

Innovative Teaching in 21st Century Classrooms: Situating the FETL Model in History, Methods, Theories, and Contemporary Conditions of Everyday Life Across Disciplines

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ARTICLE INFO

Keywords:

*FETL Model,
Innovative Learning
Ecosystems,
Connecting Lessons to
Everyday Life
Experiences,
21st Century
Pedagogical Approaches*

ABSTRACT

This practitioner paper provides a discussion on how the Ferreira's Ecosystem for Teaching and Learning (FETL) Model incorporates everyday life experiences and phenomena in the teaching and learning process to foster meaning-making, culturally and linguistically responsive pedagogy, and impactful learning experiences. A discussion is presented to highlight the alignment of the FETL Model with Everyday Life that critically connects with the history, methods, theories, and contemporary conditions of everyday life experiences and real-world phenomena. The FETL Model is a forward-thinking, adaptable, student-centric, novel, and innovative teaching and learning framework that transcends academic subjects, school levels, and educational systems. The FETL Model reimagines and redesigns lesson planning and delivery ensuring that learning experiences for all students at all levels (nursery, primary, secondary, and post-secondary) are technology-driven and equity-based.

1. Introduction

There is an urgent need for novel and innovative teaching and learning frameworks that are adaptable and enduring to effectively address the everchanging curricula, education policies, technologies (such as industrial revolution 4.0), and student demographics and learning needs (Abrar et al., 2025; Karsenti, 2019; Utomo, 2023). Teaching innovation encompasses a mixture of diverse teaching methods and forms at each stage of the teaching and learning process which overcome limitations of traditional teaching methods while simultaneously employing active teaching methods using modern teaching resources and equipment to achieve the stated learning objectives (Nguyen, 2022). The proliferation of novel forms of technology has continued to impact lives and intrigue young people which has led to schools incorporating such technologies in teaching and learning (Karsenti, 2019). In addition, countries expect their educators and students to use such technologies to be informed and responsible digital citizens (Karsenti, 2019). One such technology is artificial intelligence (AI) which provides numerous benefits including: (1) personalized learning; (2) greater academic success and learner autonomy; (3) ongoing student assessment; (4) intelligent tutoring platforms for distance

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Cite this article as:

Ferreira, C. A. (2026). Innovative Teaching in 21st Century Classrooms: Situating the FETL Model in History, Methods, Theories, and Contemporary Conditions of Everyday Life Across Disciplines. *European Journal of Teaching and Education*, 8(3): 59-77. <https://doi.org/10.33422/ejte.v8i3.1920>

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learning; (5) educational feedback; (6) adapted teaching content; (7) more opportunities for students to communicate and collaborate with each other; (8) expanded interaction between learners and academic content; (9) effective teaching through facilitation instead of content transmission; (10) immersive environments, or virtual reality; (11) AI makes distance learning more accessible and appealing; (12) extensive gamification potential, and gaming contributes directly to student engagement (Karsenti, 2019). It is important to highlight that the FETL Model has four instructional modes including Whole Group, Small Group, One-to-One, and AI and ICT Stations.

Technologies play a pivotal role in the FETL Model including AI for personalized learning, active student engagement using gamification, conceptual understanding through simulation software, and reflective, collaborative, and communicative practices using apps such as Padlet and Google Doc. The teacher's role changes to a facilitator's role where guidance, probing, and feedback are provided as students work independently to develop growth mindsets through productive struggles. Students must be adequately prepared to confront the dynamically changing world stemming from innovations in the learning field (Utomo, 2023). More specifically, these changes include developing and implementing innovative learning models, employing learning management systems (LMS) platforms and digital media, and crafting literacy, numeracy, and higher-order thinking that are relevant to today's changes (Utomo, 2023). Furthermore, teachers become more effective in teaching and impactful learning experiences when they incorporate a variety of digital tools and platforms to provide more student access to learning materials from across the globe (Abrar et al., 2025). The principal tendencies and trends of innovative learning in the modern learning environment include (1) activities of educational institutions; (2) strengthening of integration processes; (3) the use of innovative teaching methods and forms (Volodymyrivna & Georgievna, 2020).

The purpose of this practitioner paper is to situate the Ferreira's Ecosystem for Teaching and Learning (FETL) Model in Everyday Life in terms of history, methods, theories, and contemporary conditions of everyday life experiences and real-world phenomena. The FETL Model answers the clarion calls for innovative teaching and learning frameworks. This paper demonstrates the adaptability and enduring design of the FETL Model across academic disciplines, school levels, and educational systems. More specifically, the paper discusses two major themes including: (1) Meaning-Making: Connecting Lessons to Students Everyday Life Experiences and Current Events; (2) Situating the FETL Model in History, Methods, Theories, and Contemporary Conditions of Everyday Life Across Academic Disciplines. Furthermore, a brief comparison is presented with existing state of the art (SOTA) models including Gagné's Nine Events of Instruction, 5E Instructional Model, Universal Design for Learning (UDL), and Backward Design.

2. Meaning-Making: Connecting Lessons to Students Everyday Life Experiences and Current Events

It is important to note that the Ferreira's Ecosystem for Teaching and Learning (FETL) Model was created to address the shortcomings of existing teaching frameworks in terms of relevance, effectiveness, inclusivity, and adaptability in the ever-changing student demographics (student diversity) in classrooms, education policies, curricula, and pedagogy (particularly technology-integrated lessons). However, the pioneer of the FETL Model commends the scholarly works of past pioneers of the teaching frameworks that have been used for decades, and those that are currently in use in classrooms across the globe. The FETL Model (Figure 1) is an adaptable, forward-thinking, student-centric, novel, and innovative teaching and learning framework that

is effective in increasing student achievement in mathematics in secondary schools and fostering positive attitudes towards its use at post-secondary institutions (Ferreira, 2025a).

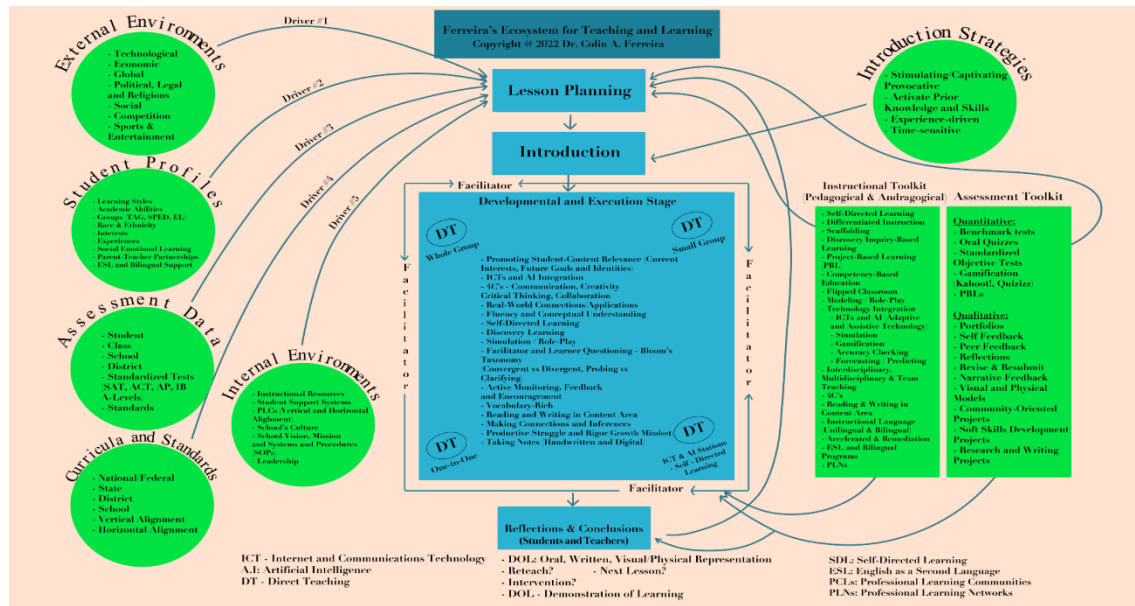


Figure 1. The FETL Model Schematic Diagram (Source: Ferreira, 2025d)

The FETL Model (Figure 1) is fully aligned with incorporating students' everyday life experiences and real-world phenomena (See Figure 2 and Figure 3) in teaching and learning activities in numerous ways but for this article, the focus is on the External Environments Driver (Figure 1) which includes but is not limited to: (1) technological; (2) economic; (3) global; (4) political, legal, and religious; (5) social; (6) competition; (7) sports and entertainment. For a comprehensive discussion on the FETL Model and its implementation in K-12 mathematics lessons, you can read Ferreira (2025b), Ferreira (2025c), and Ferreira (2025d). In addition, a discussion is presented on the alignment with the Student Profiles Driver (Figure 1) in the FETL Model which includes experiences, race, ethnicity, social emotional learning, and cultural backgrounds. Furthermore, the Instructional and Assessment Toolkits (Figure 1) component of the FETL Model is explained.

Robert Kegan's theory of meaning-making development is premised on the way human beings construct meaning of themselves, of others, and of their experiences throughout their lives (Ignelzi, 2000). This is critically important for educators given that the teaching and learning process is impacted by the way students make meaning because their new experiences and learning are interpreted through the lens of current construction of reality (Ignelzi, 2000). Meaning should be associated with concrete historical and cultural context (Radford et al., 2011).

There is a plethora of studies over the years that highlights the importance of connecting lessons to everyday life for relevance, meaning-making, and impactful learning experiences (Davidsson & Granklint-Enochson, 2021; Gainsburg, 2008; Irish et al., 2018). Studies have shown that students find mathematics lessons more meaningful when teachers make connections between their in-school and out-of-school learning (Irish, 2018). Gainsburg (2008) indicated that students reported that while most teachers plan the implementation of real-world connections in their lessons in advance, these real-world examples came from the textbooks or teacher-made problems and not from student lived experiences. In addition, past studies have shown that incorporating students' everyday life experiences in lessons and contextualizing the science content do improve learning and foster positive attitudes towards school science (Davidsson & Granklint-Enochson, 2021). This socioscientific method has been used to

improve students' interest and motivation for learning science (Davidsson & Granklint-Enochson, 2021). The FETL Model promotes the use of External Environments, Curricula and Standards, and Student Profiles as a drivers for the planning stage of lessons (see Figure 1).

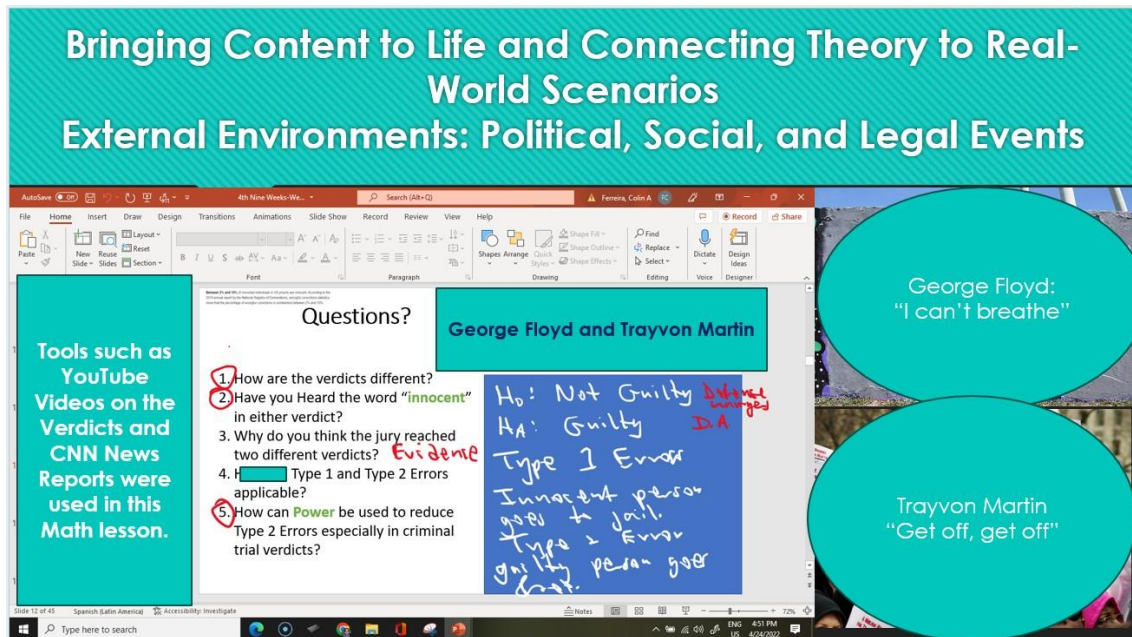


Figure 2. Lesson Slide Connecting Current Events in the Social, Political, and Legal Environments to Mathematics Concepts



Figure 3. Cross-Disciplinary Meaning-Making: Connecting Real-World Phenomena Across Academic Disciplines

Another approach to fostering meaning-making in lessons is to incorporate current events (See Figure 2 and Figure 3). Using current events in teaching and learning helps students to visualize the content area as a living entity while developing enthusiasm (Rose, 2009). Current events that occur in society have a direct impact on both primary and secondary students' physiological and psychological development (Liu & Tan, 2019). Consequently, using embedded social events in teaching and learning activities could improve student learning

activities, enhance their ability of social recognition, adaptation, and contribution to society (Liu & Tan, 2019). Furthermore, discussing current events in social studies classes, particularly those that are controversial, can allow students to unpack conflicting beliefs and confront those issues in a logical way while simultaneously developing language skills, vocabulary, reading comprehension, critical thinking, problem solving, oral expression, and listening skills (LeCompte et al., 2017).

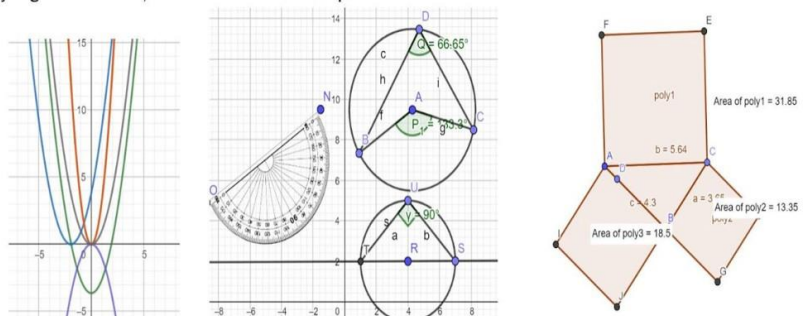
3. Situating the FETL Model in History, Methods, Theories, and Contemporary Conditions of Everyday Life Across Academic Disciplines

Instructional Rigor: Building Automaticity, Fluency, and Conceptual Understanding

Simulation Technology

INSTRUCTIONAL RIGOUR

Using Desmos or GeoGebra to promote conceptual understanding for topics in Probability, Sampling, Circle Theorem, Pythagorean Theorem, and Transformations of Graphs.



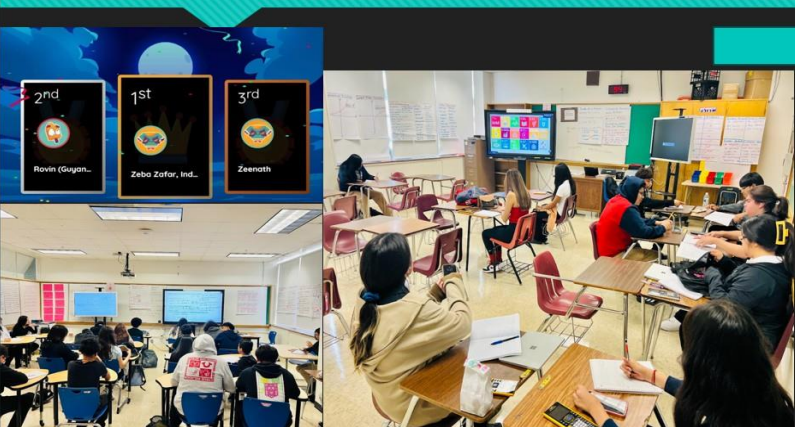
Free Tech tools include:

- **Desmos**
- **GeoGebra**

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Figure 4. Lesson Slide on Fostering Conceptual Understanding in Mathematics Through Simulation-based Learning

Promoting and Sustaining Active Engagement with Gamification Tech Tools



Free Tech tools include:

- **Wayground (Formerly Quizizz)**
- **Kahoot!**

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Figure 5. Lesson Snapshots of Using Technology-Integrated Lessons to Promote Active Student Engagement (Gamification) and the 4C's (Critical Thinking, Creativity, Collaboration, Communication)

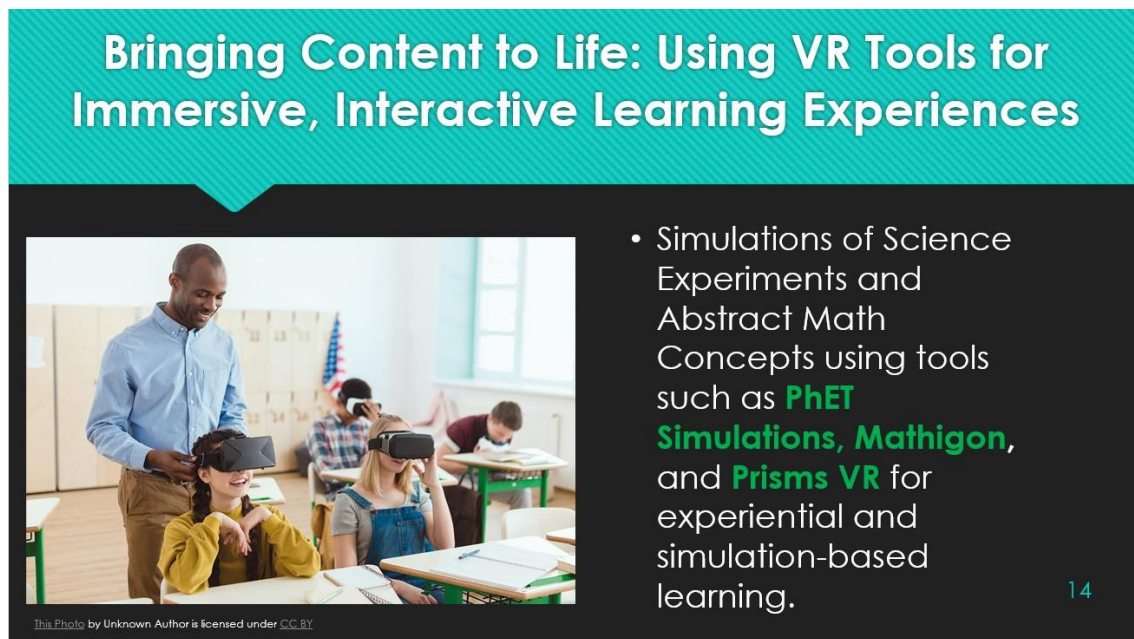


Figure 6. Lesson Snapshots of Using Artificial Technology (AI) to Promote Immersive learning Experience, Experiential Learning, and Conceptual Understanding

Education remains a key area of human civilization since ancient times because the development of a country's education is strongly correlated with its future development (Wang, 2022). From historical, methodological, and contemporary standpoints, the FETL Model is truly a student-centric, forward-thinking, adaptable, equity-based, and technology-driven lesson planning and delivery framework that incorporates everyday life experiences and phenomena in teaching and learning. As shown in Figure 1, the teacher's role changes to a facilitator's role to guide, support, and encourage students through productive struggle so students take ownership of their learning and develop student agency and growth mindsets. Culturally and linguistically relevant pedagogical practices are used to promote inclusive learning experiences. Culturally responsive pedagogy can reduce marginalization and improve students' ability to be successful in schools (Wesley-Nero & Donley, 2024). The FETL Model promotes culturally relevant teaching principles proposed by Morrison et al. (2008) including: (1) Modeling, Scaffolding, and Clarification of the Challenging Curriculum; (2) Using Students' Strengths as Instructional Starting Points; (3) Creating and Nurturing Cooperative

Environments; (4) Critical Literacy; (5) Engaging Students in Social Justice Work; (6) Sharing Power in the Classroom (Ramírez, 2020). To promote equity-based learning, reflective practices, conceptual understanding (Figure 4), personalized learning (Figure 5), active engagement (Figure 5), 4C's (communication, critical thinking, creativity, and collaboration), experiential learning (Figure 6), and content immersion (Figure 6), artificial intelligence (adaptive and assistive technologies, see Figure 6), gamification (Figure 5), and immersive technologies (Virtual Reality and Augmented Reality) are incorporated in teaching and learning activities (Figure 1). Both teachers and students engage in reflective practices and students are authentically assessed using both quantitative (quizzes, standardized tests) and qualitative assessment (portfolios, peer feedback, project-based assignments) methods. Authentic assessments seek to model the tasks and performance standards that are present in the world of work which positively influence students' learning, autonomy, motivation, self-regulation, and metacognition (abilities highly associated with employability) (Villarroel et al., 2018). Benefits of authentic assessments include enhanced quality and depth of student understanding and students are better prepared for college and employment (Villarroel et al., 2018). In addition, authentic assessments create opportunities for students to use the same

skills, knowledge, and attributes they would use in a workplace context which reduce academic integrity concerns stemming from the use of artificial intelligence software such as ChatGPT (Gedera, 2023). Student-centric, culturally and linguistically relevant pedagogy, authentic assessments, personalized learning, reflective practices (student agency), conceptual understanding, gamification, student agency, equity-and-technology based are hallmarks of modern classrooms. Besides teaching equipment and teaching formats, the difference between traditional and modern teaching methods is rooted in focus (Wang, 2022). Traditional teaching methods are teacher-centric whereas modern teaching methods are student-centric (Wang, 2022). Student agency is vitally important because it speaks to the quality of students' self-reflection and intentional actions and interactions regarding their activities and engagements in school and out of school (Prasad, 2024). As it relates to teachers' reflective practices, educators should rethink their teaching and learning practices from an ontological and epistemological standpoint as a form of inquiry and developing insights (Samarji & Hooley, 2015).

Besides the transdisciplinary design, an equally defining feature of the FETL Model is that of being adaptable to the ever-changing external and internal environments, curricula and standards, student profiles drivers, and instructional toolkit (Figure 1) which allows educators to incorporate everyday life experiences and real-world phenomena to bring content to life (Figure 1). Classrooms are not static but dynamic environments because students change which results in generational experiences and viewpoints (Machost & Stains, 2023). Advancement in technology creates new opportunities for engaging with students and exploring their understanding coupled with new curricula and pedagogical standards emerging from professional organizations and institutions can change instructional modes, concepts, and skills taught (Machost & Stains, 2023). A rise in immigration has engendered a larger number of culturally and linguistically diverse (CLD) students in K-12 mainstream classrooms which underscored the importance of teachers being cognizant of their instruction from the perspectives of both culture and language to foster culturally and linguistically responsive pedagogy (Zhang-Wu, 2017). In addition to transcending educational level (nursery, primary, secondary, and post-secondary), academic disciplines, and educational systems, the FETL Model proposes ICT & AI Stations for Self-Directed Learning (Figure 1) as one of four modes of instruction (Whole-Group, Small-Group, One-on-One, and ICT & AI Stations).

The ICT and AI Station mode of instruction employs adaptive (personalized instruction and assessment), assistive (equity-based learning environments), and content immersion (virtual reality and augmented reality). Interestingly, Bower et al. (2024) found that teaching level, experience, discipline areas, region, and gender significantly influence perceived impact of AI on teaching and assessment. More specifically, educators believe that specific curriculum, pedagogical, and assessment changes are needed in areas such as learning with AI, higher-order thinking, ethical values, and emphasis on learning processes and face-to-face relational learning (Bower et al., 2024). Furthermore, the FETL Model recommends in the Instructional Toolkit (Figure 1) interdisciplinary and multidisciplinary teaching and learning, problem-based learning (x-BL), project-based learning (PBLs), inquiry-based learning, discovery-based learning, competency-based learning, and education for sustainable development (ESD) all aligned with the United Nations 17 Sustainable Development Goals (SDGs).

From a theoretical perspective, the FETL Model, which was developed in 2022, bridges traditional and modern teaching methods and learning theories (See Figure 1). Comparatively speaking, the FETL Model is an enduring framework due its adaptability, modularity, and cyclic codification. Popular learning theories and teaching frameworks both traditional and modern, work seamlessly in the FETL Model. Some of these learning theories include: (1) Thorndike's Connectionism; (2) Pavlov's Classical Conditioning; (3) Guthrie's Contiguous Conditioning; (4) Skinner's Operant Conditioning; (5) Hull's Systematic Behavior Theory; (6)

Tolman's Purposive Behaviorism; (7) Gestalt Theory; (8) Freud's Psychodynamics; (9); Functionalism; (10) Mathematical Learning Theory; (11) Information Processing Models (Wang, 2012). Other scholars have listed a diverse set of learning theories including Behaviorism, Social Cognitive Theory, Cognitive Learning Theory, Constructivism, Social Constructivism (Kay & Kibble, 2016). Harasim (2017) categorized learning theories very ingeniously into 20th Century Learning Theories (Behaviorist, Cognitivist, and Constructivist) and 21st Century Learning Theories (Connectivist and collaborativist). Some widely used teaching and learning frameworks include: (1) Gagné's Nine Events of Instruction; (2) Backward Design; (3) Danielson's Framework for Teaching; (4) Universal Design for Learning; (5) 5E Model; (6) Connectivism; (7) Cognitivism.

Figure 7 (Created with the aid of ChatGPT) juxtaposes widely used traditional and modern lesson planning and delivery frameworks. Comparatively speaking, the FETL Model is the only lesson planning and delivery framework that codifies teaching and learning as an ecosystem underscoring the importance of contextualizing lessons in students' everyday life experiences, students' profiles, and the phenomena in the external and internal environments that directly or indirectly impact students' psychological and physiological development for meaning-making, culturally and linguistically pedagogy, and impactful learning experiences. The FETL Model can be seamlessly integrated in all academic disciplines, curricula, and school type (nursery, primary, secondary, and post-secondary) using the ingeniously designed schematic diagram (Figure 1).

4. FETL Model Comparative Analysis with UDL, Backward Design, Gagne's 9 Events of Instruction, and 5E Instructional Model

4.1. The FETL Model's Ecological Premise

The Ecological Systems Theory reflects a convergence of biological, psychological, and social science (Crawford, 2020). Bronfenbrenner's ecological systems theory argues that a person's development stems from interconnected environmental systems that encompasses family (intimate) to societal (culture) levels (Guy-Evans, 2020). There are five ecological systems including: (1) microsystem (immediate environment and direct relationships such as immediate family, school environment, peers and friends, extracurricular activities, and healthcare providers); (2) mesosystem (links between microsystems such as parent-teacher communication, school-neighborhood connections, interactions between different friend groups, family-healthcare provider relationships, religious community-family interactions); (3) exosystem (indirect influences not directly experienced by the child such as parents' workplaces and policies, extended family networks, school board decisions, mass media and social media, local government policies); (4) macrosystem (wider cultural context forming all systems including cultural norms and expectations, socioeconomic factors, educational policies and standards, technological advancements, environmental attitudes and policies, religious or philosophical ideologies); (5) chronosystem (time dimension such major historical events, technological shifts, educational reforms, economic cycles, climate change and environmental shifts, generational cultural changes) (Guy-Evans, 2020). The FETL Model is ecological model in that it is fully aligned with Bronfenbrenner's five ecological systems. The FETL Model has five external drivers including the External Environments, Internal Environments, Student Profiles, Assessment Data, and Curricula and Standards (See Figure 1).

The external environments include technological, economic, global, political, legal and religious, social, and sports and entertainment which are included in the macrosystem and chronosystem. Student profiles include learning styles, academic abilities, race/ethnicity,

student experiences, social emotional learning, and parent-teacher partnerships which are present in mesosystem and microsystem. The internal environments consist of instructional resources, student support systems, school leadership, and systems and procedures which are present in exosystem and microsystem. The assessment data include national and international standardized tests at the student, class, school, and district levels which are included in the macrosystem and chronosystem. The curricula and standards include school, district, state and federal curricula which are present in the macrosystem and chronosystem. In the FETL Model, lesson inputs are taken from the five external drivers so teaching and learning incorporates elements of the drivers so lessons are meaningful, relevant, and impactful. Teaching methods are central to producing educational outcomes, student achievement, and knowledge retention (Javed, 2023).

The FETL Model is compared with existing teaching and learning frameworks using characteristics of 21st century best pedagogical practices outlined by scholars (Colodeeva, 2024; Javed, 2023; Orakci, 2020) as the criterion for Table 1 row headings. Like the changes occurring rapidly in other areas across the globe driven by scientific and technological advancements, the models, approaches, and paradigms associated with elements of learning and teaching have experienced changes and transformations from past to present (Orakci, 2020). These changes include a gamut of best pedagogical best practices: (1) project-based learning within the context of 21st century skills; (2) active use of analogy method with technology in education; (3) task-based language teaching; (4) STEM for English Language teaching; (5) flipped learning; (6) connections-based learning (Orakci, 2020). Traditional teaching methods include lectures and rote memorization whereas modern teaching methods include active learning, flipped classrooms, experiential learning, and technology-integrated methods. Incorporating communication, creativity, collaboration, and critical thinking (known as the 4C's) in educational frameworks reflects a fundamental paradigm shift from traditional models which focused primarily on the acquisition of content knowledge at the expense of developing key skills and dispositions vital for success in the 21st century (Colodeeva, 2024). These skills and dispositions can be developed using such methods as active learning, student engagement, and integration of technology (Colodeeva, 2024). In addition, equity-based teaching (Grudnoff et al., 2017; Sibanda, 2023) and ecological systems (Crawford, 2020; Guy-Evans, 2020) are other criteria used for comparing the frameworks.

Equity-based strategies include: (1) improving the quality of teaching; (1) using a variety of assessment strategies; (3) creating equitable learning environments; (4) creating opportunities for excluded groups of learners (Sibanda, 2023). Developing soft skills are as important as technical skills in education. Soft skills not only play an integral role in students' career success and social interactions in society, but also employers highly seek these skills (Majid et al., 2012). Furthermore, soft skills are the abilities that help an individual build, maintain, and strengthen relationships and include interpersonal skills, listening skills, communication skills, time management, and empathy (Kumar et al., 2022).

4.2. Summary of the FETL Model's Lesson Planning and Delivery Processes

Figure 1 provides the schematic diagram of the FETL Model. As a teacher uses the FETL Model to plan a lesson, elements from each driver (external environments, internal environments, student profiles, curricula and standards, and assessment data) are chosen that align with the course topics, standards, and learning outcomes. Intentionally using elements from the five drivers promotes meaningful, relevant, and impactful learning experiences. At least one element is chosen from the instructional toolkit (pedagogical and assessment best practices) to effectively deliver the content and assess learning. Introductions are stimulating

and activate students' prior knowledge and skills, experiences, and time-sensitive. The execution stage involves four modes of teaching including whole group, small group, one-to-one, and ICT & AI Stations. The lesson is delivered using the chosen instructional best practices. Differentiation and scaffolding for personalized learning are accomplished with assistive and adaptive technologies as students work independently on Chromebooks. Teachers serve as facilitators in this student-centered lesson planning and delivery framework providing support, feedback, and encouragement as student immerse themselves in the content, experience productive struggle, and the 4'Cs (critical thinking, communication, collaboration, and creativity). At the conclusion of the lesson, students are evaluated using the selected assessment best practice. Students and teacher engage in lesson reflections. Student reflect anonymously in Padlet or on stick-notes on their learning experience. The lesson planning is cyclic so data from the reflective exercises and assessment are used as inputs for the subsequent lesson along with elements from the five drivers.

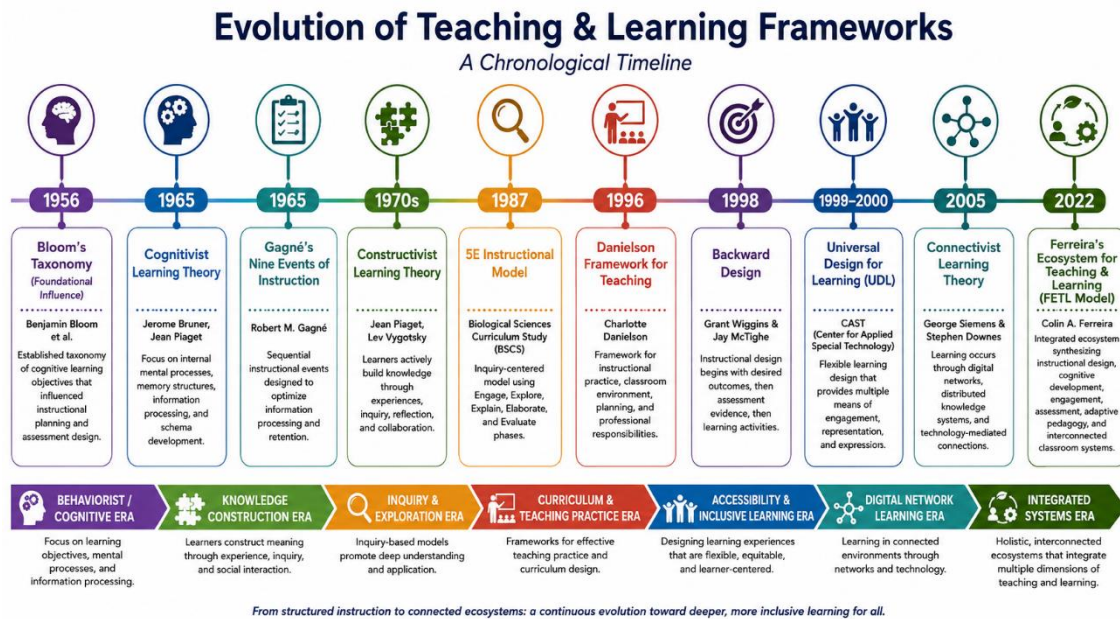


Figure 7. Chronological Timeline of Teaching and Learning Frameworks

Table 1. Comparative Analysis of Existing Models with the FETL Model

Defining Characteristics	Universal Design for Learning (UDL)	5E Instructional Model	Gagné' Nine Events of Instruction	FETL Model
Highly Effective Across Disciplines	Moderate: A plethora of studies completed but there is insufficient evidence of its efficacy (Zhang et al., 2024)	Strong: Studies done in STEM classrooms (Joswick & Hulings, 2024; Polanin et al., 2024)	Strong: Numerous studies conducted in science K-20 classrooms (Ali & Ali, 2015; Yulinda et al., 2024)	Weak: Only one study in mathematics and science classrooms (Ferreira, 2025a)
Ecological System	Moderate: Partial alignment with Bronfenbrenner's five ecological systems (Crawford, 2020; Guy-Evans, 2020)	Moderate: Partial alignment with Bronfenbrenner's five ecological systems (Crawford, 2020; Guy-Evans, 2020)	Moderate: Partial alignment with Bronfenbrenner's five ecological systems (Crawford, 2020; Guy-Evans, 2020; Li et al., 2025;	Strong: Aligns with Bronfenbrenner's five ecological systems (Ferreira (2025d; Guy-Evans, 2020)

Defining Characteristics	Universal Design for Learning (UDL)	5E Instructional Model	Gagné' Nine Events of Instruction	FETL Model
			McNeill & Fitch, 2023)	
Equity-and-Technology-Based	Strong: (Almeqdad et al., 2023; King-Sears, 2009; Levey, 2023)	Strong: (Bybee et al., 2006)	Strong: (Kruse, 2009)	Strong: (Ferreria, 2025d)
Promotes 21st Skills and Teaching Methods (Such as the 4C's and Soft Skills)	Moderate: (Almeqdad et al. (2023; King-Sears, 2009; Levey, 2023)	Moderate: (Koyunlu Ünlü, & Dökme, 2022)	Strong: (Ali & Ali, 2015; Yulinda et al., 2024)	Strong: (Ferreira, 2025d)

4.3. The FETL Model and Future Changes (FETL 2.0 Model)

As compared to the other models (Figure 7 and Table 1), the FETL Model has technology-integrated teaching and assessments as one of the four modes of instruction which allows educators to leverage the benefits of artificial intelligence (personalized instruction and assessment for gifted and neurodivergent students), intelligent tutoring (for closing learning gaps and addressing learning loss caused by the COVID-19 Pandemic), and language processing (emergent multilingual learners) to promote inclusive classrooms. Through the lens of system thinking and learning design in terms of lesson flow, and interconnectedness and interrelatedness of the model's components (Figure 1), the FETL Model reimagines and redesigns this process from a linear process to a cyclic process where outputs of completed lessons become inputs of subsequent lessons allowing for data-driven instruction, assessments, and intervention plans. This innovative system thinking and learning design is needed in today's classrooms because system thinking can profoundly transgress the traditional limits between knowledge systems domains relative to empirical, analytical, hermeneutical, and emancipatory interests through which humans make sense of their world and experience (Godfrey et al., 2014).

To highlight the model's components and processes including inputs, activities, outputs, and data flows (See Figure 1), concrete implementation protocols and exemplar lesson sequences and rubrics (refer to Ferreira 2025b; Ferreira, 2025c). The FETL Model considers students' wellbeing (physiological and psychological) in the Student Profiles Driver (Social Emotional Learning) and therefore promotes responsible, safe, and ethical use of technology including Artificial Intelligence (AI) tools (Gemini, ChatGPT, Wolfram, and social media platforms). Providing equitable and universal access to quality education remain a global challenge (Jurenka et al., 2024). The fast growing global interconnectedness and rapid speed of technological growth have engendered changes in the areas of society, economy, and environment and these changes are collectively called megatrends (Mhlanga, 2023). Regarding ChatGPT, responsible and ethical use in education should include: (1) transparency in the use of ChatGPT; (2) respect for privacy; (3) accuracy of information; (4) fairness and non-discrimination; (5) responsible AI, it is important to educate students about AI and its limitations; (6) ChatGPT is not a substitute for human teachers (Alfiras et al., 2025; Mhlanga, 2023). Studies have shown that it is imperative that educators promote transparency, equity, and stakeholder engagement, and therefore ensure that AI systems have the capability to support inclusive educational purposes (Alfiras et al., 2025). Responsible AI in education seeks

to develop AI systems that are grounded in ethical principles, improved learning outcomes, and safeguarding students' rights (Yin et al., 2025).

A renowned scientist and widely published researcher conducted a thorough review of the FETL Model and made sound recommendations to reposition and enhance its robustness and applicability across academic disciplines and school levels (early childhood to higher education). To frontally address the limitations of the FETL Model indicated in Table 1, the changes below will be reflected in the redesigned and reimagined model called FETL 2.0 Model.

1. The FETL 2.0 Model will be repositioned as a Dynamic Educational Ecosystem Optimization (DEEO).
2. The closed-loop control system will include Teacher Inputs ↓ Instructional Decisions ↓ Learner Responses ↓ Analytics ↓ Adaptive Modification ↓ Next Lesson Design.
3. To enhance the FETL Model's scientific evidence, four empirical studies will be conducted in different countries to answer the following research questions:
 - a) RQ1: How accurately does the FETL model predict student achievement compared with established instructional frameworks?
 - b) RQ2: What latent constructs define the FETL model?
 - c) RQ3: What pathways mediate the relationship between FETL implementation and learning outcomes?
 - d) RQ4: Does FETL outperform alternative frameworks regarding achievement, engagement, and retention?

Study One (Model Validation) will include a sample of 500-1000 teachers including measures of external environment, student profiles, assessment data, internal environment, technology integration, and reflection. The analysis will include exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and structural equation modeling (SEM). The purpose of this study will be to validate FETL dimensions. Furthermore, the study will seek to provide empirical validation using factor analysis and structural equation modeling. Study Two (Comparative Experiments) will consist five groups in a quasi-experimental design including Group A (Traditional Planning), Group B (Backward Design), Group C (UDL), Group D (TPACK), and Group E (FETL Model). The study will run for one high school semester with a minimum of 500 students. Outcomes that will be measured include achievement, engagement, retention, and satisfaction. Study Three (Multi-Context Generalization) purpose will be to show cross-disciplinary effectiveness. More specifically, the aim of the study will be to demonstrate the model's generalizability across educational levels and subject domains. The study's domains will include mathematics, science, language arts, and social sciences. The school levels will include elementary, secondary, and higher education.

4.4. The Universal Design for Learning

For a comprehensive discussion on the Universal Design for Learning (UDL), see Almeqdad et al. (2023). One defining attribute of the UDL framework is that it incorporates students' diversity principles in inclusive education settings (Almeqdad et al., 2023). The primary aim of UDL is to provide equal educational opportunities through inspiring teachers to provide representation, expression, and engagement for all diverse students (CAST, 2022, as cited in Almeqdad et al., 2023, p. 3).

The UDL provides multiple means of engagement (recruiting interest, sustaining effort and persistence, self-regulation), multiple means of representation (perception, language and symbols, comprehension), and multiple means of action and expression (physical action,

expression and communication, executive functions) (Almeqdad et al., 2023). Regarding students with learning disabilities (LD), UDL principles are employed in both technological and pedagogical ways (King-Sears, 2009). There are seven guiding principles that govern the UDL: (1) equitable use, (2) flexibility in use; (3) simple and intuitive use; (4) perceptible information; (5) tolerance for error; (6) low physical effort; (7) size and space for approach and use (Connel et al., 1997, as cited in King-Sears, 2009, p. 199). The UDL frontally addresses the everchanging classrooms in terms of diversity, second language learners, students with disabilities and students that vary in their perception and understanding of information (Levey, 2023). Despite UDL being in use more than two decades, there exists continuous criticisms including lacking clarity in definition, challenges with implementation, and insufficient evidence of its effectiveness (Zhang et al., 2024).

4.5. Gagné's Nine Events of Instruction

The conditions of learning was initially published in 1965 and proposed a nine-step process called the events of instruction, which relate to and respond to conditions of learning: (1) gain attention; (2) inform learners of objectives; (3) stimulate recall of prior learning; (4) present the content; (5) provide learning guidance; (6) elicit performance (practice); (7) provide feedback; (8) assess performance; (9) enhance retention and transfer to the job (Kruse, 2009). It is worth noting that Gagné's 9 Events of Instruction create a complete teaching loop in a linear sequence in which the core of activating and guiding internal cognitive processing via external events (Li et al., 2025). Gagné posits that learning is impacted by a set or series of external events which activate internal cognitive processes in the learner (McNeill & Fitch, 2023). Studies have shown that Gagné's 9 Events of Instruction positively impacted students learning in project-based collaborative learning experiments (Yulinda et al., 2024). Gagné's 9 Events of Instruction is effective in both K-12 and postsecondary classrooms. Regarding postsecondary classrooms, the application of the nine events of instruction was effective in improving the performance of undergraduate medical students in pediatrics (Ali & Ali, 2015).

4.6. 5E Instructional Model

The 5E Model is premised on the inquiry approach and was birthed from the Biological Sciences Curriculum Study (BSCS) in 1987 (Koyunlu Ünlü, & Dökme, 2022). The 5E Instructional Model consists of five distinct stages including: (1) engagement (activating prior knowledge, making connections between past and present learning experiences); (2) exploration (addressing misconceptions, practical learning activities); (3) explanation (provides opportunities for students to explain their understanding); (4) elaboration (challenging and extending students' conceptual understanding); (5) evaluation (students are given opportunities to assess their learning along with teacher's evaluation of the learning objectives) (Bybee et al., 2006). The 5E Instructional Model was designed specifically for science, technology, engineering, and mathematic (STEM) instruction and despite its extensive use in the U.S. and other countries including Turkey, there is a paucity of comprehensive systematic review and meta-analysis on the efficacy of 5E Model (Polanin et al., 2024). The 5E model is rooted in cognitive psychology, constructivist-learning theory, and research-based practices in science teaching (Duran & Duran, 2004). Polanin et al's (2024) meta-analysis and systematic review found that the 5E was effective in improving STEM education in both science and mathematics (Polanin et al., 2024). Duran and Duran (2004) provided a schematic diagram of the 5E Model that is useful in developing lessons. Studies have indicated that the 5E Model positively influenced learning in K-20 science classrooms (Joswick & Hulings, 2024).

4.7. Backward Design

The logic of backward design posits a planning sequence for curriculum and has three stages: (1) identify desired results (What students should know, understand, and be able to do?); (2) determine acceptable evidence (How will educators determine if students have achieved the desired results and met the standards?); (3) plan learning experiences and instruction (What enabling knowledge (facts, concepts, and principles) and skills (procedures) will students need to perform effectively and achieve desired results?) (Wiggins & McTighe, 1998). Childre et al. (2009) proposed a four-step process to backward design: (1) Identify Learners (it is imperative that prior knowledge, experiences, and accommodations must be included); (2) identify curricular priorities (state and local standards alignment); (3) design assessment framework (continuous and frequent assessments is critical to scaffolding student understanding; (4) create learning activities (integrating information from all previous steps into a sequence of lessons that guides students in achieving desired understanding and assessments). Backward design can easily be developed for student to understand while simultaneously simplifying the evaluation of the learning process (Ali & Dewi, 2023). Backward design is also applicable to postsecondary classrooms (Michael & Libarkin, 2016; Mills et al., 2019).

5. Conclusion and Limitations

5.1. Conclusion

This paper attempted to concisely expound how the Ferreira's Ecosystem for Teaching and Learning (FETL) Model is aligned with everyday life experiences and real-world phenomena to highlight the innovativeness and novelty of the model in fostering impactful learning environments in the following ways: (a) bringing content to life through content immersion (immersive technologies); (b) connecting academic concepts to real-world events for meaning-making and relevance; (c) simulation-based and experiential learning for building conceptual understanding; (d) promoting reflective practices for building student agency; (e) culturally and linguistically responsive pedagogy for inclusive classrooms. In addition, the FETL Model was situated in History, Methods, Theories, and Contemporary Conditions of Everyday Life Across Disciplines to highlight its adaptability, transdisciplinary and enduring design. Finally, a concise comparative analysis of the FETL Model with existing models was presented along with future studies to redesign and reimagine the FETL Model leading to a more scientifically robust model, called FETL 2.0 Model.

5.2. Limitations, Equity and Ethical Considerations of AI

Limitations of this paper include: (1) absence of a complete lesson plan on the implementation of the FETL Model across academic disciplines; (2) it is primarily practitioner-based rather than empirically-focused even though a reference to a quasi-experimental study (Ferreira, 2025a) was made to highlight the model's effectiveness in mathematics lessons. The paper does include references to two papers (Ferreira, 2025b; Ferreira, 2025c) in which complete lesson plans show how the FETL Model is implemented in mathematics lessons. However, only a summary of a lesson plan is provided in this paper because the aim of this was to concisely expound how the FETL Model is aligned with everyday life experiences and real-world phenomena. As it relates to equity and the digital divide that exist in school systems across the globe, teachers are encouraged to use alternative free apps and websites and physical models where necessary to implement various aspects of the FETL Model. For example, for personalized learning and assessment, teachers can use differentiated printed worksheets, physical models, and teacher-made anchor charts (instead adaptive and assistive technologies)

to cater to each student academic needs including special education (accommodations), emergent bilinguals (language supports), gifted and talented (extension activities). The digital divide which refers to the disparities in access to and use of technology creates a huge challenge in education (Afzal et al., 2023). Studies have shown that students from low-income backgrounds were confronted with lower levels of internet access which highlights a socioeconomic divide in technology access (Afzal et al., 2023). However, to address these challenges, schools can establish technology resource centers and form strategic public-private partnerships to bridge the gap in education (Afzal et al., 2023).

Regarding ethical and safety considerations for implementing ICT and AI Stations in the FETL Model, artificial intelligence (AI), guidelines recommended by Clark et al. (2025) should be followed: (a) creating prompts that ensure AI outputs are pedagogically sound and curriculum-aligned parameters; (2) input threat detection to prevent attacks; (3) use an independent asynchronous content moderation agent (IACMA) to evaluate outputs that are aligned with predefined safety categories; (4) preserving a human-in-the-loop technique that will encourage teachers to review content before it is used in the classroom.

Prior to implementing AI technology within a classroom, it is incumbent upon teachers to familiarize themselves with the system's effectiveness, implementation constraints, pedagogical design approach, and intended (or potentially unintended) uses of the AI system (Jackson et al., 2021). Recommendations for responsible and safe use of AI include: (1) teachers must understand the appropriate use of AI technology, (2) teachers receive continuous professional development to keep abreast of technology advances; (3) teachers are trained in detecting technology that promotes equitable educational practices; (4) teachers are trained in effective and appropriate integration technology strategies; (5) teachers are cognizant of whose and what types of data are being captured, stored, used, and shared (Jackson et al., 2021).

Acknowledgement

The researcher wishes to express profound thanks and appreciation to Professor Dimitrios A. Karras for providing a critical review of the FETL Model and making scholarly recommendations to reposition and improve the model's robustness and applicability across academic disciplines and school levels.

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