

Transformational Learning Principles: Research Annotation

This document highlights the research evidence behind the <u>Transformational Learning Principles</u>, annotating each principle with explanatory notes on supporting studies in educational psychology and learning science. Full references to the studies cited are also provided. The research highlighted includes high-quality meta-analyses, systemic reviews, and longitudinal studies. It spans diverse educational settings and grade levels, from early childhood through secondary education.

Taken as a whole, this body of research provides robust evidence that the Transformational Learning Principles reflect key elements of effective instructional practice that, when consistently implemented, can contribute to improved student achievement, engagement, and overall well-being.



Cultivate Belonging

- Educators prioritize relationship building in physical and virtual spaces.¹
- They strive to create learning cultures that ensure students' safety and belonging² (Allen et al., 2021; Wang et al., 2020) and foster durable skills such as empathy, creativity, and collaboration.³

¹ Research demonstrates that strong student-teacher relationships are foundational to learning, with studies showing that supportive relationships activate neural pathways necessary for learning (Osher et al., 2020) and predict better academic and behavioral outcomes across different student populations (Rudasill et al., 2010).

² A systematic review and meta-analysis revealed that classroom environments prioritizing emotional safety and belonging significantly improve both academic achievement and psychological well-being (Wang et al., 2020), while research examining belonging across



different educational contexts demonstrates that when students feel safe and connected, they develop stronger academic identities and engagement in learning (Allen et al., 2021).

³ Restorative practices in schools help develop students' empathy and social-emotional skills (Zakszeski & Rutherford, 2021), while strong teacher-student relationships create the foundation for developing essential skills like creativity and collaboration (Keane & Evans, 2022).

References – Cultivate Belonging

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Connect Learning to the Learner

- Educators hold high expectations for all students⁴ and tailor instruction to meet students' individual needs and interests.⁵
- They use differentiation strategies and impactful technology tools to embrace learner variability, increase engagement, and advance progress toward mastery.⁶

⁴ When teachers are trained to maintain high expectations for all students, their students demonstrate significantly higher academic achievement (Rubie-Davies et al., 2015).

⁵ Dockterman's (2018) comprehensive review of personalized learning research demonstrates that adapting instruction to individual student needs and interests leads to improved learning outcomes across diverse student populations.

⁶ A meta-analysis found that differentiated instruction significantly improves learning outcomes across different subjects and grade levels (AM et al., 2023), while research shows that personalized learning approaches supported by technology can reduce achievement gaps (Dumont & Ready, 2023), and Ohrt et al.'s (2020) study shows the importance of mental health training in addition to engagement strategies.

References – Connect Learning to the Learner

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Ensure Equity

- Educators are responsive to students' cultural⁷ and developmental contexts.^{8 9}
- They celebrate and build on students' identities,¹⁰ strengths, and voices.¹¹
- They reduce barriers to meaningful learning for all students, especially those from marginalized backgrounds.¹²

⁷ Research examining social-emotional learning in urban schools demonstrates that culturally responsive practices are essential for creating inclusive learning environments that support student success (Barnes, 2019).

⁸ Neuroscience research shows that aligning instruction with students' cultural and developmental contexts activates neural pathways that enhance learning and engagement (Hammond, 2014).

⁹ Culturally relevant/sustaining pedagogies introduced a paradigm shift in equity-centered teaching and learning. Ladson-Billings (2011) recommends practical pedagogical strategies, like changing educators' mindset and perceptions of their students, developing critical consciousness to question why certain course materials are used but not useful, and being intentional about establishing cultural competence.

¹⁰ Effective learning environments intentionally leverage students' cultural identities and lived experiences as assets (Barnes, 2019).

¹¹ Research from the science of learning and development demonstrates that elevating student voice and building on individual strengths leads to deeper engagement and improved academic outcomes (Darling-Hammond et al., 2019).

¹² Systemic barriers like racism, residential segregation, and access to basic health care can create disparities in development and overall health that have downstream effects on learning. Coordinated school support programs that prioritize equity, like the Whole Child model, support students to fully engage in challenging learning environments (Basch, 2011).

References – Ensure Equity

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Spark Curiosity

- Educators connect content and skills to students' prior knowledge, experiences, and passions to spark curiosity and inspiration.¹³
- Technology is used to create new pathways for student engagement and enable students to express knowledge, skills, and aspirations in a variety of ways.¹⁴

¹³ Hattan et al.'s (2023) systematic review of 54 studies found that teaching strategies that deliberately activate students' prior knowledge before, during, and after reading instruction increased comprehension and engagement. Similarly, Walkington and Bernacki (2020) conducted a systematic review analyzing how connecting academic content to students' individual interests and experiences enhanced motivation and learning outcomes, finding that personalization strategies were most effective when they authentically aligned with students' prior knowledge and genuine passions.

¹⁴ Major et al.'s (2018) systematic review includes 72 studies that revealed that technology tools, when used to support student expression and collaboration, significantly enhanced student participation and created more equitable opportunities for students to demonstrate their knowledge and skills across different subjects and grade levels. Xie et al.'s (2019) systematic review includes 73 studies demonstrating that when technology is strategically used to provide multiple pathways for learning and expression, students showed increased engagement and improved learning outcomes, with particularly strong effects when students could choose how to demonstrate their understanding.

References – Spark Curiosity

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Develop Expertise

- Educators use evidence-based practices to ensure students learn and develop essential skills and knowledge.^{15 16}
- They frame learning around key conceptual understandings, use multiple modes of presentation and inquiry, model skills, and prioritize intentional practice.¹⁷

¹⁵ A variety of research grounded in learning science highlights elements of learning design that promote effective learning and expertise development. Clark & Mayer (2016) describe best practices for the use of multiple modes of representation, including the need for visual, text-based, and aural elements to complement each other. The use of concrete worked examples (step-by-step demonstrations, for example) can help students build conceptual understandings through compare/contrast processes (Schwartz, Tsang, & Blair, 2016). Intentional retrieval practice helps solidify information in the brain's long-term memory and facilitates recall (Agarwal & Bain, 2019).

¹⁶ Hattie's (2009) comprehensive synthesis of meta-analyses across various educational contexts highlights the effectiveness of research-backed pedagogical practices, such as direct instruction, feedback, and teacher-student relationships, in enhancing student achievement. The findings underscore the importance of using evidence-based methods to maximize learning outcomes in preK-12 classrooms. For example, Harbour et al. (2014) demonstrate how modeling, along with other evidence-based pedagogical teaching strategies, can increase engagement, which results in great academic achievement.

¹⁷ Rosenshine's (2012) principles emphasize the importance of structuring lessons around key concepts, modeling skills, and providing opportunities for deliberate practice, all of which are essential for effective learning.

References – Develop Expertise

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Elevate Reflection

- Educators use a variety of data and tools to provide timely and specific feedback to students that helps them understand how to improve and encourages critical thinking.¹⁸
- Students are given time and support to reflect on, learn from, and apply feedback. They monitor their own progress and set goals.²⁰

¹⁸ Acknowledging the large body of research correlating teacher feedback and student achievement, Ma et al. (2023) examined the underlying mechanisms of the relationship. They found that across 75 countries, students who perceived more reading feedback from teachers enjoyed reading more.

¹⁹ Consistent with learning science research, Wiliam and Leahy (2015) demonstrate that effective formative assessment is immediate, specific, and actionable. Focusing on the learning process rather than performance helps students think critically to understand what actions they can take to improve their learning. This ultimately encourages students to develop self-regulated learning skills.

²⁰ Student self-monitoring is a component of self-directed learning. Brandt (2020) defines the five dimensions of self-directed learning: self-regulation, motivation, personal responsibility, and autonomy.

References – Elevate Reflection

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Prioritize Authentic Experiences

- Educators create opportunities for students to apply and extend their learning in meaningful, real-world contexts.²¹
- They facilitate authentic performance-based projects and assessments that elevate students' roles as designers, creators, collaborators, and problem-solvers.²²

²¹ Zhang and Ma (2023) conducted a meta-analysis examining the effects of project-based learning on student outcomes, finding that engaging students in real-world tasks significantly enhances academic achievement, critical thinking, and motivation. Their findings support the principle that when educators create opportunities for students to apply and extend their learning in meaningful, real-world contexts, it leads to deeper understanding and long-term knowledge retention.

²² Chen and Yang's (2019) meta-analysis found that project-based learning (PBL) significantly enhances students' academic achievement compared to traditional instruction. The study highlights that PBL's emphasis on student-driven projects fosters roles as designers, creators, collaborators, and problem-solvers.

References – Prioritize Authentic Experiences

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Ignite Agency

- Educators use a mix of learner-led approaches²³ and flexible learning formats to encourage student agency and exploration.²⁴
- Students have opportunities to follow their own intellectual pursuits, take risks, make discoveries, challenge assumptions, and build lifelong learning skills.²⁵

²³ Research on self-directed learning demonstrates that when educators provide opportunities for student agency and autonomous exploration, children develop stronger metacognitive skills and intrinsic motivation for learning (Ponton et al., 2009). The study shows that learner-led approaches foster students' ability to set their own learning goals, monitor their progress, take ownership of their intellectual development, and build essential skills for lifelong learning.

²⁴ Cuccolo and DeBruler (2023) conducted a literature review examining the impact of student-centered learning (SCL) on K-12 student achievement, finding modest positive gains. Doolittle et al. (2023) performed a systematic review defining active learning as a student-centered approach that promotes higher-order thinking and deep learning.

²⁵ Patall et al. (2008) conducted a meta-analysis examining the impact of choice on intrinsic motivation, finding that providing students with choices positively influences their motivation and engagement. Building on Patall et al.'s study, Shirley (2025) examined the use of adaptive teaching methods to improve engagement in a 9th grade Latin class, highlighting the importance of providing students with choices to enhance motivation and participation.

References – Ignite Agency

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