DESIGNING IMPACTFUL DIGITAL LEARNING IN HIGHER EDUCATION: LEVERAGING ADDIE FOR STRUCTURED DESIGN AND STUDENT MONITORING

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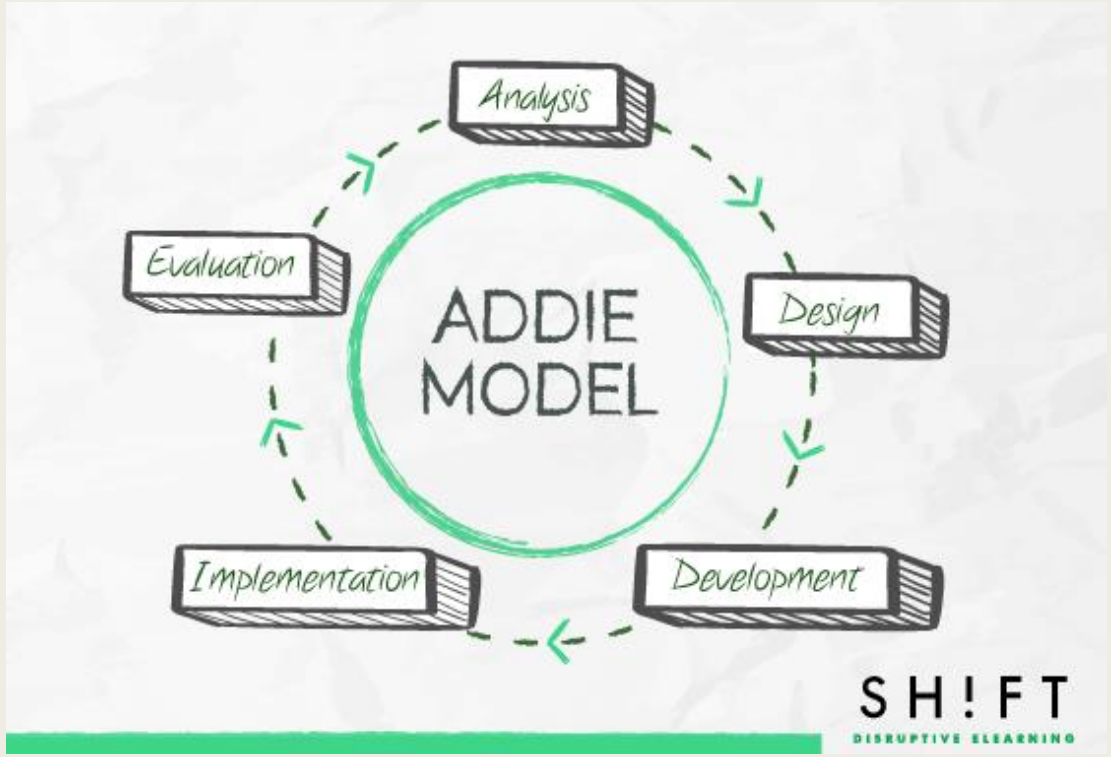
Digital learning transformation in higher education

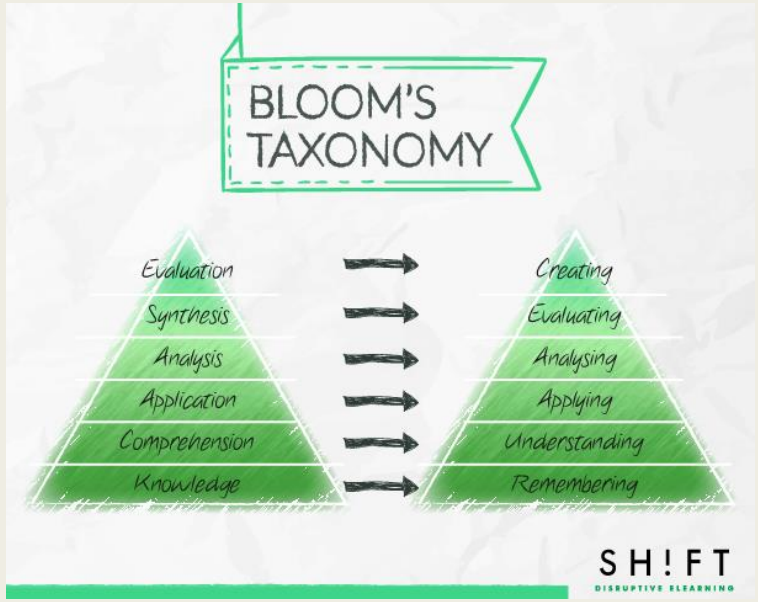
- Driven by rapid technological advancements, changing learner expectations, and the aftermath of the COVID-19 pandemic.
- Digital tools help enhance teaching, personalise learning, and improve institutional operations in general.
- Key trends - the adoption of online platforms, learning analytics, and the shift towards →hybrid and student-centered models.
- Challenges – resistance to change; uneven digital competencies among faculty and students, the need for strategic planning and investment, a rethinking of pedagogy, curriculum, and institutional culture (Rivera-Gutiérrez et al., 2024, Alenezi, 2023, Kaputa et al., 2022, Jacociunas et al., 2023, Koseda et al., 2024).

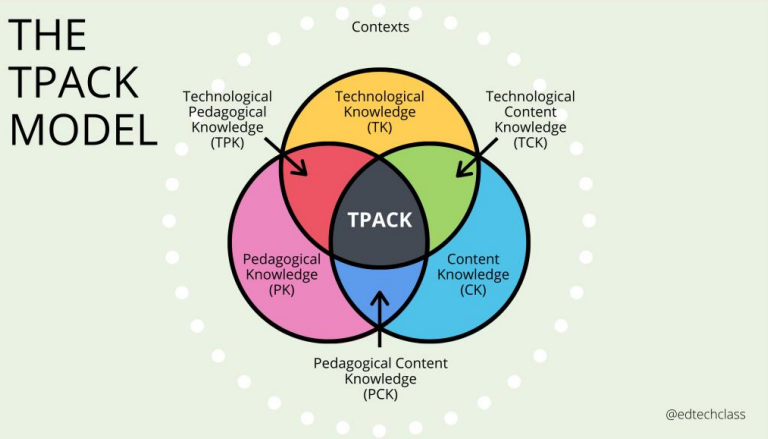
Instructional design

- **A** systematic process of planning, developing, and delivering learning experiences in ways that optimise student understanding and performance.
- Instructional design basically refers to deliberate choices about ***'what, when, where and how to teach'.*** Educators have to make decisions concerning the content, structure, timing, pedagogical strategies, sequence of learning activities and assessment, and the nature of technology used in teaching and learning.
- In the context of higher education, instructional design integrates **principles of learning theory**, **technology**, and **pedagogy** to create effective, engaging, and measurable learning environments.
- There are different stages of instructional design mainly including analysis of learners' needs, design of content and assessments, development of instructional materials, implementation of learning solutions, and evaluating outcomes (Andreea, 2022; Krouse, 2015).

Instructional design models







Instructional design models

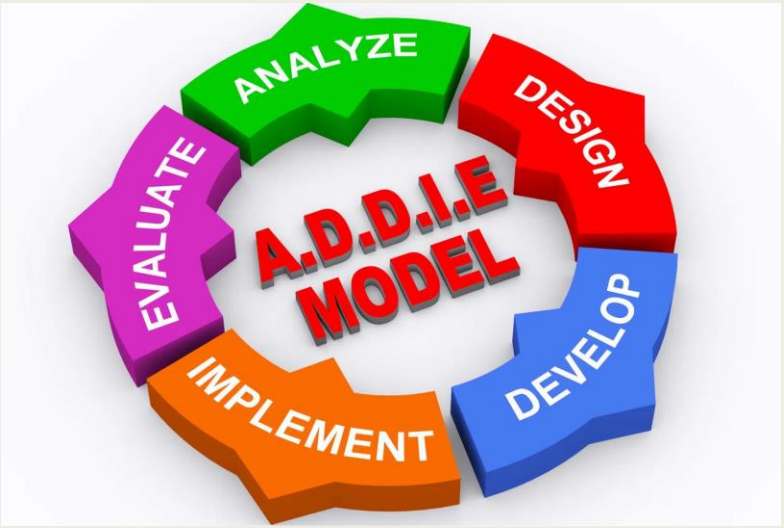
- They provide a systematic and efficient approach to learning/instructional design, and ensure alignment with learning objectives (Evanick, 2023).
- Various learning design models have been developed in the theory of learning/instructional design, namely TPACK (Mishra, Koehler, 2006), ADDIE (Valverde-Berrocoso et al., 2022), 4C/ID (van Merriënboer, Kirschner, 2018), CAFE (Borup, Archambault, 2022), ELED (Czerkawski, 2016), and etc.

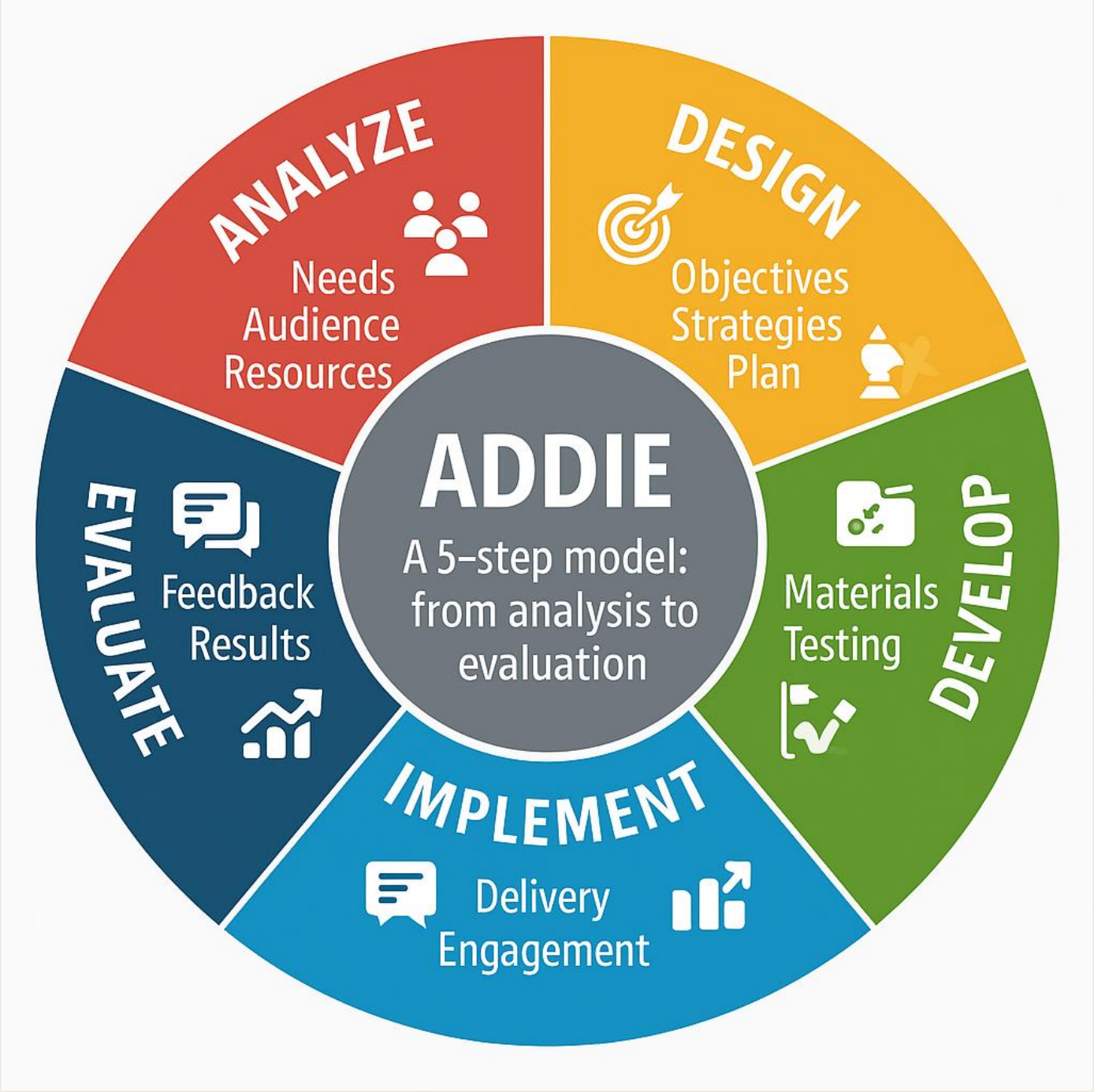
Why should they be used???

- Provide **systematic, step-by-step processes (designing → developing → delivering → evaluating).**
- Focus on **how to create** effective learning experiences from **the ground up**, especially in formal settings.
- Address **entire course or program development**
- **Outputs: learning modules, e – learning programmes, LSM courses.**

ADDIE model

- ADDIE stands out as the most widely acknowledged name among professional instructional designers.
- The elements made by following the ADDIE model stand for Analysis, Design, Development, Implementation and Evaluation (Evanick, 2023). Each phase in the ADDIE model is interconnected and influences each other.




ANALYZE
Needs
Audience
Resources
DESIGN
Objectives
Strategies
Plan
DEVELOP
Materials
Testing
IMPLEMENT
Delivery
Engagement
EVALUATE
Feedback
Results
ADDIE
A 5-step model:
from analysis to
evaluation

Analysis phase

- This involves conducting **a needs assessment,** identifying learning **gaps** and **challenges**, and performing a task analysis to define the necessary skills and knowledge required for the learning process.
- Key outcomes include learner profiles, identification of specific learning needs, and an in-depth analysis of tasks based on these needs → increasing motivation.
- In structured digital learning, this phase also helps define the **technology requirements**, preferred formats (asynchronous vs synchronous) (Mustadi et al.,2022).

Design phase

- Based on their assessment of learner and technological diversity, educators progress to the next stage—Design phase.
- The Design phase plays a fundamental role in the development of learning materials – their structure and specifics.
- This phase requires meticulous planning and a thorough understanding of the educational goals to be achieved, along with strategies for designing materials that effectively meet these objectives.
- Key outputs of this phase include the syllabus and lecture plan (Hamid, 2021).
- In digital learning, the Design phase is especially critical because it determines not just *what* students will learn, but also *how* they'll interact with content across digital platforms.
- For example, if analysis showed that students struggle with self-regulation during online learning, we might design with **microlearning**, **interactive modules**, or **progress dashboards** to scaffold their learning.

Development phase

- The development phase, which depends on analysis and design, focuses on the integration of **digital technology** within educational setting and process. This involves visually organising the content and constructing the course within the eLearning tool. It encompasses all aspects of producing the final educational material for the learners (DeBell, 2020).
- Educators move on to designing engaging and purposeful learning activities that support students in achieving learning objectives.
- This phase goes beyond merely creating content—it focuses on ensuring that all learning elements are unified, engaging, and tailored to the outcomes and learner needs established previously.

- Activities can take various forms, including collaborative projects, individual assignments, quizzes, discussions, problem-solving tasks, research initiatives, presentations, case studies, and role-playing exercises.
- For example, if the Design phase called for frequent student engagement, in Development we might build short video lectures, interactive simulations, discussion prompts, or self-paced e-learning modules.

Implementation phase

- This phase entails implementing the developed learning system in a real educational environment. It centers on deploying the instructional strategies, tools, and materials crafted in previous phases to enable authentic learning experiences (Hafni et al., 2025; Sarwa et al., 2021).
- Learning management systems (like Moodle), blended environment, or fully online platform.
- An effective implementation focuses not only on logistics, but also on **learner support.**
- **Deploying course content → launching communication channels (announcements, forums) → activating monitoring systems → gathering early feedback → providing continuous support.**

Evaluation phase

- The Evaluation phase continues until the formative evaluation is completed, with the primary objective of identifying areas that require revisions and improvements (Mustadi et al.,2025; Sarwa et al.,2021).
- Evaluating each stage of teaching/learning is crucial, to ensure that the learning objectives are effectively achieved and the learning materials are tailored to meet individual learner needs (Aldoobie, 2015).
- Did our design actually work?
- **Evaluation encompasses formative (**throughout the process: usability testing,student feedback) **and summative assessment** (overall effectiveness: performance data, surveys, grades) (Aldoobie, 2015).

- Evaluation is not only about measuring student outcomes. It also involves reflecting on the design, teaching effectiveness, technology performance, and even the support systems.”
- Ultimately, evaluation closes the loop — helping educators iterate, refine, and continuously enhance digital learning experiences in higher education.

Recommendations for practitioners

- **Analysis Phase:** conduct **a needs assessment using surveys** (e.g., Google Forms) to identify learning gaps, skills, and challenges. Perform a task analysis to map objectives to learner profiles (e.g., tech proficiency, schedules) and decide on the format - asynchronous or synchronous.

- **Design Phase:** plan structured digital materials with clear syllabi and lecture plans (e.g., using MS Word or Adobe Captivate). Design for interaction—e.g., if analysis shows self-regulation struggles, incorporate microlearning modules or progress dashboards in LMS platforms like Moodle.

- **Development Phase: i**ntegrate digital technology to produce unified, engaging content. Organize course materials, adding interactive elements like videos or quizzes. Test drafts with a small group (e.g., 5-10 students) to refine based on feedback, ensuring alignment with design goals.
- **Implementation Phase:** implement the course in an LMS (e.g., Moodle) or blended/online platform, including communication channels (announcements, forums) and monitoring systems. Provide early feedback and continuous learner support.
- **Evaluation Phase:** conduct formative (e.g. student feedback via online survey tools like “Qualtrics“) and summative assessments (performance data, grades) to assess effectiveness. Review each phase to revise content.

Students monitoring with ADDIE (Martatiyana and etc.,2023; Nuntawisuttiwong and Dejdumrong, 2024; Sánchez-García et al., 2023).

ADDIE phases	**Monitoring**
Analysis and Design	Identification of learning gaps → response to learning needs
Development and Implementation	Real- time data (digital learning platforms) → progress tracking → modifications
Evaluation	Insights → refine teaching strategies → improve course design → enhance students‘ success

Hypothetical ADDIE Scenario
Course title – Understanding Child Development

Analyse

- After analysing course data from previous semester (previous academic year), it was noticed that a majority of students confused Piaget's cognitive stages (concrete vs. formal operations).
- A diagnostic Moodle quiz confirmed that since 60% of current students also mix these concepts.
- Insight: it is necessary to emphasize not only definitions, but provide students with real-life examples to make stages more understandable.
- This analysis drives the DESIGN phase.

2. Design

- Insights (data) from Analysis phase leaed to the following learning objectives:
- 1. Identify Piaget's four stages.
- 2. Apply the stages to real classroom situations.
- Activities:

- Short lecture video (overview of stages).

- Case study activity (apply theory to child scenarios).

- Forum reflection (students share experiences, what they learned).

- Assessment: formative quiz + short written case analysis.

Development*

- Record a 10-min video where you explain Piaget's stages with specific child behavior examples (e.g. a child thinks that a tall, thin glass contains more liquid than a short, wide glass).
- Create Moodle quiz that "provides" immediate feedback.
- Prepare two short child profiles (e.g., Anna, 7 years old; Jonas, 12 years old).
- Set up Moodle forum: 'Which stage fits your child profile and why?'
- Pilot/test the resources – try yourself.

*At this stage, the **resources exist but have not been used yet**.

Implement

- During lecture week:

- Students watch the video and read a summary in Moodle.

- They complete the Moodle quiz.

- In small groups, they analyze the assigned child profile and post in forum.

- Ask guiding questions, discuss mistakes.
- This generates data for the EVALUATION phase.

Evaluate

- Moodle analytics show quiz Q3 (formal operations) was answered incorrectly by 40% of students.
- Forum posts show that many apply stages correctly but lack terminology.
- Lecturer adjusts next course: spend more time on abstract vs. concrete reasoning, an example video could be added in the future.
- Student survey: they found child profiles helpful → lecturer decides to expand them for the next course.
- ADDIE cycle closed.

Thank you