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Implementing Deep Learning Approaches in Non-Formal Equivalency Education: Strategies and Pedagogical Implications

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Abstract: This study aims to explore strategies for implementing deep learning approaches in non-formal equivalency education and to analyze their pedagogical implications for teaching practices. It addresses the limited use of contextual and holistic learning approaches in equivalency education, which often fail to adequately respond to the diverse learning needs and practical life contexts of learners. A descriptive qualitative method with an exploratory design was employed, involving data collection through in-depth interviews, participatory observation, and document analysis. The participants consisted of 20 individuals, including 5 tutors, 3 PKBM administrators, and 12 Paket C learners, selected through purposive sampling. Thematic analysis was applied to examine how the four components of deep learning—graduate profile dimensions, learning principles, learning experiences, and instructional frameworks—were integrated into practice. The findings indicate that deep learning strategies were operationalized through community-based and vocationally oriented projects aligned with learners' economic realities, fostering entrepreneurial skills, critical thinking, collaboration, and economic self-reliance consistent with the empowerment orientation of Community Learning Centers (PKBM). Tutors employed participatory and andragogical approaches supported by flexible learning environments and digital technologies. The study concludes that deep learning has the potential to transform equivalency education into a more humanistic and empowering process, better preparing learners to address 21st-century challenges. It recommends strengthening tutor capacity, developing contextual materials, and enhancing community partnerships to ensure sustainable implementation.

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Introduction

Non-formal equivalency education provides learning access for individuals who were unable to complete formal schooling. In the context of globalization, digital transformation, and the demands of 21st-century skills, equivalency education is expected not only to support academic completion but also to develop critical thinking, creativity, collaboration, communication, independence, and social awareness (Ansori et al., 2024; Arbarini et al., 2022). In Indonesia, this form of education primarily serves marginalized learners who often experience structural inequality compared to formal school graduates (Kawuryan et al., 2021). As a result, Paket C graduates are frequently perceived as second-tier graduates, affecting their self-confidence, employment opportunities, and social mobility. However, equivalency education has been shown to improve the quality of life of marginalized communities through strengthening vocational competence and economic participation (Tipani, 2025). Therefore, equivalency education must function not only as certification but

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also as an empowerment-oriented mechanism that enhances self-efficacy and economic self-reliance.

However, learning practices in equivalency education still tend to focus on basic academic achievement with limited meaningful interaction and holistic development (Edwards-Fapohunda, 2024). This indicates the need for more contextual, humanistic, and empowering learning approaches. Deep learning offers such an alternative by emphasizing not only conceptual understanding but also emotional, reflective, and social engagement (Roberts et al., 2022). In the PKBM context, deep learning differs from formal schooling as it must be grounded in learners' prior experiences, vocational backgrounds, and intrinsic motivation. Thus, deep learning in non-formal education is conceptualized in this study as Andragogical Deep Learning, which functions not only as a cognitive instructional approach but also as an empowerment process for adult learners.

This approach integrates intellectual, ethical, aesthetic, and physical dimensions (Rezekiah et al., 2022), aligning with holistic learning perspectives that emphasize balanced cognitive, emotional, social, and practical development (Kumar & Cenkl, 2021; Miseliunaite et al., 2022; Tirri, 2011). In non-formal equivalency education, this integration is essential as learners have diverse, practical, and context-based needs (Ansori & Samsudin, 2013). Therefore, deep learning strategies must be designed adaptively and collaboratively to address learners' holistic development.

Previous studies have explored contextual and meaningful learning in non-formal education. For instance, project-based learning has been shown to enhance independence and entrepreneurial skills (Nuraeni, 2021), while digital media supports motivation and collaboration (Nisa, 2025). However, these studies have not yet integrated a comprehensive deep learning framework that systematically connects graduate profile dimensions, learning principles, learning experiences, and instructional practices. Moreover, limited research has examined deep learning as an empowerment-oriented strategy in non-formal equivalency education.

This study addresses this gap by systematically examining deep learning implementation strategies based on four key components: (1) graduate profile dimensions, including faith, citizenship, critical thinking, creativity, collaboration, independence, health, and communication; (2) learning principles that are conscious, meaningful, and joyful through the integration of the four "olah" domains aligned with holistic learning theories (Kumar & Cenkl, 2021; Miseliunaite et al., 2022; Tirri, 2011); (3) learning experiences involving understanding, application, and reflection; and (4) instructional frameworks that emphasize participatory pedagogy, adaptive environments, digital technology, and learning partnerships (Lestariningrum et al., 2024).

The relevance of this study lies in the increasing need for educational models that not only deliver academic knowledge but also foster life skills necessary to respond to complex socio-economic challenges. Without deeper and more empowering learning approaches, equivalency education risks producing graduates who meet academic standards but lack essential competencies. This study contributes by offering an integrated framework of Andragogical Deep Learning that aligns educational practices with learners' real-life contexts and empowerment needs.

This study aims to explore strategies for implementing deep learning in non-formal equivalency education and to analyze their pedagogical implications. It specifically addresses the limited use of contextual and holistic approaches in equivalency education and proposes strategies that are adaptive, participatory, and empowering. The findings are expected to contribute both practically and theoretically to the development of non-formal education by

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providing a comprehensive model for implementing deep learning in community-based learning settings.

Research Method

This study employs a descriptive qualitative approach with an exploratory design to understand strategies for implementing deep learning in non-formal equivalency education an approach appropriate for investigating complex, context-bound pedagogical processes (Black & Tomlinson, 2025; Fitrah et al., 2025). The focus of this research is to examine how the components of deep learning are integratively applied by 20 participants, consisting of 5 tutors, 3 PKBM administrators, and 12 Paket C learners at a Community Learning Center. Participants were selected using a purposive sampling technique based on their direct involvement in implementing deep learning practices within the Paket C program. The selection criteria included: (1) active participation in learning activities during the research period, (2) willingness to be interviewed and observed, and (3) experience in project-based or contextual learning activities. To ensure confidentiality and adhere to ethical research standards, all participants were anonymized using coded identifiers. The following table provides an overview of participant profiles to illustrate the andragogical context of the study.

Table 1. Anonymized Profile of Research Participants

Code	Status	Teaching Experience / Occupational Background	Years of Involvement
T1	Tutor	8 years teaching Paket C; background in Social Sciences	2016-Present
T2	Tutor	6 years; Entrepreneurship facilitator	2018-Present
T3	Tutor	5 years; Civic Education tutor	2019-Present
T4	Tutor	10 years; Community empowerment trainer	2014-Present
T5	Tutor	4 years; Digital literacy instructor	2020-Present
A1	Administrator	PKBM Manager; 12 years managing community programs	2012-Present
A2	Administrator	Curriculum coordinator	2017-Present
A3	Administrator	Community partnership coordinator	2018-Present
L1	Learner	Small-scale food vendor	2 years
L2	Learner	Garment factory worker	1.5 years
L3	Learner	Motorcycle taxi driver	2 years
L4	Learner	Freelance construction worker	1 year
L5	Learner	Home-based entrepreneur	3 years
L6	Learner	Shop assistant	1 year
L7	Learner	Farmer	2 years
L8	Learner	Online reseller	1.5 years
L9	Learner	Domestic worker	2 years
L10	Learner	Informal sector trader	1 year
L11	Learner	Mechanic assistant	2 years
L12	Learner	Part-time delivery courier	1 year

Research data were obtained from primary and secondary sources. Primary data were collected through in-depth interviews with tutors, Community Learning Centers administrators, and Paket C learners, as well as through observations of learning processes and empowerment project activities. Secondary data were obtained from policy documents, learning modules, activity reports, and scholarly literature related to deep learning and non-formal education.

Data collection techniques included semi-structured interviews, participatory observation, and document analysis. Interviews were conducted both in-person and online,

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while observations focused on learning activities and student-led projects. Documentation was used to reinforce the data collected in the field. The data were analyzed using systematic thematic analysis techniques, involving data reduction, categorization based on deep learning components, narrative presentation, and conclusion drawing (Braun & Clarke, 2006; Nowell et al., 2017). Source and method triangulation were employed to enhance the credibility and trustworthiness of the findings.

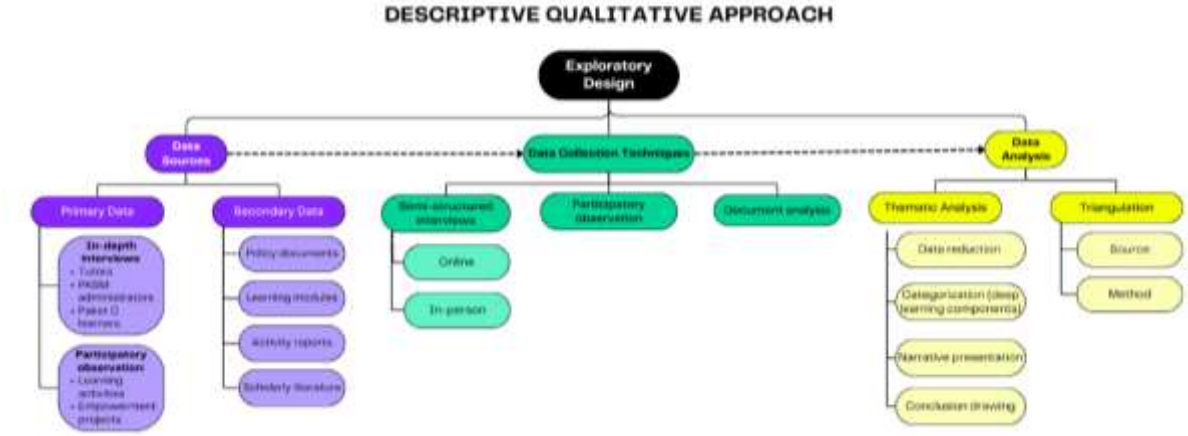

Figure 1. Flowchart of Research Method

Results and Discussion

Results

Integration of Graduate Profile Dimensions in Learning Practices

Findings from the PKBM indicate that deep learning strategies were systematically integrated to strengthen graduate profile dimensions, including faith and devotion, citizenship, critical reasoning, creativity, collaboration, and independence. These dimensions were not taught separately but embedded in vocational and community-based learning activities within the Paket C program. One tutor explained: “We do not only teach theory. When learners create small business projects, we integrate responsibility, collaboration, and ethical values into the process.” (T2) A learner also stated: “Through the project, I learned how to manage my small business better, but also how to work in a team and be more confident.” (L5) Observations showed active learner participation in economic projects, local problem mapping, and reflective discussions linking civic and moral values with real-life contexts, indicating that graduate profile development is closely connected to learners’ socio-economic realities. Figure 2 illustrates the integration of graduate profile dimensions within deep learning practices implemented at PKBM.

Figure 2. Integration of Graduate Profile Dimensions in Deep Learning

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This integration supports holistic development by balancing spiritual, social, intellectual, and practical aspects. Learners connected religious values with business ethics, collaborated in product development, and presented their work to the community. As one tutor noted: "Faith and responsibility are part of entrepreneurship here. We connect moral values with daily economic practices." (T1) This reflects deep learning principles emphasizing cognitive, emotional, and practical engagement (Roberts et al., 2022) and aligns with andragogical perspectives grounded in learners' prior experiences and intrinsic motivation (M. Knowles, 2013). Thus, deep learning in PKBM functions as an empowerment-oriented process embedded in vocational and community contexts. Figure 3 illustrates the process of strategy integration, beginning with identifying learners' socio-economic needs and followed by contextual planning of deep learning activities linked to vocational skills and community empowerment.

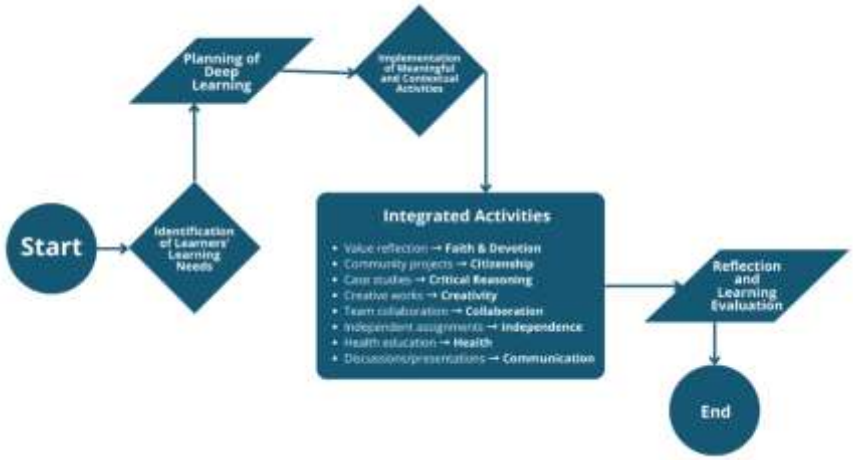

Figure 3. Flowchart of Strategy Integration into Graduate Profile Dimensions

The process is implemented through collaborative, project-based activities and concludes with reflection and evaluation. For example, tutors designed projects based on learners' occupations, such as small businesses or digital marketing. One learner stated: "The project was directly related to my work, so I could apply it immediately." (L3) This sequence reflects experiential learning cycles of experience, reflection, and experimentation (Kolb, 2014). In the PKBM context, it reinforces Andragogical Deep Learning, where learning functions not only cognitively but also as a means of strengthening vocational competence, self-efficacy, and economic self-reliance.

Implementation of the Principles of Conscious, Meaningful, and Enjoyable Learning

Findings from the PKBM indicate that the principles of conscious, meaningful, and enjoyable learning were implemented through the integration of four domains intellectual, emotional, aesthetic, and physical within vocational and community-based activities. These principles were embedded in real-life learning aligned with learners' socio-economic contexts. A tutor explained: "We design activities that make learners think, feel, and act at the same time. When they work on business projects, they are not only learning theory but also reflecting on their values and responsibilities." (T3) Observations showed that intellectual engagement was developed through contextual discussions, problem-solving, and small-scale research based on learners' work experiences. One learner stated: "When we discussed problems from our own work experience, I understood the lesson better because it was connected to my daily life." (L7) This reflects holistic learning perspectives emphasizing

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balanced cognitive, emotional, and practical engagement principles (Gemmell & Kolb, 2020; M. S. Knowles, 1984).

Emotional engagement was fostered through reflective dialogue and discussions of moral values. A tutor noted: "Before starting a business project, we discuss honesty, trust, and responsibility. These values are important for entrepreneurship." (T1) Aesthetic practice was integrated through creative activities and project presentations that enhanced confidence. One learner expressed: "I used to feel shy, but presenting our project made me more confident." (L4) Physical engagement occurred through vocational practices such as food production, tailoring, and digital content creation, enabling direct application of knowledge and aligning with holistic education principles.

Digital technology also played a key role, particularly for working adults. WhatsApp and instructional videos were used to support learning beyond classroom hours. A tutor stated: "Using WhatsApp made it easier to support learners who are working during the day. They can ask questions at night." (T5) A learner confirmed: "Because I work during the day, I review the materials at night through WhatsApp or videos." (L9) This demonstrates andragogical flexibility, where technology overcomes spatial and temporal barriers, allowing learners to access learning according to their schedules. Thus, these principles do not merely enhance engagement but form a holistic and empowerment-oriented process integrating cognitive, emotional, and practical development. In this context, deep learning operates as an adaptive andragogical framework that responds to the lived realities of marginalized adult learners.

Learning Experience as a Reinforcement of Contextual Learning

Findings from the PKBM indicate that learning experiences in the Paket C program were designed to connect academic content with learners' real-life economic and social contexts. Tutors emphasized experiential and contextual activities that enabled learners to understand, apply, and reflect on knowledge in their daily lives. One tutor explained: "We always start from their real problems business, family, or community issues so the lesson feels relevant." (T4) A learner confirmed: "When we discussed environmental problems in our neighborhood, I realized that the lesson was not only theory. It was about what we face every day." (L6) Observations showed learners engaging in projects such as mapping local economic challenges, developing entrepreneurial plans, and organizing community campaigns, indicating that learning is closely tied to socio-economic realities. This practice aligns with constructivist perspectives, where knowledge is actively constructed through interaction with experience (Waite-Stupiansky, 2022). Piaget emphasized active cognitive development, while Vygotsky highlighted social interaction and cultural context in meaning-making (Huang, 2021).

In PKBM, learning occurs both individually and collaboratively through dialogue and community engagement. These activities also reflect experiential learning cycles involving experience, reflection, and experimentation (Kolb et al., 2014). For instance, learners developed business prototypes and reflected on implementation challenges. One learner stated: "After trying to sell the product, I understood what worked and what didn't. Then we discussed it in class." (L2) Such practices also resonate with situated learning theory, where knowledge becomes meaningful when embedded in authentic social contexts (Lave & Wenger, 1991).

In PKBM, learners participated in real community activities, extending learning beyond classroom discussions. Reflection played a key role in strengthening learning. Tutors facilitated reflective sessions linking experiences to personal development. As one tutor noted: "Reflection is important. We ask them what they learned from the experience, not just

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what score they got." (T1) This process enhances metacognitive awareness and social responsibility (Sadiah et al., 2024), while also supporting transformative learning among adult learners.

Therefore, learning experience in PKBM reinforces contextual learning by positioning learners as active agents. Through project-based and socially embedded activities, learners develop 21st-century competencies such as critical thinking, creativity, collaboration, and communication (Kurniawan et al., 2024), while strengthening vocational competence and economic self-reliance.

Pedagogical Practice and Adaptive Learning Environment

Findings from the PKBM show that pedagogical practices in the Paket C program are participatory, dialogical, and adaptive to learners' socio-economic contexts. Tutors act as facilitators who encourage dialogue and connect learning with learners' experiences. One tutor explained: "In our class, learners are not just listening. We discuss their experiences first, then connect them to the lesson." (T3) A learner added: "Here, I can express my opinion freely. The tutor listens to our experiences and connects them to the material." (L8) Observations confirmed that learning often begins with learners' work or community issues before moving to theory. This reflects critical pedagogy, which positions learning as dialogue and consciousness-raising rather than one-way transmission (Corbett & Guilherme, 2021; Freire, 1996).

Tutors also applied andragogical principles emphasizing relevance and flexibility. One tutor noted: "Most of our learners are working adults. So, we adjust the material to their jobs and daily challenges." (T2) A learner confirmed: "The lesson is connected to my business, so it feels useful, not just theory." (L5) These practices align with andragogy, where adult learning is experience-based and problem-oriented (M. Knowles, 2013; M. S. Knowles, 1984), demonstrating adaptive strategies across diverse learner backgrounds.

The learning environment further supports this approach through flexible spaces and community-based activities. One learner stated: "Sometimes we learn directly from the field. It helps us understand better." (L6) Tutors also created a safe and supportive atmosphere. As one tutor noted: "Some learners used to feel insecure because they dropped out of school. We make sure they feel respected here." (T1) This reflects an ecological learning environment that integrates social, emotional, and cognitive dimensions, while strengthening psychological safety and learner confidence. Thus, pedagogical practices and adaptive environments in PKBM form the foundation of Andragogical Deep Learning, where flexibility, dialogue, and contextual relevance enable adult learners to re-engage in education with dignity and agency.

Utilization of Digital Technology to Increase Learner Engagement

Findings from the PKBM indicate that digital technology is a key strategy for sustaining learner engagement, especially for working adults in the Paket C program. Platforms such as WhatsApp, educational videos, and social media are integrated to extend learning beyond face-to-face sessions and accommodate learners' schedules. A tutor explained: "Using WhatsApp made it easier to support learners who are working during the day. They can ask questions at night, and we can continue the discussion." (T5) A learner confirmed: "Because I work until the afternoon, I review the materials at night through WhatsApp or videos. It helps me stay connected to the class." (L9) Observations showed active use of WhatsApp groups for sharing materials, assignments, and peer interaction, along with short instructional videos created by tutors. These practices reflect blended learning principles that enhance accessibility and flexibility.

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Social media such as Facebook and YouTube were used to showcase learners' projects and entrepreneurial products. One learner stated: "When our product was posted online, I felt proud and more confident to promote it." (L8) This supports constructivist learning, as learners actively build knowledge through digital interaction and real-world application.

Digital technology also enhanced self-directed learning, enabling learners to revisit materials, participate in discussions, and create digital outputs. This aligns with connectivism theory, where learning occurs through networks of information and technology (Siemens, 2005). In the PKBM context, technology supports andragogical flexibility by overcoming spatial and temporal barriers. As one tutor noted: "If they cannot attend because of work, we continue the learning online. The process does not stop." (T2)

Thus, digital technology not only increases engagement but also transforms learning into a flexible and empowerment-oriented process. By integrating technology into vocational and contextual activities, PKBM strengthens learners' autonomy, confidence, and readiness to face socio-economic challenges.

Learning Partnerships as a Pillar of Empowerment

Findings from the PKBM indicate that learning partnerships function as a key mechanism for strengthening learner empowerment in the Paket C program. The Community Learning Center collaborates with community leaders, parents, local business actors, and social organizations to ensure learning remains socially relevant and economically grounded. A PKBM administrator explained: "We involve local business owners so learners can practice in real business settings, not only in simulations." (A1) A tutor added: "When community leaders support the program, learners feel that what they learn here is recognized by society." (T3) Observations showed learners engaging in mentoring with entrepreneurs, community discussions, and field-based business activities, creating authentic learning experiences embedded in community life.

This model aligns with social capital theory, which emphasizes the role of networks and trust in empowerment (Bourdieu, 2012; Putnam, 1994). In PKBM, partnerships expand access to knowledge, economic opportunities, and social recognition. Collaboration with business actors also strengthened vocational competence. One learner stated: "After talking directly with business owners, I understood better what customers actually want." (L4) These experiences reflect experiential learning through direct engagement and reflection (Gemmell & Kolb, 2020).

Parental and community involvement further supported learner motivation. A tutor noted: "When parents understand the purpose of the program, they encourage learners to continue and complete their projects." (T1) This aligns with adult learning perspectives emphasizing supportive social environments (Merriam & Baumgartner, 2020). Thus, learning partnerships function as a core pillar of Andragogical Deep Learning, embedding learning within community and economic contexts. Through this model, PKBM transforms deep learning into an empowerment-oriented framework that strengthens learners' agency, vocational competence, and socio-economic participation.

Reflection on Opportunities and Challenges in Implementing Deep Learning

Findings from the PKBM indicate that deep learning offers significant opportunities to create more relevant and empowering learning for adult learners. Tutors utilized policy flexibility and digital tools to design contextual, project-based learning aligned with learners' socio-economic realities. One tutor explained: "With the flexibility we have now, we can design projects based on learners' real work and community problems." (T4) A learner added: "The lessons feel different here. They are connected to my daily life and business."

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(L6) Observations showed the integration of project-based activities, reflective discussions, and digital tools such as WhatsApp to sustain learning beyond classroom sessions. These practices reflect emancipatory and contextual learning principles (Freire, 1996) and align with andragogical perspectives emphasizing relevance and experience-based learning (M. Knowles, 2013).

However, challenges remain in implementation. Tutors reported limitations in designing contextual learning due to insufficient training. One tutor stated: "We understand the concept of deep learning, but sometimes we lack training on how to design engaging contextual activities." (T2) Resource constraints, including limited teaching materials and infrastructure, also hindered implementation. A PKBM administrator noted: "We want to expand project-based learning, but sometimes financial support is limited." (A1) Additionally, diverse learner backgrounds increased the complexity of designing inclusive strategies. As one tutor explained: "Some learners work full time, others have different educational backgrounds. We must adjust constantly." (T3) These challenges highlight the need for adaptive pedagogical approaches (Dwikurnaningsih et al., 2025) and continuous professional development.

To address these issues, PKBM practitioners implemented collaborative and reflective strategies. One tutor stated: "We share ideas with other tutors and try simple innovations first before expanding them." (T5) This aligns with experiential and transformative learning theories, where reflection supports ongoing improvement (Kolb, 2014; Mezirow, 2000).

Thus, reflection on opportunities and challenges becomes integral to the deep learning process. In the PKBM context, continuous adaptation, collaboration, and reflection enable deep learning to function as an empowerment-oriented framework that is responsive to social and economic realities.

Conclusion

Deep learning strategies in non-formal equivalency education, particularly in the Paket C program at Community Learning Centers (PKBM), are conceptualized in this study as Andragogical Deep Learning, a model that differs from formal schooling by positioning learning not merely as a cognitive process but as an empowerment-oriented framework for marginalized adult learners. The integration of graduate profile dimensions faith, citizenship, and critical and creative thinking is embedded within vocational and community-based activities to support holistic development across cognitive, social, emotional, spiritual, and practical domains. Grounded in principles of conscious, meaningful, and enjoyable learning, this approach utilizes real-life, project-based, and constructivist experiences, supported by participatory and adaptive pedagogy where tutors act as facilitators of experience-based learning. A flexible and community-based learning environment, combined with simple digital technologies, enables andragogical flexibility by overcoming spatial and temporal barriers faced by adult learners. Thus, this study demonstrates that deep learning in PKBM functions as an empowerment mechanism that strengthens learners' self-efficacy, vocational competence, and socio-economic resilience, positioning Andragogical Deep Learning as a transformative pathway for enhancing adult learners' agency and readiness to face 21st-century challenges.

Recommendation

Based on the findings, several recommendations are proposed to strengthen the implementation of Andragogical Deep Learning in non-formal equivalency education. PKBM managers are encouraged to institutionalize tutor capacity-building programs focused on

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contextual, project-based, and digital learning, while fostering professional learning communities, developing locally relevant materials, and strengthening partnerships with community and business actors to sustain experiential learning. Policy makers should provide systemic support through funding, digital infrastructure, and flexible regulatory frameworks that accommodate working adult learners and recognize deep learning as an empowerment-oriented approach. In addition, long-term evaluation systems are needed to assess impacts on learner independence, employability, and community participation, supported by multi-stakeholder collaboration. Future research should explore scalability across diverse contexts and examine the integration of emerging technologies to enhance personalized and flexible learning. These coordinated efforts will enable deep learning in PKBM to evolve into a sustainable and transformative model for community-based empowerment.

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