



TAX-EDX 2.0: REIMAGINING TAX EDUCATION THROUGH TPACK-DRIVEN AI-AUTOMATED SMARTTAX AUTO-CASE BUILDER

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ABSTRACT

Traditional classroom-based tax education in higher learning institutions is commonly delivered through lecture-based and theory-oriented approaches, which limit students' opportunities to apply taxation knowledge in authentic professional contexts. Consequently, graduates often demonstrate conceptual understanding but lack advisory and analytical competencies required in modern tax environments. Simultaneously, Malaysia's transition toward mandatory e-Invoicing presents considerable challenges for Micro, Small, and Medium Enterprises (MSMEs), particularly due to limited digital readiness, low tax literacy, and the complexity of compliance requirements. To address these interconnected issues, this study introduces TAX-EdX 2.0, an experiential tax education ecosystem supported by the SmartTax Auto-Case Builder (STAC), a generative artificial intelligence-driven system guided by the Technological Pedagogical Content Knowledge (TPACK) framework. Undergraduate students engage directly with MSME entrepreneurs through structured interviews to evaluate tax compliance practices and e-invoicing preparedness. Interview data are processed using STAC, which automatically extracts themes and generates preliminary narrative case studies that students refine through higher-order analysis. Implemented among a total of 82 undergraduate students enrolled in the Taxation I course, the initiative integrates experiential learning, AI-assisted analysis, and industry engagement to transform students into active knowledge creators. The method simultaneously enhances student learning outcomes, supports MSME digital transition, and establishes a scalable repository of localized tax education case studies for teaching and research purposes.

KEYWORDS: Automation, Artificial Intelligence, Experiential Learning, Taxation, Educational Innovation.

PROBLEM AND OBJECTIVE

The accounting and taxation landscape is being rapidly reshaped by digital transformation and increasingly complex regulatory frameworks. However, two interconnected challenges persist. Higher education institutions continue to rely on traditional, theory-driven teaching approaches that do not adequately develop students' practical advisory skills, critical thinking, or ability to navigate real-world ambiguity. Within such environments, students often develop strong conceptual understanding but lack applied competencies such as professional judgment and analytical agility. Evidence from

experiential and game-based learning models further suggests that these higher-order skills can only be cultivated through authentic, real-world engagement rather than static instruction. At the same time, Malaysian Micro, Small, and Medium Enterprises (MSMEs) are facing significant difficulties in complying with the Inland Revenue Board's mandatory e-Invoicing system (Inland Revenue Board of Malaysia, 2025), which requires technical knowledge, digital infrastructure, and financial resources that many small businesses do not possess. Many MSMEs remain critically uninformed about key technical requirements such as digital signatures, Tax Identification Numbers, and structured data reporting, exposing them to substantial compliance risks and penalties (Syahira et al., 2025).

The core problem lies in the disconnect between these two issues where universities have a surplus of students needing practical experience, while MSMEs have real compliance problems but lack access to affordable advisory support. TAX-EdX 2.0 is designed to bridge this gap by transforming tax education into an experiential, consultancy-based learning model. It enables students to engage directly with real MSME cases, applying their knowledge in authentic contexts while simultaneously supporting businesses in meeting e-Invoicing requirements.

The primary objectives of TAX-EdX 2.0 are to shift tax education from passive learning to active experiential engagement, to leverage generative artificial intelligence in reducing the cognitive burden of handling unstructured field data so that students can function effectively as novice consultants, and to support Malaysia's digital economy agenda by providing MSMEs with accessible and practical e-Invoicing compliance assistance. Ultimately, the initiative aims to build a scalable repository of real-world tax cases that continuously enrich academic curriculum and inform policy development.

DESIGN DESCRIPTION

The TAX-EdX 2.0 ecosystem is an interdisciplinary design that integrates pedagogical theory and advanced technology to transform how tax education is delivered and applied. Anchored in the Technological Pedagogical Content Knowledge (TPACK) framework, the system combines Malaysian tax content, experiential learning pedagogy, and generative artificial intelligence to create a lightweight yet impactful instructional model that avoids reliance on costly legacy systems while maintaining high conceptual depth (Koehler et. al., 2013). Its primary purpose is to shift students from passive learners into active consultants by enabling them to work on real MSME tax compliance cases, particularly those related to e-Invoicing requirements. The design uniquely positions AI not as a source of answers but as a structuring tool that structures raw qualitative data into meaningful case narratives, allowing students to engage deeply with authentic tax problems faced by MSMEs.

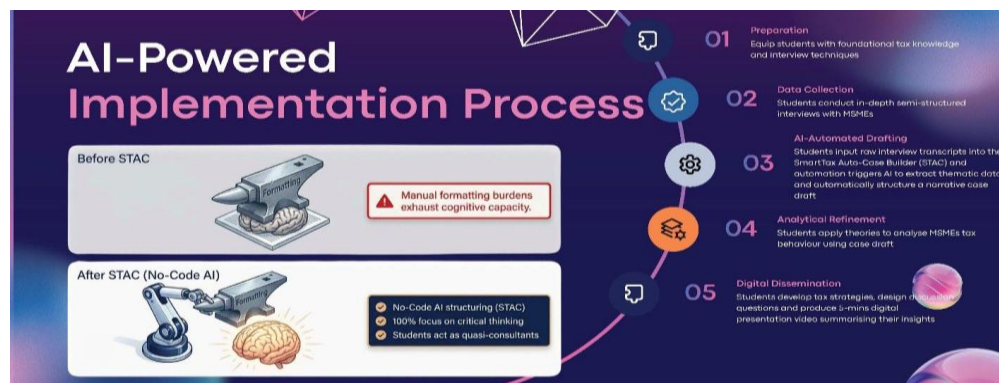
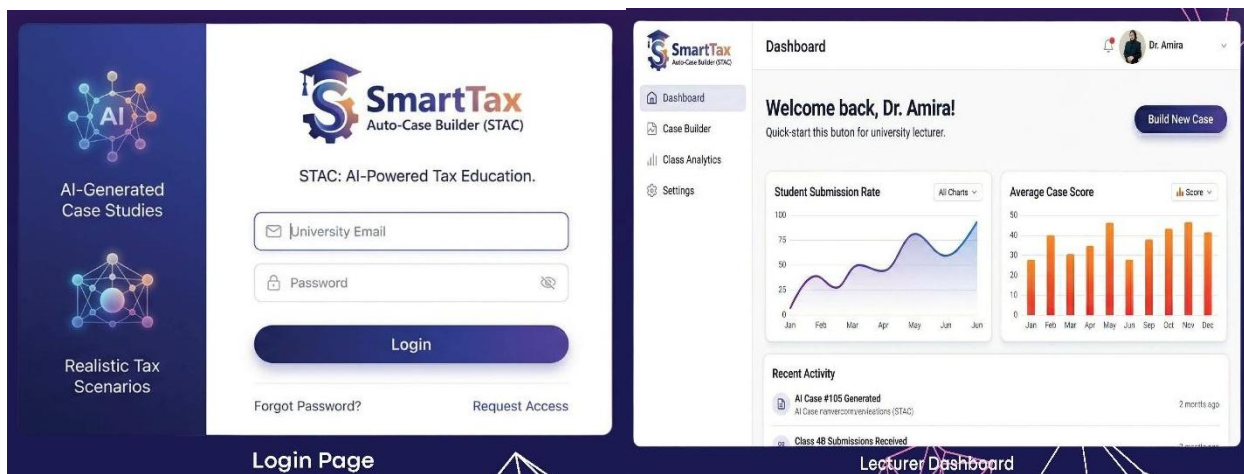
The framework is operationalised through a structured experiential workflow that reflects principles from Cognitive Load Theory and Experiential Learning Theory. 82 undergraduate students enrolled in the Taxation I course begin with preparation and scaffolding, where they acquire foundational tax knowledge and are trained in conducting semi-structured interviews. This is followed by experiential data collection, where they engage directly with MSME owners to gather real-world data on financial practices and e-invoicing readiness. The process then advances to AI-automated drafting, where raw interview transcripts are uploaded into the SmartTax Auto-Case Builder (STAC), a no-code generative AI system that extracts key themes and produces a structured narrative case draft. This design directly reduces extraneous cognitive load and preserves students' capacity for higher-order thinking (Sweller, 1988). In the analytical refinement stage, students critically interrogate the AI-generated scaffold, expanding it into a comprehensive case study to evaluate behavioural and regulatory dynamics. The

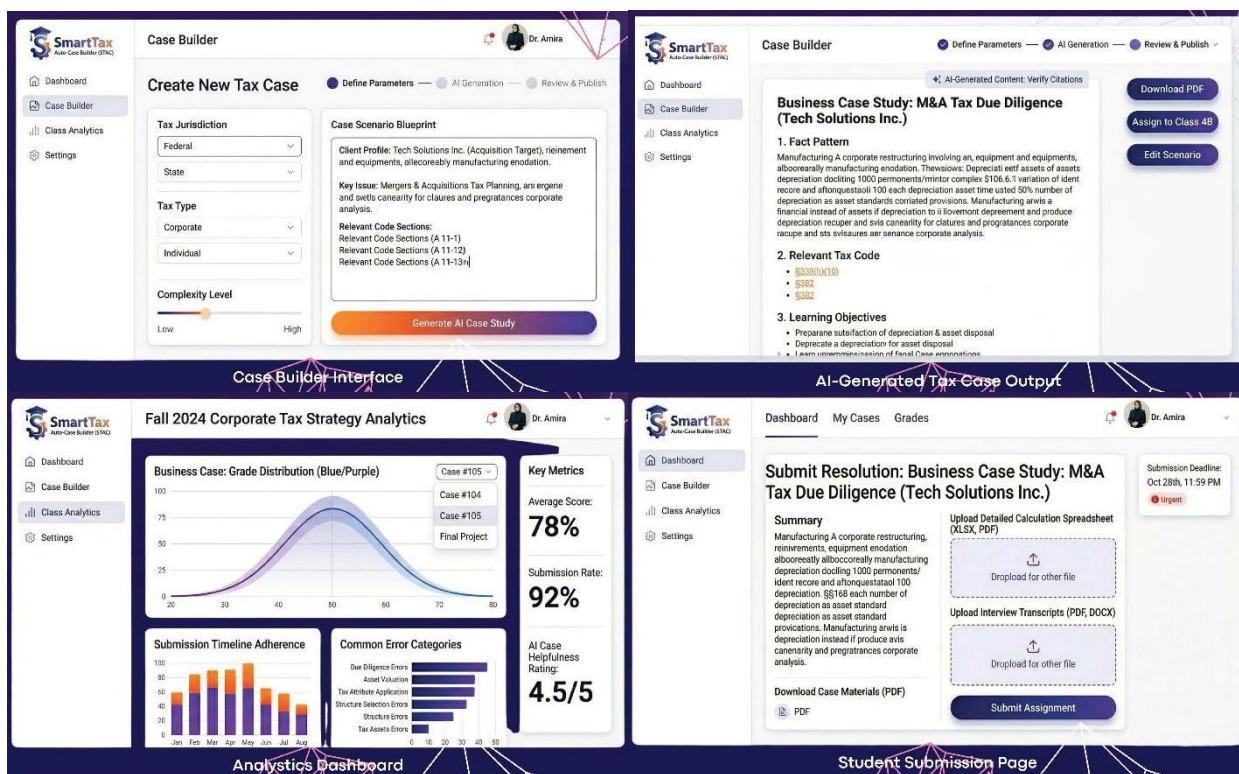


final stage involves digital dissemination, where students synthesise their findings into actionable tax strategies and communicate them through professional digital presentations delivered to MSMEs.

The primary functionality of TAX-EdX 2.0 lies in its SmartTax Auto-Case Builder, which features a dual-portal system supporting both educators and students. Educators benefit from real-time analytics dashboards that reveal learning patterns and common analytical errors, enabling responsive teaching interventions (Jamil et al., 2025). Students, meanwhile, are supported by an intelligent case-building interface that transforms unstructured field data into coherent, analysis-ready case studies. The target audience includes undergraduate accounting students, educators, and MSMEs requiring accessible advisory support. A key unique selling point of the system is its ability to simultaneously solve an educational gap and an industry compliance challenge by converting real MSME issues into scalable learning assets, while building a continuously evolving repository of localized, real-world tax cases for curriculum enhancement and policy insight.

VISUALS





NOVELTY AND UNIQUENESS

The innovation of TAX-EdX 2.0 lies in its fundamental reversal of how artificial intelligence is used in education. While conventional approaches often position generative AI as a tool for producing answers, which raise concerns about plagiarism and weakened critical thinking, this ecosystem redefines AI as a problem-construction mechanism rather than a solution provider. Instead of allowing students to bypass learning, STAC structures raw, unstructured field data into preliminary case drafts. These outputs are intentionally treated as imperfect blueprints, requiring students to verify assumptions, challenge inaccuracies, and apply higher-order tax reasoning. This approach shifts cognitive effort back to the learner, preserving deep analytical engagement while introducing students to algorithmic literacy and the critical evaluation of AI-generated outputs.

What distinguishes TAX-EdX 2.0 from existing solutions is its ability to transform students into active knowledge creators within a real-world ecosystem. Traditional accounting education relies heavily on static, textbook-based case studies that are often detached from local regulatory and socio-economic contexts. In contrast, this framework continuously generates dynamic, hyper-localized case materials derived from MSME engagements. As students collect and analyse real business data, the system builds an evolving repository of current, context-specific tax cases that reflect ongoing developments such as Malaysia's e-Invoicing implementation and digital taxation shifts. This dual innovation repositioning AI as a cognitive scaffold and creating a self-sustaining, locally grounded curriculum, sets TAX-EdX 2.0 apart from conventional pedagogical models. It not only enhances learning outcomes but also aligns academic practice with industry realities, ensuring that both students and the curriculum remain responsive to real-time changes.



BENEFITS TO MANKIND

TAX-EdX 2.0 delivers dual educational and economic benefits by bridging the gap between academic theory and real-world practice. It equips students with practical tax advisory skills, digital literacy, and critical thinking through experiential learning, producing industry-ready graduates. Simultaneously, it supports MSMEs by providing free, high-quality e-Invoicing compliance guidance, helping them avoid penalties and transition into the digital economy despite limited resources. This enhances workforce readiness, strengthens small business resilience, and promotes inclusive national economic growth.

COMMERCIAL POTENTIAL

TAX-EdX 2.0 demonstrates strong global market potential through its jurisdiction-agnostic design, allowing adaptation across different tax systems. Its primary competitive advantage lies in transforming AI into a curriculum-generation engine rather than a content shortcut. The system is highly scalable via a Software-as-a-Service model targeting universities, corporate training programs, and government agencies. It reduces costs associated with case development and professional training while enabling continuous, localized content creation, making it a viable, high-impact solution across education, industry, and public sectors.

CONCLUSION

TAX-EdX 2.0, supported by STAC, transforms accounting and taxation education by integrating TPACK with Cognitive Load Theory. By automating formatting and other procedural tasks through generative AI, the system reduces extraneous cognitive load, enabling students to focus on higher-order analytical thinking and real-world tax compliance issues faced by MSMEs. This shifts learners from passive recipients to active, industry-ready problem-solvers while also supporting small businesses navigating digital e-Invoicing requirements. Future development may include expanding jurisdictional adaptability, integrate real-time regulatory updates, and enhance predictive analytics for tax compliance scenarios. Further scalability into professional training and government-led digital literacy programs could strengthen its global applicability and socio-economic impact.

AWARD AND RECOGNITION

Silver Award for Taxpad Pro: E-Portfolios for Social Constructivism Learning in the Third International Competition on Sustainable Education 2024 (SUSED 2024)

Silver Award for TAX-EdX: Transforming Tax Education through Experiential Learning and SMEs Engagement in the Global Accounting Innovation Showcase (GAIS 2025)

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