Principles Needed in Establishing the Use of Instructional Technologies in Educational Institutions

By

FABUNMI, Kazeem Olaiya

Department of Educational Technology, University of Ilorin, Nigeria.

olaolaoluwa21@gmail.com

https://orcid.org/0009-0009-8911-5763

Introduction

Instructional technologies refer to the broad range of technological tools, resources, and methodologies employed to enhance and facilitate teaching and learning. These include not only digital devices and software but also encompasses a variety of media and instructional methods that leverage technology to improve educational outcomes (Sundeen & Sundeen, 2013). The core purpose of these technologies is to make learning more efficient, effective, engaging, and accessible.

In this 21st century, the classroom walls have expanded, blurring the lines between conventional learning spaces and the boundless potential of the digital world. Instructional technologies, offer a vast array of tools to enhance education. Yet, with this digital varieties, comes the crucial question: how do we integrate these technologies effectively and responsibly within educational institutions? This discussion focuses on the essential principles that should guide the establishment of instructional technologies, ensuring they become not mere distractions, but powerful catalysts for learning.

There is no doubt that integration of instructional technologies holds immense promise for the future of education in our educational institutions (Usman, 2016). But some guiding principle must be adhered to for us to ensure that technology becomes not just a tool, but a transformative force in educational institutions.

Scope of Instructional Technologies

1. **Digital Devices**: Includes computers, tablets, smartphones, interactive whiteboards, and other electronic devices that are used in educational settings.
2. **Software and Applications**: This encompasses a wide array of educational software, ranging from learning management systems (LMS), student information systems (SIS), assessment tools, to subject-specific applications.
3. **Online Learning Platforms**: E-learning platforms, MOOCs (Massive Open Online Courses), virtual classrooms, and other web-based educational environments.
4. **Multimedia Resources**: Audio, video, animations, and interactive simulations that can be used to enrich the learning experience.
5. **Communication and Collaboration Tools**: Tools such as email, forums, chat, video conferencing, and social media platforms that facilitate interaction and collaboration among students and educators.
6. **Adaptive Learning Technologies**: Software and platforms that adapt to the individual learner's pace, style, and level of understanding.
7. **Assistive Technologies**: Technologies designed to support learners with special needs, such as screen readers, speech-to-text tools, and customized keyboards.
8. **Learning Analytics**: The use of data analysis tools to monitor student progress, predict performance, and personalize learning experiences.
9. **Augmented Reality (AR) and Virtual Reality (VR)**: Technologies that create immersive learning experiences, allowing students to explore virtual environments or overlay digital information onto the physical world.
10. **Gamification**: The incorporation of game design elements in educational contexts to motivate and engage learners.
11. **Cloud Computing**: The use of cloud services for storage, collaboration, and accessing educational resources from any location.
12. **Internet of Things (IoT)**: The use of interconnected devices and sensors in an educational context, such as smart classrooms that adjust automatically to optimize learning conditions.

13. **Artificial Intelligence (AI) and Machine Learning**: The application of AI in personalizing learning, automating administrative tasks, and providing intelligent tutoring systems.
14. **Educational Robotics**: The use of robotics as a tool for learning, particularly in STEM (Science, Technology, Engineering, and Mathematics) education.

Principles Needed in Establishing the Use of Instructional Technologies in Educational Institutions

The following are some key principles needed in establishing the use of instructional technologies in educational institutions:

1. Alignment with Educational Goals and Standards

First and foremost is the principle of alignment with educational goals of the institution. Technology in education should not be an end in itself but a means to achieve broader educational objectives (Davies & West, 2014). This requires a clear understanding of how various technologies can support curricular aims and learning outcomes.

Technology should be used to enhance and support the educational objectives of the institution. It's essential to align the use of technology with curriculum standards and learning outcomes. Technology complements, not replaces, good pedagogy. Designers must focus on the established principles like active engagement, differentiated instruction, and formative assessment. Technology for instruction must be chosen based on learning goals, not novelty, and tools should be aligned with specific curriculum objectives to enhance or personalize the learning experience.

2. Accessibility and Inclusivity

Furthermore, the principles of universal design for learning (UDL) need to be incorporated to ensure that instructional technologies cater to diverse learning needs and styles of the learners (Kelly, Buckley, & Lieberman, 2022). UDL principles advocate for multiple means of representation, expression, and engagement, thereby promoting inclusive education. This inclusivity is crucial in a global educational landscape characterized by diverse student populations with varying abilities and learning preferences.

To optimally establish the use of instructional technologies in educational institution, one must ensure equitable access to devices, internet, and training. Bridging the digital divide to prevent technology from exacerbating existing inequalities. Design tools and practices must be inclusive for all learners by considering diverse needs and abilities to create a learning environment where

everyone can thrive. Also, there is a need to ensure that technology is accessible to all students, regardless of their socio-economic background, abilities, or learning styles. This includes necessary provision and support for students with disabilities.

Moreover, instructors need to be aware of the multitude of educational delivery systems for distributed learning, such as audioconferencing, videoconferencing, web conferencing, TV, radio, web-based learning environments, social media and DVDs. However, the appropriateness of these media is a function of the learning goals, as well as the preferences and circumstances of the learner.

3. **Pedagogical Focus**

It is crucial to acknowledge that the role of technology in education should be pedagogically driven rather than technology-driven as understood from TPACK Model. The Technological Pedagogical Content Knowledge (TPACK) framework suggests that effective technology integration requires an understanding of the interplay between technology, pedagogy, and content knowledge (Koehler & Mishra, 2009). This pedagogical focus ensures that technology serves as a tool to enhance learning outcomes rather than as an end in itself.

The choices of educational technologies must be based on sound principles of learning. There can be a synergy between the tools used and the cognitive processes engaged in learning. Databases, for example, can be used to prompt learners to examine the interrelationships, the organizational patterns, and the codification systems of data itself. Hyperlinking technology and adaptive systems can generate new forms of interactivity between the student and the content displayed. Educators must be extensively consulted when educational hardware, software, or networks are being designed and selected.

4. Scalability

Scalability must be considered in the technological architecture of all systems, including educational system. Kasch, Van Rosmalen, and Kalz (2017) explained that scalability simply refers to networks that can be connected to other networks and thus expanded; software that is compatible with relevant other software; educational content, programs and courses that can be shared or transferred across departments, programs, or education and training providers; educational resources that can be used for multiple applications; and learning management systems that can expand as student numbers and courses grow.

Scalability is also a means by which innovation can be encouraged and enabled in establishing the use of instructional technologies in educational institutions. For example, instructional teams can add a software component to a learning management system using the

capacities embedded in such systems. The interoperability benefits can reduce costs, prolong and extend usability, and also facilitate cooperation.

5. Principle of Sustainability/Continuous Development

Moreover, the principle of sustainability is crucial. Educational institutions need to consider not only the immediate impact of technology implementation but also its long-term viability and adaptability to future educational needs and technological advancements. The sustainability of technology integration are key factors for long-term success (Lawson, & Van Veen, 2016).). This involves not only the initial adoption of technology but also its ongoing evaluation, support, and adaptation in response to the evolving educational needs and technological advancements

Establishment of usage of instructional technologies requires educational institutions provide continuous professional development for educators. Equip them with the skills and knowledge to effectively integrate and utilize technology in their teaching. Alsaad and Abdul-Fariji, (2021) suggested that regular evaluation and assessment of the impact of technology in education, identify successes and address challenges, would optimize learning outcomes.

In addition to this, policies can be established to support the principle of sustainability and the context in which it applies. There is a need for longer-term revenue streams and multiple funding sources to offset cycles in the economy. Multi-purpose products and services can be created to encourage departments and training providers to share costs. Shared services, open educational resources (OERs), collaborative program and course development are all examples of this.

6. Collaborative Community

Building a supportive network is one of the key principles for establishing the use of instructional technologies in educational institutions. Education and training providers that learn to share and cooperate can reduce costs and improve quality in a number of technological areas. Online courses are expensive to create, increasing learner enrolments through partnerships between departments or institutions and training providers can reduce costs, increase viability, and permit low demand courses to be offered more frequently (DePetris, & Eames, 2017).

Community building and cooperation are essential features of the knowledge economy. So, educational institutions need to connect students with global communities and diverse perspectives, expand the learning environment beyond physical classrooms through technologies.

7. **Customization**

One of the advantages technologies bring to learning is the ease with which we can customize programs, courses and services to individual learners. Now, with the advent of artificial intelligence and machine learning, we can adapt instructional design to be responsive to both the needs of learners and their performance. According to Banerjee and Murthy (2018), learners are diverse, with individual needs in terms of their goals, the pace at which they learn, the modes of communication they prefer, their motivations for learning, the stimulations they respond to, the prior learning aptitudes they bring, physical and sensory differences (e.g., sight, hearing) and the manner in which they can demonstrate what they know and can do.

The Institutions learning delivery technologies and course designs can be customized to meet the needs of individual learners. This means, all the needs of individual learners, as well as the diverse needs of individual cultures and society at large, must be accommodated, as appropriate. Though, there are limits, in terms of economies, course requirements, time and access, but there is so much more that can be done with the aid of instructional technologies to improve the quality of education for each learner.

8. **Ethical Considerations**

Another vital consideration in establishing the use of instructional technologies in educational institutions is the ethical use of technology in education. This encompasses issues related to data privacy, digital citizenship, and the digital divide. Davies and West (2014). argues for a critical approach to technology adoption in education, where ethical considerations are paramount. Ensuring students' and educators' data privacy and fostering responsible digital behavior are essential aspects of this principle (Huda, 2019).

Privacy and data security of students and educators need to be prioritized. Institutions need to implement robust measures to protect sensitive information in the digital learning environment, promote responsible use of technology and critical thinking skills. The students must be guided to navigate the digital world ethically and to critically evaluate information they encounter.

Conclusion

These principles provide a framework for establishing and evaluating the use of instructional technologies in educational institutions. By focusing on purposeful integration, accessibility, continuous improvement, and ethical considerations, technology could be leveraged to create a more engaging, equitable, and effective learning environment for all.

There is a need to recognize that technology is not a silver bullet for education. Its true value lies in its ability to complement, not to replace the established pedagogical practices. The emphasis must remain on sound educational principles – active engagement, differentiated instruction, and formative assessment – with technology acting as a tool to amplify these practices. To establish the use of instructional technologies in educational institutions, educators need to carefully analyze their curriculum and learning goals, identifying specific areas where technology can enhance or personalize the learning experience.

It is worthy of note that these are just some key principles, and the specific needs and context of each institution will dictate how they are implemented and prioritized. The goal is to create a technology-infused learning experience that not only complements conventional education but also empowers educators and students to thrive in the ever-evolving digital world.

References

Alsaad, M. A., & Abdul-Fariji, J. (2021). The Impact of the University's Environmental Sustainability Strategy on the Continuous Improvement of the Overall University Performance: An Exploratory Study on a Sample of Basra University Teachers. *Journal of Social Science for Policy Implications, 9*(2), 7-20.

Banerjee, G., & Murthy, S. (2018). CuVIS: An interactive tool for instructors to create effective customized learning designs with visualizations. *Australasian Journal of educational technology, 34*(2). doi:https://doi.org/10.14742/ajet.3773

Brown, A. H., & Green, T. D. (2019). The essentials of instructional design: Connecting fundamental principles with process and practice. *Routledge*.

Davies, R. S., & West, R. E. (2014). Technology integration in schools. *Handbook of research on educational communications and technology*, 841-853. doi: https://doi.org/10.1007/978-1-4614-3185-5_68

Davies, R. S., & West, R. E. (2014). Technology integration in schools. *Handbook of research on educational communications and technology*, 841-853. doi:https://doi.org/10.1007/978-1-4614-3185-5_68

DePetris, T., & Eames, C. (2017). A collaborative community education model: Developing effective school-community partnerships. *Australian Journal of Environmental Education, 33*(3), 171-188. doi:https://doi.org/10.1017/aee.2017.26

Huda, M. (2019). Empowering application strategy in the technology adoption: insights from professional and ethical engagement. *Journal of Science and Technology Policy Management, 10*(1), 172-192. doi:https://doi.org/10.1108/JSTPM-09-2017-0044

Kasch, J., Van Rosmalen, P., & Kalz, M. (2017). A Framework towards Educational Scalability of Open Online Courses. *Journal of Universal Computer Science, 23*(9), 845-867. doi:https://doi.org/10.3217/JUCS-023-09-0845

Kelly, O., Buckley, & Lieberman, L. (2022). Universal Design for Learning - A framework for inclusion in Outdoor Learning. *Journal of Outdoor and Environmental Education, 25*, 75–89. doi:https://doi.org/10.1007/s42322-022-00096-z

Koehler, M., & Mishra, P. (2009). What is Technological Pedagogical Content Knowledge (TPACK)? Contemporary Issues in Technology and Teacher Education. *Society for Information Technology & Teacher Education, 9*(1), pp. 60-70. Retrieved January 6, 2024, from https://www.learntechlib.org/primary/p/29544/

Lawson, H. A., & Van Veen, D. (2016). Planning for Scale-Up, Scale-Out, Sustainability, Continuous Improvement, and Accountability. *Developing Community Schools, Community Learning Centers, Extended-service Schools and Multi-service Schools: International Exemplars for Practice, Policy and Research*, 363-405. doi:https://doi.org/10.1007/978-3-319-25664-1_14

Sundeen, T. H., & Sundeen, D. M. (2013). Instructional technology for rural schools: Access and acquisition. *Rural Special Education Quarterly, 32*(2), 8-14. doi:https://doi.org/10.1177/875687051303200203

Usman, Y. D. (2016). Educational Resources: An Integral Component for Effective School Administration in Nigeria. *Online Submission, 6*(13), 27-37.