Lecture 3

Theories and Principles of Educational Technology

A. Introduction

Image 1: How smart classrooms are revolutionizing education in Makati City (Source: Doctolero, 2024: Online)

Our two first lectures tackled maximizing and keeping safe with technology for teaching and learning. We learned that educational technology is not solely about using sophisticated devices and gadgets for pleasure. Using digital technology can empower people to be more efficient and productive. However, with extensive power comes substantial responsibility. The teacher and the learner are responsible for being ethical and safe with online and digital technology for teaching and learning.

In this lecture, we will focus more on how ICT is optimized in the language of professional teaching. The manner in which educators use technology in teaching and learning is highly dependent on their assumptions regarding how individuals acquire knowledge. They need to understand who their students are and how they should approach the teaching process. As teachers, it is their responsibility to offer educational opportunities that will contribute to accomplishing the predetermined goals.

With digital tools and resources, experiential learning using educational technology entails fun, valuable exercises that fully engage students in real-world situations. The approach highlights active participation, critical thinking, and introspection, enabling students to put academic understanding into practice. Students gain more profound comprehension and enhance their abilities by utilizing simulations, virtual worlds, gamified exercises, and interactive multimedia. Experiential learning in educational technology cultivates critical thinking, teamwork, and creativity, providing students with the needed skills to tackle the demands of the digital era while also increasing their motivation and pleasure of learning.

Lecture 2 Conclusions

Optimizing teaching and learning requires understanding ICT policies and concerns. Access, privacy, security, and digital literacy must be balanced to maximize technology's transformational power. Collaboration and informed tactics may help educators develop inclusive, innovative, and safe learning environments that prepare students for digital success.

B. Session Objectives

After this session, you are expected to:

1. Discuss theories of experiential learning that are applied in technology-driven teaching-learning models; and,
2. Explain technology-based principles to enhance the teaching and learning process.

C. Session Content

1. Theories of Experiential Learning

Experiential learning is an educational method that prioritizes practical involvement and active participation in learning activities to enhance comprehension and cultivate practical abilities (Bilbao et al., 2019). It entails students engaging actively in practical assignments, problem-solving activities, and reflecting exercises, enabling them to apply theoretical knowledge in genuine situations. Experiential learning promotes actively exploring, experimenting, and discovering, which enhances critical thinking, creativity, and the development of lifelong learning habits. Through active participation in tangible experiences, thoughtful analysis of observations, formulation of abstract concepts, and exploration of innovative methods, students acquire a profound comprehension of topics and cultivate versatile talents that may be applied in diverse fields.

Teaching has been modernized by incorporating educational technology into instructional techniques to improve engagement, interaction, and individualized learning experiences. Technology-enhanced instruction utilizes diverse digital tools, resources, and platforms to facilitate experiential learning methods. Simulations, virtual reality (VR), and augmented reality (AR) apps offer

immersive and interactive settings that allow students to safely and effectively explore complex concepts and scenarios, such as scientific investigations, historical events, or engineering designs. These tools provide chances for practical experimentation and actual learning that may not be possible in typical classroom environments.

Additionally, strategies like game-based learning platforms and educational apps may effectively turn learning chores into fun activities that motivate students to participate and reach their learning goals actively. Adaptive learning systems use algorithms and AI to tailor training to each student's needs, interests, and preferred ways of learning. This creates personalized learning experiences that keep students interested and helps them understand more.

In addition, online platforms that promote collaboration, such as discussion forums, wikis, and video conferencing tools, allow students to communicate with one another, work on group projects, and engage in collaborative problem-solving. This fosters the development of teamwork and communication skills as students learn from one another. These technology-based teaching methods encourage active participation, analytical thinking, and the acquisition of skills in line with the principles of experiential learning to create effective and significant learning results in the digital era.

Amid all these models, this lecture focuses on the two model theories of experiential learning that are the groundwork for integrating technology into the teaching and learning process – Dale's Cone of Experience and Bruner's Three-Tiered Learning Model.

a. Edgar Dale's Cone of Experience Model

Edgar Dale's Cone of Experience assists educators in designing instructional experiences that optimize the use of the most efficient learning settings. The 10-stage approach categorizes multimedia items based on their level of concreteness. The multimedia asset's capacity to avoid becoming abstract and accurately depict reality to different extents (Cloke, 2023).

The model depicts various learning engagement levels, from concrete experiences to more theoretical notions. In education, instructors utilize this approach by integrating multiple learning activities, such as practical experiments, simulations, conversations, and multimedia presentations, to accommodate various learning preferences, improving the retention and understanding of information.

The Bands in Dale's Cone of Experience

1. Direct Purposeful Experiences. Direct experiences let us control a precise result. We participate in learning. These experiences are life uncut. Students can see, touch, taste, feel, and smell these sensations. They learn by doing. Learning is done via hands-on experiences.

2. Contrived Experiences. Contrived experiences prioritize the manipulation of reality. At this stage, educators utilize representational models and prototypes to offer an experience that closely resembles reality.

3. Dramatization. These exercises frequently engage students in a recreated experience through role-playing or dramatization, encouraging active participation.

4. Demonstration. A demonstration is a presentation that visually illustrates and explains facts, concepts, or processes. They are a popular method for educating children, requiring less preparation and resources. Ultimately, individuals get significant insights only by closely observing others.

5. Field Trips. Also called 'study trips,' these learning experiences enhance understanding as learners are physically exposed to real-world concepts. They are exposed to settings that are not accessible in the classroom.

6. Exhibits. This experience enables learners to comprehend the significance and applicability of concepts through the many images and depictions offered. Exploring displays in educational establishments such as museums is a prevalent method of providing educational experiences.

7. Movies and Television. Movements and cinematic experiences are added to enhance the visual and auditory learning experience.

8. Still Pictures and Recording. Visual and auditory learning materials advance learning rather than mere symbols.

9. Visual Symbols. Abstract representation of learning concepts is used to improve understanding through charts, graphs, maps, tables, matrices, and diagrams

10. Verbal Symbols. Learning is acquired through reading symbols, such as letters, numerals, and other basic characters or codes.

b. Jerome Bruner's Three-Tiered Model of Learning

Jerome Bruner posited that children acquire information and derive meaning by actively engaging with their environment. He highlighted the significance of culture and language in the process of cognitive growth, which unfolds in a spiral manner as children progressively revisit fundamental concepts at higher degrees of intricacy and abstraction (Mcleod, 2024).

According to Bruner, learning knowledge is represented by three layers or tiers of thinking based on environmental stimuli and experiences. These are (1) enactive, (2) iconic, and (3) symbolic.

1. Enactive Stage (from age 0 or 1 onward). Knowledge is predominantly stored as motor responses in the enactive phase. This phase is utilized throughout the initial year of life. Cognition entirely relies on physical activities, and newborns acquire knowledge via active engagement rather than internal mental processes. The process entails converting physical action-based data into a coded format and its subsequent retention in human memory.

This stage is also labeled "concrete" because children learn and understand concepts best through real experiences and tangible objects.

2. Iconic Stage (from ages 1 – 6 onward). Information is retained through sensory images or icons, typically visual ones, such as mental pictures. While some individuals are aware of this phenomenon, others do not perceive it. Having diagrams or pictures with spoken information might be beneficial while studying a new subject.

Cognitive processes also rely on various sensory representations, like auditory, olfactory, or tactile sensations, making this stage "logical."

3. Symbolic Stage (from age 7 onward). During the symbolic stage, knowledge is predominantly stored as linguistic expressions, mathematical notations, or other systems of symbols. Symbols possess a high degree of flexibility as they may be changed, organized, classed, etc. This allows the learner to avoid being limited by actions or visuals, which have a set and unchangeable relationship to the things they represent.

Implications of Dale's and Bruner's Theories to Educational Technology

The significance of active involvement and different degrees of abstraction in the learning process is underscored by both Dale's Cone of Experience and Bruner's Three-Tiered Model. It can be construed that these models associate and agree on how learning occurs according to the stimulus and environment utilized. Figure 1 on the next page depicts this association. When applied to technology in the context of education, these theories propose some implications for teaching and learning:

1. Multimodal Learning Resources. Technology provides diverse educational materials like movies, interactive simulations, virtual reality encounters, and multimedia presentations. This reinforces the concept of varied educational experiences that accommodate different sensory modes and degrees of abstraction.

2. Interactive and Experiential Learning. Technology facilitates experiential learning through simulations, virtual laboratories, and instructional games. This is consistent with the focus on the efficacy of first-hand experiences in acquiring knowledge. Students can actively interact with the topic, which helps to strengthen their learning and ability to remember the information.

3. Personalized Learning Paths. Technology supports using adaptive learning systems that customize training based on each learner's requirements and preferences. These platforms facilitate the scaffolding learning process by offering information suitable for different degrees of abstraction, aligning with the idea of gradually transitioning from tangible to abstract notions.

4. Collaborative Learning Environments. Online collaboration tools and social learning platforms enhance peer interaction and group projects, fostering active learning and knowledge creation. Collaborative work focuses on the role of social contact and reinforces learning via shared experiences.

5. Accessible and Inclusive Learning. Technology may improve accessibility by offering alternate forms, such as text-to-speech or closed captioning, and configurable interfaces to accommodate a wide range of learners. In this way, there is fair access to learning opportunities, consistent with promoting diversity in education.

In summary, incorporating technology into education may successfully utilize the ideas described in Dale's Cone of Experience and Bruner's Three-Tiered Model, promoting compelling, interactive, customized student learning experiences.

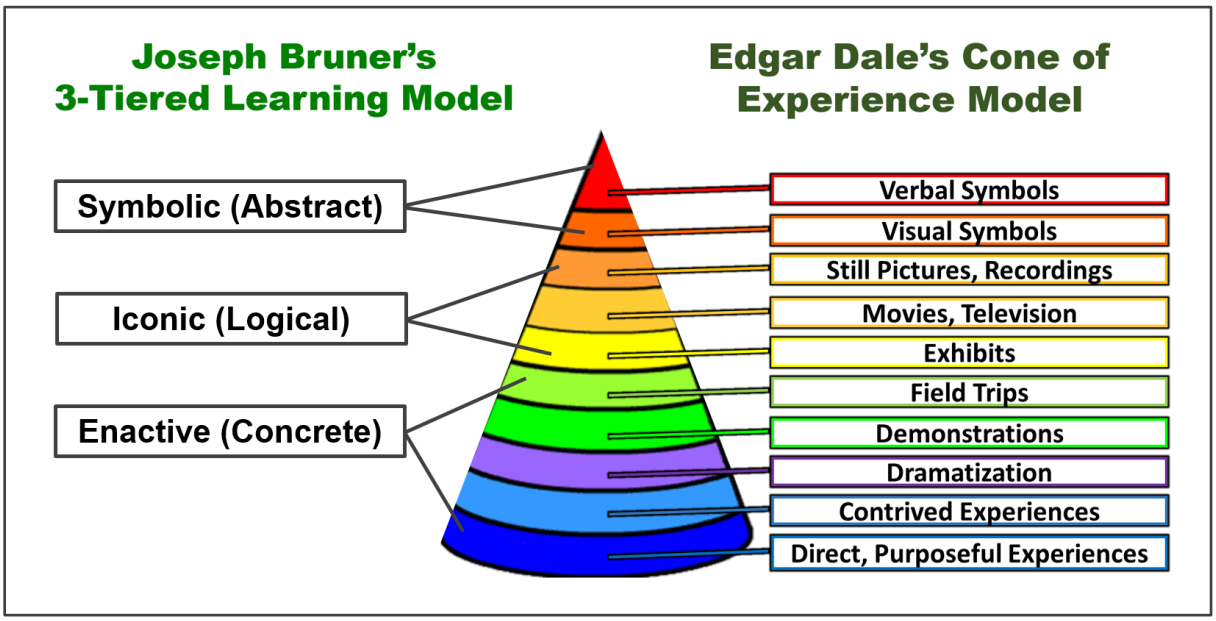

Figure 1: **Associative Model of Bruner's and Dale's Learning Theories**

2. A Model of Planning Technology for Teaching and Learning

Integrating technology into the curriculum is now essential in today's fast-changing educational environment to promote practical learning that equips students with the necessary skills to navigate the complexity of the contemporary world. Technologizing the curriculum is utilizing digital tools, resources, and platforms to improve teaching and learning experiences in many courses and disciplines.

By integrating technology, educators may provide dynamic and engaging learning settings that accommodate various learning styles and promote critical thinking, problem-solving, and digital literacy abilities. Functional learning, which prioritizes the practical use of information and skills in real-life situations, can be accomplished by carefully incorporating technology that facilitates genuine learning experiences. This method entails creating curricular frameworks that smoothly include technology-enhanced activities, projects, and evaluations, allowing students to interact with knowledge in meaningful ways actively.

Furthermore, incorporating technology into the curriculum allows for the creation of customized learning paths specifically designed to meet each student's

unique needs, interests, and talents. This, in turn, fosters self-directed learning and independence. In light of the ongoing impact of technology on education, educators need to adopt creative methods for designing and delivering curriculum, utilizing technology as a potent instrument to empower students and foster the abilities necessary for success in the 21st century.

In this part of the lecture, we will focus on the power of the TPACK (Technology, Pedagogy, and Content Knowledge) framework by Mishra and Kohler in 2006.

TPACK as a Principle for Technology-Driven Teaching and Learning

To help teachers overcome the obstacles they face while implementing educational technology, Punya Mishra and Matthew J. Koehler created the TPACK framework in 2006. All three types of expertise—technological, pedagogical, and content—are highlighted in this model.

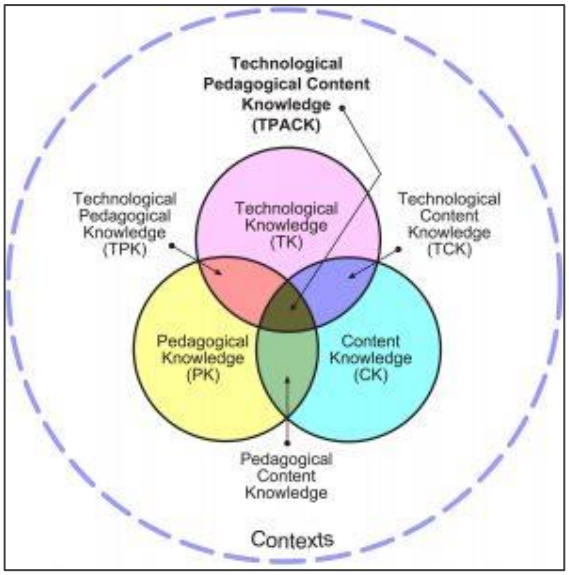

Image 2: **TPACK Framework by tpack.org (Source: Koehler, 2012: Online)**

According to Koehler at http://tpack.org/ (2012), the TPACK framework suggests that utilizing specific technological and digital tools may enhance instruction and facilitate students' more profound understanding of the subject matter. The TPACK framework, as shown in *Image 2*, incorporates and integrates the three forms of knowledge - Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK)—in different combinations and permutations.

Understanding the interconnectedness between knowledge components in specific contexts is crucial for successfully incorporating technology into subject-specific instruction. The absence of a universally applicable combination of content, technology, and pedagogy arises from the unique nature of each case, influenced by elements such as individual teachers, grade level, school-specific features, demographics, culture, and several other variables. The following components of the TPACK framework are, therefore, essentially presented to wit:

Domains of Teaching:

Content Knowledge (CK) refers to the teacher's own understanding and expertise in the specific field of study. It is "what to teach".

Pedagogical Knowledge (PK) pertains to instructors' understanding of the procedures, processes, and strategies involved in teaching and learning. It is "how to teach".

Technological Knowledge (TK) is the teacher's proficiency in utilizing different technologies, technical tools, and related resources. It is the "means to teach more proficiently."

Intersecting Components:

Technological Pedagogical Knowledge (TPK) refers to comprehending how different technology resources may be efficiently incorporated into teaching approaches.

Pedagogical Content Knowledge (PCK) explains how different educational strategies are related to particular learning objectives.

Technological Content Knowledge (TCK) conveys comprehending the interplay between different technologies and their Alignment with academic goals.

The foundational areas of content, pedagogy, and technology—TPACK—are the product of numerous combinations and interests. It lays the groundwork for quality education that makes use of technological tools. Teachers are expected to be receptive and open to certain TPACK concepts to use the framework effectively, such as:

a. Integrating technology, pedagogy, and content knowledge ensures that technology is used purposefully to support effective teaching and meaningful learning experiences.

b. Contextualizing instruction encourages educators to adapt their technological, pedagogical, and content knowledge to meet their students' unique needs, interests, and abilities.

c. Promoting collaboration among educators, instructional designers, and technology specialists can co-create technology-enhanced learning experiences that leverage the strengths of each domain of knowledge.

d. Alignment with 21st-century skills makes TPACK an essential tool to prepare students for success in the digital age.

e. TPACK empowers educators to make informed decisions about selecting, integrating, and implementing technology tools and resources.

f. Fostering a culture of continuous improvement and professional growth among educators makes TPACK a robust framework to enhance the quality of education.

D. Conclusions

The use of relevant tools enhances experiential learning by diversifying experiences and scaffolding knowledge acquisition across levels of abstraction. Integrating technology, pedagogy, and content knowledge adds meaning to the teaching and learning experiences.

E. References

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