search string was subsequently adapted to the syntax and characteristics of each database. The search was primarily conducted on the title, abstract, and keyword fields. This strategy aimed to obtain sufficiently broad literature coverage while maintaining relevance to the research focus. In addition to the database search, backward citation searching of the reference lists of relevant articles was also conducted to identify additional studies that might meet the inclusion criteria.

Inclusion and Exclusion Criteria

To ensure the consistency and relevance of the selected studies, inclusion and exclusion criteria were established prior to the screening process. Articles were included in the review if they met the following criteria: (1) published in a peer-reviewed scientific journal or conference proceeding; (2) discussed the implementation of the deep learning approach or its core dimensions, including mindful learning, meaningful learning, and joyful learning; (3) involved university students, school students, or learners as the study population; (4) conducted within a digital, online, blended, or technology-enhanced learning environment; and (5) discussed student well-being or indicators closely related to students' psychological, emotional, or social conditions, as well as their learning experiences.

Conversely, studies were excluded if they were editorials, commentaries, opinion pieces, book chapters, theses, dissertations, or non-peer-reviewed publications. Articles were also excluded if they did not substantively discuss the deep learning, did not examine student or learner well-being, were unrelated to digital educational environments, or did not provide sufficient information for methodological and substantive analysis. Review articles were not used as primary evidence but were used to identify other relevant studies through reference list searching.

Study Selection Process and PRISMA Procedure

The study selection process followed the PRISMA 2020 framework, which consists of four main stages: identification, screening, eligibility, and inclusion [14]. At the identification stage, all articles obtained from the specified databases were collected and imported into reference management software. Duplicate articles were then identified and removed.

At the screening stage, the titles and abstracts of the remaining articles were examined against the established inclusion and exclusion criteria. Articles clearly irrelevant to the research question were excluded at this stage. Articles considered potentially relevant were then obtained in full-text form and examined at the eligibility stage. At this stage, articles were excluded if they failed to meet one or more of the established criteria, and the reasons for exclusion were documented.

At the final stage, inclusion, articles that met all requirements were included in the systematic review for subsequent quality assessment, data extraction, and synthesis of findings. This entire selection process is presented in a PRISMA 2020 flow diagram, which shows the number of articles identified, the number of duplicate articles removed, the number of articles screened, the articles assessed based on full text, the articles excluded along with the reasons for exclusion, and the final number of articles included in the synthesis.

Study Quality Assessment

A methodological quality assessment was conducted on the articles that met the inclusion criteria to ensure the reliability and credibility of the evidence used in the study. Because studies on deep learning and

student well-being may employ quantitative, qualitative, or mixed-methods approaches, this study used the Mixed Methods Appraisal Tool (MMAT), 2018 version, as the quality assessment framework [15]

Each study was assessed using the MMAT criteria appropriate to its research design. The assessment covered the appropriateness of the research design, sample characteristics and selection, data collection procedures, quality of measurement, and consistency among the research questions, methods, and findings. The results of the quality assessment were used to inform the interpretation of the strength of evidence and to understand the limitations of the reviewed studies.

Data Extraction

To ensure that the information-gathering process was systematic and consistent, a structured data extraction form was used. Information extracted from each article included the author's name, year of publication, country or geographic context of the study, research design, participant characteristics, educational level, digital learning environment, deep learning approach or dimension used, form of pedagogical application, student well-being indicators, key findings, and study limitations.

Particular attention was given to how deep learning was applied within digital educational environments and to the mechanisms or contributions through which it affected the well-being of university students or learners. The extracted data were then organized into a synthesis matrix to facilitate comparison across publications and to identify patterns, themes, and research gaps.

Data Synthesis

Given the likelihood of considerable heterogeneity among the included studies in terms of research design, participant characteristics, educational context, deep learning approaches, and well-being indicators used, this study employed narrative and thematic synthesis rather than statistical meta-analysis. A narrative synthesis approach is appropriate when the studies under review differ substantially in methodology, population, intervention, or outcome measures, such that statistical pooling of data cannot be appropriately performed [16].

The analysis was conducted by comparing findings across studies, identifying recurring concepts, grouping findings with similar characteristics, and interpreting the relationship between the application of deep learning and student well-being. The synthesis specifically focused on several key themes, such as early detection of psychological and emotional problems, personalized learning, adaptive learning support, learning engagement and motivation, learning satisfaction, monitoring of emotional conditions, and identification of risk factors that may affect students' learning experiences. Findings across publications were then compared to identify consistent patterns, discrepancies in research results, and evidence gaps that still require further investigation.

PRISMA 2020 Framework

Overall, the research procedure can be summarized using the PRISMA 2020 model, which consists of four main stages: Identification → Screening → Eligibility → Inclusion.

At the identification stage, relevant articles were obtained from the specified academic databases. At the screening stage, duplicate articles were removed, and titles and abstracts were examined against the established criteria. At the eligibility stage, the full texts of potentially relevant articles were thoroughly evaluated. Subsequently, at the inclusion stage, articles meeting all criteria were entered into the quality assessment, data extraction, and synthesis processes.

The use of the PRISMA 2020 framework was intended to ensure that the process of identifying and selecting literature was conducted transparently, systematically, accountably, and reproducibly. The number of articles at each stage in the PRISMA diagram should be adjusted to reflect the actual search results and screening process carried out by the researchers.

RESULTS AND DISCUSSION

RESEARCH RESULTS

Researcher & Year	Research Title	Findings Relevant to Your Research
Wang, Zhang, Zhang, & Chen [17]	The Impact of Mindful Learning on Subjective and Psychological Well-Being in Postgraduate Students	Mindful learning has a positive relationship with subjective well-being and psychological well-being. The study shows that increased mindful learning can serve as a protective factor for students' well-being.
Koivuneva & Ruokamo [18]	Assessing University Students' Study-Related Burnout and Academic Well-Being in Digital Learning Environments: A Systematic Literature Review	Digital learning environments are related to academic well-being and study-related burnout. Pedagogical support, formative assessment, AI, and game-based learning have the potential to support student well-being in digital

Researcher & Year	Research Title	Findings Relevant to Your Research
		environments.
Aulia, Hastjarjo, Setiyawati, & Patria [19]	Student Well-being: A Systematic Literature Review	Student well-being encompasses several aspects, including positive emotions, school satisfaction, negative emotions, social relationships, and student engagement. This finding reinforces that well-being needs to be understood as a multidimensional concept, not merely academic achievement.
Topluk & Genc [20]	Exploring Student Well-Being in Digital Learning Environments: A Scoping Review	A review of 50 studies shows that well-being in digital learning is influenced by psychological well-being, academic engagement, social climate, digital competence, educator support, motivation, and self-regulation. This finding reinforces the importance of a holistic learning approach.
Pratama, Artha, & Abidin [21]	The Effectiveness of Mindful Learning in the Context of Education in Indonesia (2000–2024): A Meta-Analysis Study	A meta-analysis of 12 studies examines the effectiveness of mindful learning in Indonesian education and the factors that moderate its effectiveness. This finding can serve as a basis for the claim that mindful learning holds an important position in developing learner-centered instruction.
Biantoro & Sukiyanto [22]	Mindful Learning as a Strategy to Improve the Psychological Well-Being of Students and Teachers: A Literature Review	Mindful learning is viewed as an approach that emphasizes full awareness during the learning process and has the potential to improve the psychological well-being of both students and teachers. This finding supports the relationship between the mindful aspect and well-being.
Kusuma et al. [23]	School Branding Based on Meaningful Learning in Promoting Student Well-Being in Elementary School	The study directly links meaningful learning with student well-being. Meaningful learning is positioned as part of the effort to create a school environment that supports student well-being.
Putra et al. [24]	A Systematic Literature Review of Joyful Learning in Mathematics: An Implication for Teaching and Learning in Elementary School	An SLR of 30 articles shows that joyful learning is used as an approach to make learning more meaningful and enjoyable. The study also maps the integration of technology and various pedagogical strategies within joyful learning.
Elisa, Setiyadi, & Sumarti [25]	Development and Validation of the Joyful Learning of Reading Scale for EFL Students	The study develops an instrument to measure enjoyment, engagement, and intrinsic motivation in reading instruction. The validation results show that the instrument has high reliability, reinforcing the relationship between joyful learning and engagement and intrinsic motivation.
Abdillah & Anggara [26]	Analysis of Learning Activeness and Concept Understanding of University Students Using the Joyful Learning Model in Higher Education	The implementation of joyful learning results in higher learning activeness and improved concept understanding compared to conventional learning. This finding shows that an enjoyable learning atmosphere can support students' engagement and cognitive processes.
Sembiring, Sukmayadi, & Gunara [27]	Joyful Learning: An Effective Strategy for Interactive Drum Learning	Joyful learning through exploration, improvisation, and dynamic interaction increases student engagement in learning. This finding supports the joyful aspect as an approach that can create positive learning experiences.
Nazarwin et al. [28]	Charismatic Leadership, Joyful Learning, and Student Engagement in Maritime Vocational Education: The Moderating Role of Gender-Based Experiences	The study examines the relationship between joyful learning and student engagement in vocational education. This finding is relevant because student engagement is one important aspect in building positive learning experiences that support well-being.
Moore, Veletsianos, & Barbour [29]	A Synthesis of Research on Mental Health and Remote Learning: How Pandemic Grief Haunts Claims of Causality	A synthesis of research on distance learning shows a complex relationship between online learning and mental health. The study emphasizes that the impact of digital learning on well-being is influenced by various factors and cannot be understood simply as a direct cause-and-effect relationship.
Angelos Konstantinidis [30]	An Integrative Review of the Literature on Factors Influencing Student Well-Being in the Learning Environment	A review of 24 studies found four main factors that influence student well-being: teachers, learning design, classroom climate, and resources. Student-centered pedagogical practices are one important factor in supporting well-being.
Bahar et. Al [31]	The Digital Well-Being among Learners in Higher Education: A Scoping Review	The study shows that digital well-being is a multidimensional concept related to technology use, learning experience, and overall well-being conditions. The review draws on literature from Web of Science, PubMed, and Scopus.

1. The Application of Deep Learning in Supporting Student Well-Being

The synthesis results obtained through the Systematic Literature Review (SLR) method show that the application of deep learning in digital education has developed across various contexts, such as online learning, blended learning, LMS, and technology-based learning. The SLR process enables prior research to be identified, selected, compared, and systematically synthesized to uncover patterns in the application of

deep learning [32]. The findings show that deep learning can be directed toward creating a more learner-centered learning experience. Its application is related to three main principles, namely mindful, meaningful, and joyful learning.

In terms of the mindful learning aspect, learning is directed so that learners have awareness of the learning process, their own condition, and the experiences they undergo during learning. Digital environments can support this process through reflective activities, attention to learners' needs, and more focused learning interactions [33]. This approach helps learners not only focus on academic outcomes, but also understand the process and experience of their learning. Thus, mindful learning can contribute to learners' emotional and psychological well-being.

In terms of the meaningful learning aspect, the synthesis results show that learning becomes more meaningful when material is connected to learners' experiences, needs, environment, and real life. Digital technology provides opportunities to present contextual learning resources, collaborative activities, and tasks relevant to daily life [34]. Meaningful learning can increase learners' engagement, motivation, and understanding of the material studied. This condition can, in turn, support the formation of a positive learning experience and enhance student well-being [35].

Meanwhile, joyful learning emphasizes the creation of a learning atmosphere that is enjoyable, safe, active, and provides a positive experience for learners. Digital education environments can support this approach through the use of interactive media, collaborative activities, educational games, and varied learning strategies [36]. Enjoyable learning can reduce boredom and increase learners' participation and enthusiasm. Therefore, the element of joyful learning is an important part of creating a digital education experience that supports student well-being.

In addition to these three approaches, the SLR synthesis results show that the application of deep learning also encourages more learner-centered learning. Learners are given space to explore knowledge, develop creativity, engage in reflection, and build understanding through active learning experiences [37]. This approach allows the learning process to develop not only as one-way transmission from teacher to student, but through interaction and participation. This condition can strengthen learners' sense of ownership over the learning process and support their well-being.

The findings also show that the effectiveness of deep learning is greatly influenced by how teachers design and manage the digital learning environment. Technology is not the main goal, but rather a means of creating a learning experience that is conscious, meaningful, and enjoyable. Teachers play a role in selecting activities, providing guidance, building positive interactions, and ensuring that technology is used according to learners' needs. Thus, the application of deep learning requires a balance between the use of technology and a humanistic pedagogical approach.

2. Dimensions of Student Well-Being in Digital Learning

The SLR results show that student well-being is a multidimensional concept that relates not only to academic achievement, but also encompasses emotional, psychological, social, and learning-experience aspects of learners. Well-being is reflected through a sense of safety, comfort, motivation, engagement, learning satisfaction, and positive relationships within the education environment [38]. The three approaches of mindful, meaningful, and joyful learning make complementary contributions to these dimensions. Learners' well-being therefore needs to be viewed holistically within the digital learning process.

The emotional and psychological dimension relates to learners' ability to manage emotions, maintain attention, cope with learning pressure, and feel comfortable during the learning process. The mindful learning approach provides space for learners to become more aware of their own condition and the ongoing learning process. This awareness can help create a calmer, more reflective learning process that is not solely outcome-oriented. A more positive emotional condition is one important element in supporting student well-being.

The engagement and motivation dimension relates to the extent to which learners actively participate, hold interest, and feel that the learning process is relevant to them. The meaningful learning approach can strengthen this dimension through contextual learning connected to learners' real experiences [39]. When learners understand the benefit and meaning of what they are learning, their engagement in learning tends to become more positive. This indicates a relationship between the meaningfulness of learning and learners' well-being.

The social dimension and positive experience are also an important part of student well-being. Learning that provides opportunities to interact, collaborate, communicate, and enjoy the learning process can create a more positive education environment. The principle of joyful learning supports this condition by presenting learning that is active, enjoyable, and builds positive relationships. Therefore, learners' well-being in digital education is determined not only by academic success, but also by the quality of the experience they feel while learning.

The synthesis results also show that learners' well-being is closely related to the quality of the learning environment they experience. A digital environment that is too task- and achievement-oriented can lead to burnout if it is not balanced with interaction, reflection, and meaningful activity. The application of mindful, meaningful, and joyful learning can serve as an approach to creating this balance. Digital learning design therefore needs to consider academic needs as well as learners' emotional, social, and psychological aspects.

Furthermore, the SLR shows that student well-being can serve as an important indicator in assessing the success of digital learning. Success cannot be measured adequately through scores or competency achievement alone, but also through learners' engagement, motivation, satisfaction, comfort, and positive experience. The deep learning approach provides a framework that allows the learning process to be directed toward both academic achievement and well-being simultaneously. This reinforces the view that digital education needs to be developed holistically and oriented toward human needs.

3. The Relationship between Mindful, Meaningful, and Joyful Learning and Student Well-Being

The SLR synthesis shows that the three deep learning approaches have a complementary relationship in supporting student well-being. Mindful learning plays a role in building learners' awareness of and attention to the learning process, meaningful learning creates relevance and meaningfulness in learning, while joyful learning brings an enjoyable and positive learning experience. Together, the three can form a more complete, learner-centered learning experience. The integration of these three approaches is one of the important findings of this study.

This relationship can be described as a process that begins with awareness (mindful), continues with meaningfulness (meaningful), and is reinforced through positive experience (joyful). Learners who are aware of their own learning process will be better able to understand the purpose and meaning of the learning they undergo. When learning has meaning and relevance, learners are more likely to experience a positive and enjoyable learning process. This condition can ultimately support the emotional, psychological, social, and academic aspects of student well-being.

In the context of digital education, these three approaches also show that technology should not be used merely to deliver material or improve academic achievement. Technology needs to be utilized to create learning spaces that allow learners to reflect, connect learning with real life, and participate in enjoyable activities [40]. Teachers still play an important role in designing learning experiences that suit learners' characteristics and needs [41]. Thus, technology functions as a support for creating learning that is mindful, meaningful, and joyful.

The SLR synthesis results further show that the integration of the three approaches can build a stronger relationship between the quality of the learning process and learners' well-being. Mindful learning helps learners recognize and manage their learning experience, meaningful learning provides purpose and relevance to what is being learned, while joyful learning strengthens the positive aspects of that process [35]. When the three are applied in an integrated manner, learning can become a more balanced experience between academic achievement and learners' needs. This balance is an important part of efforts to improve student well-being.

In addition, the findings show that the relationship between the three approaches and student well-being is contextual in nature. Its application needs to be adapted to learners' age, learning characteristics, educational goals, school culture, and digital environment conditions. Not every enjoyable strategy is automatically meaningful, and meaningful learning does not necessarily proceed in an enjoyable manner if learners' conditions are not taken into account. Therefore, integrating mindful, meaningful, and joyful learning requires balanced pedagogical planning oriented toward students' needs.

Overall, the SLR results show that the Deep Learning approach has strong potential to support student well-being in digital education environments. The mindful approach supports learners' awareness and balance, meaningful supports the relevance and meaningfulness of learning, while joyful supports a positive and enjoyable learning experience. The integration of the three can build a learning environment that is oriented not only toward academic achievement, but also toward learners' overall well-being. This finding underscores the importance of digital education that is oriented toward people, the learning experience, and learners' well-being.

DISCUSSION

The application of the Deep Learning approach in digital education reflects a shift in learning orientation from mere academic achievement toward a more complete learning experience [42]. This approach, through the mindful, meaningful, and joyful learning approaches, places learners at the center of the learning process [43]. These three approaches give attention to cognitive aspects as well as learners' emotional, social, and psychological aspects. This makes deep learning relevant in supporting the creation of student well-being in digital education environments.

Mindful learning builds learners' awareness of the process, condition, and experiences they undergo during learning [44]. This awareness encourages learners to be more focused, reflective, and able to recognize their own needs in the learning process. In a digital environment with numerous distractions, the ability to sustain attention and self-regulate becomes increasingly important. Learning that proceeds consciously and purposefully can create a sense of comfort and support learners' emotional and psychological well-being.

Meaningful learning provides a learning experience that connects knowledge with learners' experiences, needs, environment, and real life [45]. When learners understand the reason for and benefit of what they are learning, the learning process becomes more relevant and purposeful. This meaningfulness can increase motivation, engagement, self-confidence, and satisfaction in learning. Meaningful learning therefore has a close relationship with the formation of positive experiences that are part of student well-being.

Joyful learning creates a learning atmosphere that is enjoyable, safe, active, and provides a positive experience for learners [46]. Digital education environments can support this approach through the use of interactive media, collaborative activities, educational games, and various forms of learning exploration. An enjoyable learning experience can increase enthusiasm and participation while helping to reduce boredom during the learning process. Thus, the positive atmosphere built through joyful learning can strengthen the emotional and social aspects of student well-being.

The three approaches have a complementary relationship in shaping a learning experience that supports learners' well-being. Mindful learning provides awareness of the learning process, meaningful learning provides relevance and purpose, while joyful learning brings a positive and enjoyable experience. The integration of the three allows learning to focus not only on what should be learned, but also on how learners experience that learning process. Balance among awareness, meaningfulness, and enjoyment can strengthen engagement and support student well-being more holistically.

Digital education environments provide ample room to integrate these three approaches into the learning process. Various digital resources, interactive media, collaborative activities, and learning flexibility can be used to create a learning experience suited to learners' needs. However, the use of technology does not automatically produce learning that is mindful, meaningful, and joyful. Teachers still play an important role in designing activities, building positive interactions, providing guidance, and ensuring that technology is used appropriately and humanely.

Student well-being also needs to be understood as part of the success of the learning process itself, rather than merely a secondary effect of academic achievement [47]. Learners who feel comfortable, engaged, motivated, and have a positive learning experience are in a better condition to develop optimally. In this context, deep learning provides a learning framework that connects the attainment of knowledge with the quality of learners' experience. Well-being therefore needs to be one of the considerations in designing and evaluating digital learning.

The connection between deep learning and student well-being ultimately reveals the importance of a human-centered approach to education. Mindful learning supports self-awareness and balance, meaningful learning strengthens relevance and motivation, while joyful learning creates a positive learning experience. Together, the three can build a digital education environment that is healthier, more adaptive, and more responsive to learners' needs. Thus, deep learning not only deepens understanding of the material, but can also deepen the quality of the learning experience and support learners' well-being.

CONCLUSION

The Deep Learning approach plays an important role in supporting student well-being in digital education environments. The mindful, meaningful, and joyful learning approaches show that the quality of learning is determined not only by academic achievement, but also by the quality of the experience felt by learners. Mindful learning helps build awareness, focus, and the ability to self-regulate during the learning process. Meaningful learning provides relevance and purpose so that learners can connect knowledge with experience and real life. Meanwhile, joyful learning creates a learning atmosphere that is enjoyable, safe, active, and provides a positive experience. The integration of the three approaches can strengthen learners' motivation, engagement, comfort, and satisfaction in digital learning. Student well-being thus becomes an important part of learning oriented toward learners' holistic development. Ultimately, the application of the Deep Learning approach through mindful, meaningful, and joyful learning can serve as a foundation for creating digital education that is more humanistic, meaningful, enjoyable, and supportive of learners' well-being.

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