

Lecture 5

Adaptive Learning Technologies

A. Introduction



Image 1: Tech company seeks to address digital, education divide in Philippines (Source: Tipchai in Cruz, 2022: Online)

Adaptive learning technologies have become influential instruments in the K-12 education field of the 21st century. They are changing traditional teaching methods and customizing learning experiences for students. These technologies employ data analytics and artificial intelligence to adapt educational material, pace, and real-time assessments to cater to each

student's unique requirements and learning preferences. As educators manage the complexity of incorporating technology into teaching methods, it is crucial to explore the possibilities and difficulties of adaptive learning technologies to promote fair and practical education for all students.

The goal of Philippine education in fostering adaptable schools is to establish flexible learning settings that can successfully cater to pupils' varied requirements and circumstances (Bilbao et al., 2019). This entails incorporating cutting-edge pedagogical approaches, harnessing the power of technology, and cultivating an environment that promotes ongoing enhancement. Philippine schools strive to foster critical thinking, creativity, and lifelong learning abilities in students by embracing flexibility. This prepares them to succeed in a constantly evolving global environment while promoting diversity and fairness in education.

Adaptive learning technologies enhance children's education by offering customized learning experiences specifically designed to meet their unique requirements, abilities, and preferred learning methods. This encourages active participation, improves understanding, and encourages independent learning, eventually empowering students to achieve their maximum potential academically and in other areas of life. All these and more are what we will explore in this lecture.

Lecture 4 Conclusion

The digital and information literate educator can adapt to the ever-shifting digital landscape, effectively use technology in the classroom, promote critical thinking and creativity, and help students learn to be responsible and ethical in consuming and producing knowledge.

B. Lecture Objectives

After this lecture, you are expected to:

1. Describe an adaptive learning environment in the context of educational technology; and,
2. Discuss how major learning theories relate to using adaptive learning technologies in teaching.

C. Lecture Content

1. The Adaptive Learning Environment: A Post-Conventional Perspective

An adaptive learning environment represents a significant change in teaching and learning, providing a look into the future of education. Using technology and data analytics, adaptive learning environments customize education to accommodate each learner's individual talents, preferences, and learning pace. This personalized method encourages more profound involvement, facilitates knowledge acquisition, and nurtures the development of analytical thinking abilities.

Furthermore, adaptive learning environments provide educators with immediate and up-to-date information on students' progress, allowing them to make specific interventions and adjustments to their training. The future of education relies on the development of adaptable, interactive, and all-encompassing learning experiences that enable students to excel in a swiftly changing environment.

In this part of the lecture, we will tackle the three significant attributes of an adaptive teaching-learning environment that Filipino schools can well subscribe to. However, more modern frameworks may be available elsewhere in the world, which will form part of your quest for better ideas when you become a professional teacher.

a. Contextualized Learning Platforms. Contextualized educational technology incorporates digital tools and resources customized to fit unique educational environments, including cultural, linguistic, and institutional factors. It guarantees that technology harmonizes with learners, educators, and educational institutions' distinct requirements, difficulties, and objectives, improving efficacy and significance.

In immersing young students in the adaptive learning mode, making them realize the reason for doing so is vital. Contextualized learning platforms allow students to be at liberty to develop strategies to attain their learning goals. The teacher provides opportunities rather than the director of what and how they should perform. Learning management systems, assignment portals, and other online platforms may allow students to share their learning experiences and outputs according to their unique but relevant circumstances.

b. Mobile Learning. Mobile learning in an adaptive learning environment involves using mobile devices, including smartphones and tablets, to provide individualized and flexible learning experiences. Adaptive learning technologies in this context modify educational material, pace, and activities in response to individual learners' specific requirements and preferences. Mobile learning facilitates learners' access to educational resources at any time and location, enabling the smooth incorporation of learning into everyday activities. Mobile learning systems can utilize adaptive strategies to accommodate various learning styles and surroundings, promoting engagement, autonomy, and effectiveness in the learning process.

Mobile learning uses mobile devices and adaptive learning technology to engage teachers and students in flexible and adaptable teaching and learning. Mobile learning platforms give teachers adaptable curriculum materials to tailor lessons to students' needs and learning styles.

There are widely used devices, software applications, and platforms that we will further explore in this course, such as flipped classrooms, learning management systems (LMS), online educational apps, and game-based assessment tools that allow students to be creative and productive even though they are in the comfort of their homes.

c. Blended Learning Environment. A blended learning environment, under the framework of adaptive learning technology, integrates conventional in-person teaching with online learning elements. Adaptive technologies customize online material, exams, and activities to suit each student's requirements, while in-person training offers collaboration, debate, and experiential learning opportunities. This technique optimizes flexibility, customization, and efficacy in teaching.

Blended learning environments deviate from the traditional classroom instruction in which the teacher can engage students in synchronous and asynchronous learning tasks. One of the primary goals of this 21st-century imperative is to train learners to be self-directed and empowered. The aftermath of the COVID-19 pandemic fast-tracked the permeation of this mode of teaching and learning in Philippine schools, a blessing in disguise, so to speak.

This mode of schooling has capacitated the greater population to undertake blended learning so that even during class suspension, learning continues in alternative modes.

2. Learning Theories that Support Adaptive Technologies

Adaptive learning technologies utilize a range of teaching and learning theories to offer customized learning experiences for students. Several prevalent theories that endorse adaptive learning systems include:

a. Cognitive Load Theory. The pioneer of this theory was John Sweller in 1988. The idea posits that human working memory has a limited capacity to retain information and recommends that instructional techniques be designed to prevent overwhelming it, optimizing learning outcomes (Structural Learning, 2022). With finite mental storage, using adaptive technologies can reinforce the learners' capacity to retain information.

Cognitive Load Theory fits with adaptive learning technologies because they change learning materials' difficulty level and speed based on each student's cognitive skills. These technologies reduce brain stress by breaking information

into manageable chunks and building up learning tasks. This makes it easier to remember and understand what you've learned. They can also change their teaching methods based on real-time input, ensuring students aren't too easy or too hard. This personalized method reduces unnecessary brain load so students can focus their mental resources on essential learning tasks. This makes learning more efficient and effective in the long run.

An excellent illustration is the interactive lessons that adapt the difficulty level according to the learner's performance, minimizing unnecessary cognitive burdens. Spaced repetition systems employ a systematic approach to plan review sessions to maximize memory retention. They achieve this by effectively controlling cognitive load through the distribution of learning throughout time. Adaptive quizzes adjust the complexity of questions based on an individual's ability level, reducing mental strain. Moreover, individualized learning routes customize the delivery of knowledge to align with the cognitive capacity of individual learners, hence reducing cognitive strain.

b. Constructivist Learning Theory. According to the constructivist theory, students actively participate in their own learning process and acquire information through their experiences. The unfolding of events prompts individuals to reflect on their own experiences and incorporate fresh ideas into their current body of knowledge. Individuals develop schemas to organize and structure the knowledge they have gained. The learning theories proposed by Dewey, Piaget, Vygotsky, Gagne, and Bruner were the foundation upon which this paradigm was solidly established (Kurt, 2021).

Constructivist learning theory emphasizes active engagement and knowledge construction by learners. Adaptive learning technologies facilitate this process by providing interactive learning experiences, enabling exploration and problem-solving. This alignment promotes learner autonomy and fosters deeper understanding, reflecting the principles of constructivist theory.

An exemplary instance is the utilization of interactive simulations. This activity involves students in virtual experiments where they may change different factors and observe the immediate results. This helps them develop their grasp of scientific ideas. Project-based learning modules encourage mental creativity and involve learners in real-world projects inside adaptive platforms. As learners progress, they receive individualized resources and feedback, which helps create cooperation and improve critical thinking abilities. These examples adhere to constructivist ideas by emphasizing active participation and knowledge creation.

c. Multiple Intelligences Theory. Individual differences encompass many aspects of personality, physical prowess, emotional aptitude, and intellectual potential. However, according to Howard Gardner's Theory on Multiple Intelligences (1983), no individual possesses all the intelligences outlined in his theory. This approach also highlights that intelligence encompasses more than just an individual's cognitive talents. It can also become evident in other abilities and characteristics of the individual due to their "cognitive conduct" (Marens, 2024).

Extracted from Gardner's theory, the following list of intelligences enumerates the learners' different learning abilities and mental aptitudes.

- Linguistic intelligence ("word smart")
- Logical-mathematical intelligence ("number/logic smart")
- Spatial intelligence ("picture smart")
- Bodily-kinesthetic intelligence ("body smart")
- Musical intelligence ("music smart")
- Interpersonal intelligence ("people smart")
- Intrapersonal intelligence ("self smart")
- Naturalist intelligence ("nature smart")

In the context of differentiated instruction, adaptive learning technologies support the Multiple Intelligences Theory by providing a range of learning activities that address different intelligences, including visual, auditory, kinesthetic, and interpersonal abilities. These platforms adapt how information is presented and assessed to match students' abilities, allowing them to interact with the subject in ways that fit their particular intelligences. Adaptive technologies provide a learning environment that is more inclusive and effective by catering to different learning styles and preferences. This enables students to develop their intelligences and succeed in areas where they have natural strengths.

d. Zone of Proximal Development (ZPD). ZPD, as conceptualized by Lev Vygotsky, is the disparity between a learner's independent capabilities and potential accomplishments when provided with direction and support. Adaptive learning technologies can recognize each learner's Zone of Proximal Development (ZPD) and adjust learning experiences appropriately, offering suitable degrees of difficulty and assistance (Mcleod, 2024).

Adaptive learning technologies cater to the ZPD theory by offering customized learning experiences that align with individual students' existing abilities and potential for advancement. These technologies determine the ZPD of each student by evaluating their existing knowledge and skills and providing appropriate learning activities to support their progress. Adaptive platforms facilitate skill growth and information acquisition by offering activities that are somewhat more difficult than the student's present competency level while also delivering appropriate degrees of challenge and support. This individualized method guarantees that learners are neither too burdened nor insufficiently stimulated, optimizing their capacity for learning and fostering ongoing advancement within their ZPD.

When students are engaged in self-directed learning through flexible modalities, they develop their potential and self-confidence. For instance, the teacher offers the expected learning outcome as the goal of the students, and the latter gets the liberty to use his nominated means at his own pace. Suggested instructions may exist, but the student can modify them based on his circumstances and capacities.

e. Self-Determination Theory. The Self-Determination Theory places significant emphasis on the crucial role of autonomy, competence, and relatedness in cultivating intrinsic drive. Adaptive learning technologies can empower learners by providing them with options, encouraging them to achieve mastery through tailored learning paths, and cultivating a feeling of belonging in online learning communities (Ackerman, 2018).

The mere fact that students are entrusted to perform self-directed learning and individual tasks, they develop independence and maximize their critical thinking and ability to solve problems.

Adaptive learning technology in schools promotes independence by providing tailored learning routes, enabling students to assume responsibility for their educational journey. These technologies foster and stimulate creativity and critical thinking by providing a wide range of information and interactive experiences. Furthermore, adaptive platforms facilitate self-directed learning by enabling students to establish objectives, monitor their advancement, and make well-informed educational choices. By utilizing adaptive technology, kids acquire the abilities and self-assurance to freely manage their studying freely, fostering a sense of ownership and control over their academic endeavors.

D. Conclusion

Adaptive technologies revolutionize education by tailoring learning to various needs and interests. They give students individualized support and challenges to boost engagement, retention, and mastery. Personalized learning maximizes performance, helping students succeed in changing educational situations.

E. References

- Ackerman, C. E. (2018). *Self-Determination Theory and how it explains motivation* [Online Article] [Accessed on April 8, 2024] <https://positivepsychology.com/self-determination-theory/>
- Bilbao, P.P., Dequilla, M.A.C.V., Rosano, D.A., & Boholano, H.B. (2019). *Technology for teaching and learning 1: OBE-, PPST-, and ICT competency-based*. Quezon City, Philippines: Lorimar Publishing Inc.
- Cruz, J. P. (2022). *Tech company seeks to address digital education divide in Philippines* [Online Image] [Accessed on April 6, 2024] <https://interaksyon.philstar.com/trends-spotlights/2022/08/12/225054/lenovo-seeks-to-address-digital-education-divide-in-philippines/>
- Kurt, S. (2021). *Constructivist learning theory*. [Online Article] [Accessed on April 7, 2024] <https://educationaltechnology.net/constructivist-learning-theory/>
- Marens, M. (2024). *Howard Gardner's Theory of Multiple Intelligences* [Online Article] [Accessed on April 7, 2024] <https://www.simplypsychology.org/multiple-intelligences.html>
- Mcleod, S. (2024). *Vygotsky's Zone Of Proximal Development And Scaffolding Theory* [Online Article] [Accessed on April 7, 2024] <https://www.simplypsychology.org/zone-of-proximal-development.html>
- Structural Learning (2022). *Cognitive Load Theory: A teacher's guide* [Online Article] [Accessed on April 7, 2024] <https://www.structural-learning.com/post/cognitive-load-theory-a-teachers-guide>