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Transformative deep learning in secondary education: the 3P framework for inclusive and sustainable knowledge development

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ABSTRACT

This study explores the potential of the 3P (Precise, Process, Product) framework to incorporate the principles of transformative and deep learning in secondary education. This research addresses the urgent need for meaningful, reflective, and student-centered learning to tackle the complex challenges of the 21st century. A qualitative case study was conducted at a secondary school using purposive sampling of curriculum coordinators, teachers, and policymakers. Data were gathered through semi-structured interviews, focus group discussions, and observation of classes. Thematic analysis, supported by NVivo 12 software, showed that the Precise component helps formulate clear and focused learning objectives; the Process component encourages reflective dialogue, active participation, and an inclusive learning environment; and the Product component fosters authentic, project-based assessment practices. The findings indicate that the 3P framework has shifted learning from exam-centered methods to an emphasis on deep understanding, inclusivity, and global citizenship. Challenges included gaps in teacher training, low digital literacy, and unequal access, while solutions emerged at the teacher, school, and policy levels. The framework proved to be versatile and effective, enhancing students' learning identity and social awareness, and aligning curriculum standards with classroom practice. This study offers a conceptual contribution to curriculum transformation by presenting an adaptive and sustainable pedagogical model that supports Sustainable Development Goal (SDG) 4 on inclusive and quality education.

Keywords: Transformative Learning, Deep Learning, 3P Framework, Secondary Education, Inclusive Pedagogy, Authentic Assessment.

1. INTRODUCTION

The rapid transformation of the global landscape in the 21st century, characterized by digital disruption, social complexity, and environmental challenges, calls for a reevaluation of how secondary education prepares students for an uncertain future. Traditional education models that emphasize memorization and standardized testing are increasingly viewed as insufficient for developing higher-order thinking skills, adaptability, and ethical awareness necessary in a complex world. In response to this challenge, transformative learning approaches are gaining widespread recognition because they not only transfer knowledge but also foster learners' identity, agency, and critical awareness. awareness (Anand et al., 2020).

The rapid digitalization of education has fundamentally reshaped teaching, learning, and educational space design. Research by Yang (2025) emphasizes that innovative education extends beyond online delivery, involving intelligent ecosystems powered by AI, big data, IoT, cloud computing, and XR. As highlighted by HERD (2025), these infrastructures have redefined hybrid learning spaces, facilitating interactions between students and teachers. The "Education 4.0" framework by Mukul and Büyüközkan (2023) connects such transformations to deep learning outcomes, critical thinking, collaboration, and problem-solving, thus positioning technology as a means of pedagogical innovation.

Understanding this innovation requires a clarification of the distinction between surface and deep learning. Salguero (2024) described surface learning as rote-driven and assessment-oriented, whereas deep learning entails intrinsic motivation, critical inquiry, and the integration of prior and new knowledge. According to Wolff (2023), transformative learning theory extends this by framing deep learning as critical reflection that reshapes perspectives. Operational indicators include problem-solving, self-directed inquiry, and collaborative meaning-making, in contrast to the fragmented retention and dependency that are typical of surface approaches. These conceptual foundations are essential for interpreting how innovative ecosystems foster genuine transformative learning.

In secondary education, transformation is closely tied to inclusivity and sustainability. A study by Subban (2022) highlights supportive factors of inclusion, such as teacher attitudes and peer collaboration, while Koutsouris (2024) argues that inclusion requires reconceptualizing diversity as an institutional asset. Parallel studies by Navas-Bonilla (2025) Show how AI and VR enhance participation for diverse learners. Simultaneously, Vesterinen and Ratinen (2024) and Lagoudaki (2024) Demonstrate that Education for Sustainable Development (ESD) is advanced through interdisciplinary project-based learning, supported by policy and teacher training. Further situates secondary education within the ESD 2030 agenda, aligning personal transformation, pedagogy, and policy under the 3P model (Sharma, 2025).

Transformative learning theory provides a powerful framework for shifting the focus of education from mere content delivery to profound cognitive and affective changes (Taylor, 2018). This theory emphasizes critical reflection, dialogic interactions, and meaning reconstruction. These aspects make the theory highly relevant for secondary education, a time when students undergo significant cognitive, emotional and social development (Taylor, 2018). However, recent studies have shown that these obstacles can be overcome using appropriate strategies. First, teacher training that emphasizes reflective and dialogic pedagogy has been shown to improve teachers' capacity to adopt transformative learning principles. (Brookfield, 2017). Second, the development of a flexible and contextual curriculum enables the integration of student-centered and project-based learning, thereby supporting deep learning (Fullan & Langworthy, 2014). Third, the integration of educational technology can expand access to learning resources, strengthen collaboration, and provide personal space for students to explore. (Redecker, 2017). Fourth, authentic and formative assessment systems can encourage students to think critically, synthesize information, and reflect on their learning experiences (Boud & Falchikov, 2006).

According to Mailani (2025), the essence of this transformation lies in the distinction between deep and surface learning. Surface learning emphasizes memorization and short-term achievements (Biggs & Tang, 2011). Deep learning promotes conceptual understanding, knowledge transfer, and lifelong learning. Therefore, According to Andriana (2021), pedagogy that supports deep learning is crucial in creating meaningful learning processes, especially in inclusive and diverse classrooms.

To address this implementation gap, this study adopts the 3P (Precise, Process, Product) learning framework developed by Abdul Mu'ti (Minister of Primary and Secondary Education) as a comprehensive and practical model for teacher training. This framework guides educators to (1) develop clear, specific, and contextual learning objectives (Precise), (2) create interactive and reflective learning processes (Process), and (3) assess learning outcomes that demonstrate the integration of concepts and their application in real-world situations (Product). The integration of objectives, processes, and outcomes provides a concrete direction for inclusive and sustainable curriculum transformation (Biggs & Tang, 2011; Fullan & Langworthy, 2014; OECD, 2019; United Nations Educational, 2017). This gap opens up space for the development of the 3P framework, which integrates the dimensions of technology, pedagogy, and sustainable curriculum as a new contribution to the academic discourse.

This is in line with Sustainable Development Goal (SDG) number 4, which is to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all (United Nations Educational, 2017). This study places inclusive and sustainable knowledge development at the center of curriculum design and learning practices. Inclusivity means ensuring that all learners, regardless of their social, cultural, or economic backgrounds, have fair access to transformative learning experiences. (Hidayatullah, 2024). In contrast, sustainability focuses on developing long-term competencies, such as critical thinking, global awareness, and social responsibility, which are essential for the resilience of individuals and communities in the future (Rieckmann, 2012).

Although many policies have declared educational transformation, many education systems still face challenges such as fragmented curriculum structures, teacher-centered pedagogy, and unequal access to quality learning. Therefore, a strategic, evidence- and theory-based model of educational transformation is needed. This study aims to examine how the 3P (Precise, Process, Product) framework can operationalize the principles of transformative and deep learning in the context of secondary education. In addition, this study investigates the potential of this framework to support inclusive and sustainable knowledge development, as emphasized in Sustainable Development Goal (SDG) 4. Finally, this study aims to provide a practical model that teachers can apply in curriculum development and classroom learning practices to encourage meaningful and future-oriented educational transformation.

This study aims to answer three main questions: how to effectively integrate transformative learning principles into secondary education through the 3P framework approach; in what ways can the application of the 3P model strengthen deep learning practices and support the creation of an inclusive educational environment; and what are the strategic impacts of applying the 3P framework on the design of sustainable curricula and efforts to transform secondary education.

2. METODOLOGY

This study uses a qualitative approach with an exploratory case study design to gain an in-depth understanding of the application of the 3P (Precise, Process, Product) framework in integrating the principles of transformative learning and deep learning in secondary education. This approach was chosen because it allows researchers to explore the complex context, meaning, and social dynamics of classroom learning practices (May & Perry, 2022; Tomaszewski et al., 2020). Exploratory case study designs have proven effective in previous studies that sought to understand educational processes holistically and contextually, especially in contexts involving paradigm shifts in learning and deep-learning experiences (Hancock et al., 2021; Schoch, 2020).

The study site was purposefully determined at the Muhammadiyah Mertoyudan Islamic Boarding School in Magelang, Central Java, considering its preliminary indications of transformative learning practices and the diversity of institutional characteristics, including institutional status and students'socioeconomic background. Participants were selected using purposive sampling, with specific criteria such as having at least three years of teaching or studying experience, direct involvement in transformative learning activities, and willingness to share reflections. To enhance sample diversity, the study involved participants with various institutional roles (teachers, students, and administrators). These

considerations not only ensure a rich variety of perspectives but also strengthen the transferability of the findings to other similar educational contexts (Patton, 2020).

Data collection was conducted through classroom observations, semi-structured interviews, focus group discussions (FGDs), and document analysis of learning tools (lesson plans, syllabi) and curriculum materials. This multi-method approach enabled triangulation across data sources and techniques, thereby improving the robustness and credibility of the findings. The importance of triangulation in qualitative research, particularly in educational transformation studies, has been highlighted in previous studies (Meydan & Akkaş, 2024).

Data analysis was carried out systematically using NVivo 12 Plus software to organize, code and explore qualitative data. Coding was developed through a combined inductive (emerging from the data) and deductive (informed by theoretical frameworks) approach. To ensure coding reliability, two researchers independently coded subsets of the data and compared the results through consensus discussions, establishing inter-coder reliability. Themes were refined iteratively, supported by triangulation across sources and methods, member checking with participants, and the maintenance of an audit trail. To further enhance transparency, a coding tree was constructed to illustrate the hierarchical relationships between the initial codes, categories, and emerging themes. This strategy is consistent with Strauss and Corbin's (1998) grounded theory approach, which allows for an in-depth exploration of social phenomena and has been proven effective in transformative learning studies (Corbin, 2021; Lim, 2025).

3. RESULT AND DISCUSSION

3.1 Informant

The results of the informants are presented in Table 1.

Table 1. Informant of study

No.	Informant	Informant Category	Number	Description
1.	FT SH MS PR	Subject Teacher	4	From various disciplines (religion, science, social studies, and language)
2.	MR	Head of Islamic Boarding School	1	Main leader of the institution, involved in deciding curriculum policy
3.	EH	Deputy Head of Curriculum	1	Responsible for curriculum planning and evaluation
4.	AL AP MO AZ IS EM	Grade XI Students	6	Selected based on their activity in learning activities
5.	FZ RZ AO DA EW TY	Grade XII Students	6	Selected based on their activity in learning activities
	Total		18	

3.2 Discussions

3.2.1 Integrating Transformative Learning Principles in Secondary Education through the 3P Framework

The results of the analysis demonstrate a substantial correlation between the precise component of the 3P framework and the necessity for explicit and contextual learning objectives that extend beyond conventional competency targets. Teachers reported that the 3P approach enabled them to reinterpret curriculum objectives in a manner that reflected the needs of learners and the broader sociocultural reality. This finding aligns with Mezirow's (1997) view that transformative learning involves a shift in the structure of meaning through reflection and dialogue. *"Alih-alih hanya mengikuti rencana pembelajaran standar, saya sekarang mempertimbangkan jenis pembelajar seperti apa yang ingin saya bentuk dari siswa saya," (Instead of just following the standard lesson plan, I now consider what kind of learners I want to shape my students into.)* Said Teacher SH

Furthermore, the Process dimension in this framework has been shown to encourage critical dialogue, reflection, and agency among learners, which are key characteristics of transformative pedagogy (Taylor, 2018; Brookfield, 2017). Dialogic practices such as debates, personal reflective journals, and collaborative inquiry have been shown to increase students' deep engagement and empower them to reshape meaning based on their own experiences.

At several levels of the educational system, specific problems must be identified, and related solutions must be suggested to convert the conceptual insights of the 3P framework into workable methods. Table 2 lists the main systemic obstacles, including resource inequalities and teacher competence gaps, and provides practical, situation-specific solutions that educators, educational institutions and legislators may use. This mapping demonstrates the 3P framework's flexibility and its potential to act as a guide for inclusive and long-lasting educational reform.

Table 2. Challenges and Practical Solutions for Implementing the 3P Framework in Secondary Education.

Systemic Challenges	Practical Solutions	Level of Implementation
Gaps in teacher training on critical pedagogy	Tiered training modules (basic–advanced), peer mentoring, and teacher learning communities	Teacher and School
Low levels of digital literacy among teachers	Integration of digital literacy in teacher training; gradual use of simple and accessible platforms	Teacher / School
Resource disparities across schools	Utilization of low-cost technologies (e.g., WhatsApp, radio, community-based digital platforms)	School
Limited practice of dialogic pedagogy	Structured implementation of debates, reflective journals, and peer inquiry within the curriculum	Teacher
Unequal access across regions	Utilization of low-cost technologies (e.g., WhatsApp, radio, community-based digital platforms)	School
Lack of scalability of local best practices	Documentation and dissemination of innovative practices; creation of a national digital repository	School / Policymaker

The operationalization of the 3P framework within educational contexts necessitates a strategic response to systemic challenges. Within the *People* dimension, enhancing teacher capacity through tiered professional development modules constitutes a viable strategy to mitigate competency gaps, particularly in the domains of digital literacy and inclusive pedagogy. Recent reports have emphasized that a lack of systematic teacher training remains a critical barrier to equitable learning outcomes (Ward et al., 2022;

Widiastuti, 2025). In relation to the *process* dimension, schools may adopt a phased implementation trajectory, commencing with localized needs assessments, followed by the design of adaptive curricula, and culminating in the integration of technology calibrated to existing resource capacities. Osipovskaya and Dmitrieva (2021) highlight that such adaptive processes are essential to ensure that innovation in education does not exacerbate inequities but instead promotes inclusion. Concerning the *Product* dimension, learning outcomes should be evaluated not solely in terms of academic attainment but also in relation to collaborative competencies and socio-cultural awareness that align with global educational demands (Compass, 2019; Saleh et al., 2025).

At the policy level, the framework may be translated into actionable directives, including (1) the systematic development of digital training modules aligned with differentiated levels of teacher competence, (2) the establishment of monitoring mechanisms to identify and address disparities in school resources, and (3) the formulation of strategies to document, disseminate, and scale contextually effective practices to the national level. Marradi and Mulder (2022) underscore that the scaling of local innovations is a critical step toward achieving inclusive and sustainable educational ecosystems. Collectively, these measures position the 3P framework not merely as a theoretical abstraction but as a pragmatic roadmap for fostering education that is both adaptive to contextual constraints and responsive to global challenges.

3.2.2 Strengthening Deep Learning Practices and Inclusive Environments through the 3P Model

The difference between deep and surface learning was consistently understood by the informants, reinforcing the theoretical foundation of Biggs and Tang (2011). Teachers generally associate deep learning with conceptual understanding, long-term retention, and knowledge transfer, whereas surface learning is typically understood to be limited to memorization and exam preparation. *"*

Siswa lebih mengingat materi saat mereka mengerjakan proyek yang bermakna dibandingkan sekadar menghafal," (Students demonstrate a stronger retention of course material when engaging in projects that possess significant relevance rather than when merely memorizing information). Said Teacher PR

The Process element has also proven to be essential in supporting inclusive practices. Teachers stated that by using student-centered pedagogy, such as project-based learning (PBL), blended learning, and group collaboration, they are better able to engage diverse learners, including those from marginalized backgrounds or with learning difficulties.

In line with the literature on inclusive pedagogy by Florian and Black-Hawkins (2011), these findings suggest that interactive and reflective learning processes not only promote deeper learning but also create a safe, participatory, and equitable classroom environment. In particular, several teachers noted an increase in participation from previously passive students, demonstrating the inclusive potential of dialogic and experiential learning methods.

*"Siswa dengan kebutuhan khusus mulai bersuara melalui kerja kelompok dan presentasi (*Students with special needs begin to speak up through group work and presentations)" Said Teacher FT.

However, these practices face several challenges. Teachers highlighted that limited training in PBL and unequal access to digital resources often impede the consistent implementation of deep and inclusive learning. To address this, the 3P framework can guide practical actions, such as tiered teacher training in inclusive pedagogy, gradual adoption of low-cost digital tools, and sharing locally tailored best practices. Policymakers could further support these efforts by creating monitoring systems to identify disparities and ensure the fair distribution of resources across schools. While these findings show the potential of the 3P model, they come from a specific educational setting; therefore, broader cross-cultural validation is necessary to enhance its general applicability and practical effectiveness.

3.2.3 Strategic Implications of the 3P Framework for Sustainable Curriculum and Educational Transformation

The findings of this study show that the 3P framework offers a practical and clear structure for curriculum design that aligns with SDG 4, promoting inclusive, equitable, and high-quality education

(UNESCO, 2017). Participants involved in curriculum development highlighted that the integration of Precise, Process, and Product evaluation allows for combining global skills with local values and the learners' context.

"Kami mulai beralih dari perencanaan pembelajaran berbasis kepatuhan ke perencanaan yang responsif terhadap konteks," (We are beginning to shift from compliance-based learning planning to context-responsive planning), Said Curriculum Coordinator EH

The Product component, which emphasizes authentic and formative assessment, has emerged as an important tool for evaluating students' complex competencies. Teachers have reported a shift in their pedagogical practices, characterized by a transition from conventional examination models to performance-based tasks. These tasks, including environmental campaigns and community-based projects, are designed to encourage students to synthesize, reflect, and apply their knowledge in real-world contexts.

This change aligns with Fullan and Langworthy's (2014) call to shift from test-based systems to assessments that promote deep learning and the development of global citizenship. *"Alih-alih ujian, siswa sekarang membuat kampanye kesadaran dan membagikannya kepada masyarakat,"* (Instead of exams, students now create awareness campaigns and share them with the community) Said Teacher MS

Finally, policymakers from educational institutions indicated that the 3P framework provides a theory-based yet practical model that can be implemented to transform the curriculum. The structural integrity of this framework, which is both strong and adaptable, offers a pathway that supports the convergence of educational reform from a top-down approach and pedagogical innovation from a bottom-up approach. However, this study is limited by its focus on a single educational context, highlighting the need for future research to test the 3P framework across diverse cultural and systemic settings (UNESCO, 2020). gs (UNESCO, 2020; Gottschalk & Weise, 2023).

"Model ini bukan hanya teori—ini sesuatu yang langsung bisa digunakan guru untuk mengubah praktiknya," (This model is not just a theory; it is something that teachers can immediately use to change their practices.) Said Curricuum Coordinator.

3.2.4 Synthesis and Contribution to SDG 4

Overall, the study's results show that the 3P framework can implement transformative and deep learning through clear learning objectives (Precise), interactive and reflective teaching methods (Process), and authentic assessments (Product). These three components support each other to build an inclusive and sustainable learning environment that promotes pedagogical quality and educational access equity.

The implications of this initiative extend beyond the classroom, significantly influencing systemic curriculum reform by providing a model that is both contextual and globally connected. This model is essential for supporting the achievement of Sustainable Development Goal (SDG) 4, especially its focus on quality education for all. As Rieckmann (2012) emphasized, education for sustainable development must develop skills such as critical thinking, global awareness, and social responsibility. The 3P model structure effectively promotes these competencies.

4. CONCLUSION

Based on the analysis in the previous chapters, this study concludes that the integration of the 3P framework (Precise, Process, and Product) is an effective pedagogical model for promoting transformative learning practices and deep learning in secondary education. By designing learning that is oriented toward clear goals, reflective and dialogic processes, and authentic and relevant assessments, this framework enables a shift from a standard content-centered teaching approach to a more reflective, learner-centered, and socially oriented approach. The study found that when the 3P components were implemented strategically, learners became more critically aware, developed a strong ethical foundation, and actively engaged in their learning process.

Theoretically, this study advances the discussion of transformative education by offering a practical framework grounded in empirical evidence that can be implemented in real-world settings. In practice,

these findings demonstrate that the 3P framework can be adopted by teachers, school leaders, and curriculum designers to create a more inclusive and meaningful learning environment. This model also aligns with the global education agenda, especially Sustainable Development Goal (SDG) 4, which highlights the need for equitable and quality education accessible to all segments of society. These implications are important for educational systems aiming to shift from an exam-focused approach to the holistic development of learners.

However, this study has several limitations. First, it was conducted within a single case study context with specific socio-cultural characteristics; therefore, the generalizability of the results to other education systems or cultures remains limited. Second, although the qualitative approach used allowed for an in-depth understanding, it did not provide broad quantitative validation of the 3P framework's effectiveness. Third, despite triangulation and data confirmation, the use of interviews, FGDs, and observations still carries the potential for subjective bias in interpretation.

In summary, the 3P framework holds significant potential as a teaching tool and a catalyst for systemic educational change. By simultaneously addressing theoretical advances, practical applications, and systemic issues, this model connects classroom innovation with policy reform. With support through cross-cultural validation and strategic collaboration among educators, policymakers, and international organizations, the 3P framework can help build equitable, inclusive, and future-ready education systems worldwide.

Further research is recommended to test the 3P framework across diverse educational settings, both geographically and institutionally, employing quantitative or mixed-methods approaches to obtain a more comprehensive and measurable understanding of its impact. Long-term studies are also necessary to evaluate the sustainability of learning transformations over extended periods. Additionally, further exploration of how teacher education programmes and professional development can incorporate the principles of 3P will greatly contribute to embedding this approach within a broader educational ecosystem. Cross-cultural validation is also crucial to ensure that the framework is adaptable and relevant across different social and educational contexts, thereby strengthening its global relevance and theoretical foundations.

Ethical approval

This research did not require ethical approval.

Informed consent statement

This research did not require informed consent.

Author's Contributions

EH conceptualized and drafted the manuscript, developed the methodology, refined the theoretical perspectives, and carried out the reviewing and editing process. He approved the final manuscript and is solely accountable for its content.

Disclosure Statement

No potential conflict of interest was reported by the author(s).

Data availability statement

The data presented in this study are available on request from the corresponding author due to privacy reasons.

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Notes on Contributions

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