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EDUCATION TRANSFORMATION THROUGH DIGITAL PEDAGOGY: A CASE OF TEACHING ENGLISH AS A SECOND/FOREIGN LANGUAGE

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Abstrak

Penelitian ini bertujuan untuk mengetahui: 1) konsep pedagogi digital, 2) tantangan utama dalam penerapannya, dan 3) cara efektif untuk mengintegrasikan teknologi ke dalam kurikulum. Ada beberapa konsep yang terkait dengan pedagogi digital, yaitu Integrasi teknologi dalam pembelajaran, pembelajaran kolaboratif, personalisasi pembelajaran, dan pembelajaran aktif dan interaktif. Lebih lanjut, beberapa konsep di balik pedagogi digital meliputi 1) inovasi pembelajaran, 2) penggunaan alat berbasis data, 3) aksesibilitas dan fleksibilitas, dan 4) keterampilan digital. Tantangan utama dalam penerapan pedagogi digital yaitu A) Akses dan infrastruktur, B) Pengembangan kurikulum dan materi pembelajaran yang sesuai, C) Pelatihan dan kesiapan guru, D) Privasi dan keamanan data, E) Evaluasi dan penilaian, F) Kesenjangan aksesibilitas , dan G) Pengelolaan waktu belajar daring. Berikut beberapa langkah yang dapat dilakukan untuk keberhasilan keberhasilan integrasi teknologi, yaitu, 1) Evaluasi kebutuhan dan tujuan pembelajaran, 2) pemilihan teknologi yang tepat, 3) pelatihan dan dukungan bagi guru, 4) perencanaan integrasi dalam kurikulum, 5) kolaborasi antara guru dan teknologi, 6) evaluasi dan umpan balik, 7) mengutamakan kreativitas dan inovasi, 8) keamanan dan etika digital. Berikut beberapa contoh nyata penerapan pedagogi digital dalam konteks pendidikan, antara lain: 1) Pembelajaran adaptif melalui aplikasi atau platform, 2) Simulasi dan laboratorium virtual, 3) Alat multimedia dan pembelajaran interaktif, 4) Pembelajaran kolaboratif dan berbasis proyek, 5) Evaluasi dengan alat digital, 6) Pengajaran jarak jauh dan kehadiran virtual, dan 7) Aplikasi kreatif untuk proyek siswa.

Kata Kunci: Pedagogi Digital, Tantangan, Cara Efektif

Abstract

This study aims to determine: 1) the concept of digital pedagogy, 2) the main challenges in implementing it, and 3) effective ways to integrate technology into the curriculum. There are several concepts related to digital pedagogy, i.e., Integration of technology in learning, collaborative learning, personalization of learning, and active and interactive learning. Furthermore, some concepts behind digital pedagogy include 1) learning innovation, 2) use of data-based tools, 3) accessibility and flexibility, and 4) digital skills. The main challenges in implementing digital pedagogy, i.e., A) Access and infrastructure, B) Appropriate curriculum and learning material development, C) Teacher training and readiness, D) Data privacy and security, E) Evaluation and assessment, F) Gaps in accessibility, and G) Management of online study time. Here are some steps you can take to carry out successful technology integration, i.e.,1) Evaluation of learning needs and goals, 2) selection of the right technology, 3) training and support for teachers, 4) integration planning in the curriculum, 5) collaboration between teachers and technology, 6) evaluation and feedback, 7) prioritizing creativity and innovation, 8) digital safety and ethics. Here are some concrete examples of digital pedagogy implementation in an educational context, including: 1) Adaptive learning through applications or platforms, 2) Simulation and virtual labs, 3) Multimedia tools and interactive learning, 4)

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Collaborative and project-based learning, 5) Evaluation with digital tools, 6) Remote teaching and virtual presence, and 7) Creative applications for student projects.

***Keywords**: Digital Pedagogy, Challenges, Effective Ways*

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1. Introduction

The developments of information technology have had a significant impact on the education world. The use of information technologies within the education sector enables educational institutions to promote more student engagement by creating digital artifacts about their learning (Jesson et al., 2018). Moreover, some studies have also shown the exploitation of features of the digital environment allows students to become producers as well as consumers of the knowledge (McLoughlin & Lee, 2008). As with the purpose of education for promoting student engagement, it should capitalize on features of the digital environment, including productive activities for students' knowledge creation (McLoughlin & Lee, 2008) and increased engagement (Bebell & O'Dwyer, 2010). The following discussion mainly focuses on the advancement of information technology and the impacts it may have.

Access to Information and Resources

In discussing digital pedagogy, the internet becomes the key to the argument. The development of information technology has enabled the Internet to be the source of education. Its roles in the classroom date back to the work of McDonald et al. (McDonald et al., 1996). They began by questioning of the use of the internet in education, either as it merely played as teaching media, or it might inspire a change in pedagogy itself. As time goes by and studies have been so advanced, the internet has allowed easy access to educational resources from around the world. Study materials, academic journals, learning videos, and educational content can be accessed instantly. One interesting discussion relates to the availability of the internet and whether it is provided as an open access or commercial entity, such as its accessibility as a learning media (such as, in Otero-González & Vázquez-Herrero, 2023).

The advancement of information technology has enabled many parties to take part in offering online educational materials. This development has opened up new businesses especially those of the providers of Online Learning Platform. Studies have investigated the roles of the platform in assisting students' learning. For instance, one study aims to identify whether this platform could significantly improve the proficiency of English as a foreign language (EFL) (Zhonggen et al., 2019). The existence of online learning platforms allows students to learn from anywhere and at any time. Distance teaching is becoming more possible and allows access to education for those who would find it difficult to access it traditionally.

Mobil learning enables more diverse and interactive learning. In this case, mobile devices such as smartphones or tablets enable flexible and portable learning. Educational applications provide various types of learning materials that can be accessed easily. The study of mobile learning relates to some studies that explore the application of mobile technology in the education field (such as, Sharples, 2000). The more current development in research of mobile learning recognizes three groups of people with different interests in the field: students and professors, system developers, and m-learning researchers and designers. This study recommends researchers and designers of mobile learning to understand "students' views and needs so that m-learning development can provide better opportunities to practice authentic learning" (Chiu et al., 2018).

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More Interactive and Engaging Material Delivery

Media plays a vital role in education. It enables the teaching and learning activities more meaningful for learners. The learning media has developed so advanced and even evolved into Multimedia. It is supported very much by the development of technology. Ubiquitous in social life, technology is both a social process and a social product (Canale, 2019). Technology allows the teaching and learning process to become more engaging by the use of multiple media. Videos, animations, images, and interactive presentations make the material more interesting and easier to understand. Moreover, in this digital era, learning media are available almost everywhere. Our task as educators is to select the appropriate media suitable for our education.

The development of information technology has even brought more engaging learning media. Learning media have developed so advanced that the traditional borders in learning media have faded away. Simulation and Virtual Reality (VR) technology allows students to learn in interactive and experimental ways, such as the exploration of virtual environments or the simulation of scientific experiments that are not possible in person. Further development in the area has been with the implementation of augmented reality (AR) in education. Research on AR in education has focused on the effective use of immersive worlds and environments for educational purposes. Innovative research that covers technologies and tools enables successful services and products of immersive environments to foster learning, training, and other activities in motivational and engaging ways (Beck, 2019). The development of VR and AR has been advancing education by providing made-up realities for learning.

Other impacts of information technology developments on education

The advancement of information technology has also impacted other areas of education. The main areas that become our special concerns include the change to personalization of learning, the way students engage and collaborate in their learning, and the preparation for facing the changing world of work.

Nowadays, the teaching and learning activities have changed. Learning has been personalized as the challenges and changes in the learners' physiological and psychological state. COVID-19 is considered the primary catalyst for the changes in learners' attitudes. There have been studies reporting multiple cases of learning loss because of this pandemic (as in Donnelly & Patrinos, 2022). Learning loss refers to the state of students who are described as experiencing declines in their knowledge and skills (Pier et al., 2021). Pier et al. further explain that learning loss happens when educational progress does not occur at the same rate as in previous years. In coping with this matter, adaptive learning has become one effective solution. Information technology has made it possible to develop adaptive learning systems that can adapt the curriculum and learning methods according to students' needs and level of understanding, such as in the case of differentiated learning.

A more engaging innovation impacted by the development of information technology includes collaborative learning platforms. Many learning platforms allow students to work together, share ideas, and learn collaboratively, both locally and internationally. Learning becomes even so challenging and moves away beyond the concept of a classroom. Collaborative text developments, interactive speaking activities, and other IT-supported learning collaborations become evidence. Moreover, by the utilization of educational social media, students become more than learning; but they learn enthusiastically. In this case, social media has also been utilized as a

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learning tool, allowing for greater interaction between students and teachers, as well as students and fellow students.

The last to consider about the impact of information technology advancement is to prepare learners for the changing workloads and their requirements. Physical work is decreasing and being replaced by robotic tools. Digitalization is massive and digital skills become vital skills to master. Technology-enabled education needs to teach digital skills that are essential for success in the modern world. This includes digital literacy, programming, and other information technology skills. Moreover, connecting learners to the Real World is also needed to prepare them for real-world challenges. Technology-enabled education tends to link learning concepts to real-world applications, helping students understand the relevance of the subject matter to their lives.

Technological developments have changed the way we learn and teach. Information technology even advances the revolutionary ways of teaching and learning activities performed. This not only provides greater access to educational resources, but also stimulates changes in teaching methods, increases student engagement, and helps prepare them for success in the digital age.

Formulation of the problem

1. What is digital pedagogy?
2. What are the main challenges in implementing digital pedagogy?
3. How to integrate technology into the curriculum effectively?

2. Discussion

Understanding Digital Pedagogy

a. Definition of digital pedagogy and the concepts behind it.

Digital pedagogy refers to a learning approach that uses digital technology as a tool to improve the learning and teaching process. It is concerned with new pedagogical approaches that utilize digital tools and resources to equip instructors with the necessary knowledge and competencies to teach (Bećirović, 2023). This not only includes the use of technological hardware and software but also includes the underlying teaching philosophy and strategies.

The following are the concepts that relate to the definition of Digital Pedagogy:

1) Integration of Technology in Learning: Digital pedagogy involves the integration of technology into the learning process (Wieser, 2019). How far education integrates technology has raised disputes, such disagreement relate to the term “disruptive” that refers not to a new process, but to a negative characterization of technological progress and change, making way for the new (Hiltz & Turoff, 2005). Among the differences of opinions in managing the integration, the bottom of it includes the utilization of technology in education, such as the use of computers, the internet, mobile devices, applications, and online platforms to facilitate teaching and learning.
2) Collaborative Learning: One of the characteristics of digital pedagogy refers to the process of moving … to … collaborative, student-centered pedagogy, offered by a few hundred “mega-universities” that operate on a global scale (Hiltz & Turoff, 2005). Encourages collaboration between teachers and students, as well as between students in an online environment. This could be through joint projects, online discussion forums, or group work using digital communication tools. In this case, the role of a “digitally-competent” teacher is to mentor students in their progressive and more autonomous learning endeavors, and must therefore be able to “design new ways, supported by digital technologies, to provide guidance and support to learners, individually and collectively and to initiate, support and monitor both self-

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regulated and collaborative learning activities" (Redecker & Punie, 2017).

3) Personalization of Learning: Digital pedagogy utilizes technology to present individual learning materials that suit learners' needs, abilities, knowledge, and learning styles (Sharples, 2000, p. 178). This can be done through adaptive learning platforms or content curation according to student interests. Personal learning begins with the learner's social, cultural, and technological environment. The process of learning requires the strategic use of the environment's tools and resources to solve problems and gain new knowledge (Sharples, 2000).
4) Active and Interactive Learning: Within the European Framework for the Digital Competence of Educators, actively engaging learners has become one characteristics for empowering learners (Redecker & Punie, 2017, p. 74). We need to encourage students to perform active and interactive learning experiences by using tools such as simulations, educational games, interactive videos, or collaborative platforms. Their cognitive engagement in online classes can be optimized by integrating active learning environments with authentic learning tasks, fostering personal connections between students and teachers as well as among students, and facilitating the learning process in an online environment.

Concept Behind Digital Pedagogy:

1) Learning Innovation: Digital pedagogy encourages innovation in learning approaches. This means looking for new ways to convey information, measure understanding, and engage students in more engaging and effective ways. traditional higher education-campus-based, lecture-bound and faculty-driven-will fail to benefit significantly from the explosion of opportunities borne of technological innovation and development unless it reduces its resistance to change as it pertains to operational models-both administrative and pedagogical-embraces publishers and software developers as partners, and fully funds the entire scope of services that comprise the engagement of information technology in academic environments necessary to fulfill a revised set of charters and missions that address current trends and future demands (Friedman & Deek, 2003, p. 403).
2) Use of Data-Based Tools: The digital transformation includes "a broad range of technologies such as cloud systems, big data, predictive analytics, and integrative platform technologies that have created both opportunities and challenges in today's organizations" (Jackson, 2019, p.2)(Jackson, 2019, p. 2). The digital pedagogy utilizes data to understand student learning progress. Through data analysis, learning approaches can be adjusted to improve learning outcomes. Each institution has to identify content it considers to be valuable, create modules out of that content, then ascribe a metadata tagging system that "allows for efficient storage and retrieval. For most organizations, the move to a learning object model could be labor-intensive and expensive" (Friedman & Deek, 2003).
3) Accessibility and Flexibility: In empowering learners, European Framework for the Digital Competence of Educators positions accessibility and inclusion as one important aspect. The aims is "to ensure accessibility to learning resources and activities, for all learners, including those with special needs" (Redecker & Punie, 2017, p. 22). Digital pedagogy can enable broader access to education by facilitating distance learning, considering the needs of different

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students, and providing time flexibility in learning.

4) Digital Skills: Apart from subject matter, digital pedagogy also emphasizes developing digital skills that are important for students to succeed in the digital era, such as digital literacy, the ability to search for information, and technological problem solving. Digital pedagogy implies the thoughtful use of modern digital technologies in the educational process to expose students to relevant educational experiences so as to achieve the expected teaching and learning outcomes, including acquiring the necessary skills and competencies required by the labor market in the digital age (Bećirović, 2023, p. 10).

Digital pedagogy is not only about the use of technology but also about changing the way education is presented and understood by students. This enables learning that is more adaptive, interactive, and relevant to current and future needs.

Key Differences between conventional and digital learning methods

1) Interaction: Conventional learning tends to focus more on direct interaction between teachers and students. The study is typically conducted in classroom and laboratories. Whilst, digital learning can provide more varied interactions and is not limited by physical boundaries. Upon reflection of the various approaches to online education, it is evident that technology's impact on higher education extends beyond student interaction with ICT (Wieser, 2019). It is crucial to consider various types of technology, particularly in regard to the future. Examples of digital technologies include cloud computing for the internet, crowdsourcing for social media, and flipped classrooms for education (Wieser, 2019).
2) Access and Flexibility: While conventional methods tend to have limitations in terms of this access and flexibility, digital learning provides wider access to resources and flexibility in time and place. Nowadays, new groups of learners have emerged, including adult learners, working students, and lifelong learners, all seeking improved and more diverse access to education. Consequently, the student profile has changed, and higher education institutions (HEIs) are once again being challenged to adapt their curricula, content, structure, and delivery methods to meet the needs and requirements of these diverse students
3) Student's Role in the Learning Process: Digital learning allows students to have a more active role in the learning process, while conventional methods often focus more on the teacher's role as the main source of knowledge. Digital pedagogy, also known as technology-enhanced learning, has introduced a new theory of learning that is innovative and changes the way students learn (Howell, 2012). Teachers, as digital pedagogues, are required to use digital technologies in a skillful and effective manner to support the learning of their students. Only by learning in this way can students acquire essential digital skills and competencies for the future and avoid digital illiteracy. Teachers should act as co-collaborators or e-moderators in the digital learning environment.

This difference shows that digital learning not only changes learning tools, but also changes the dynamics and approaches in conveying knowledge and the way students learn.

The main challenges in implementing digital pedagogy.

Implementing digital pedagogy brings several challenges that need to be overcome to achieve success in educational

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transformation. Some of the main challenges include:

a. Access and Infrastructure
- Technology Availability: There are still areas or communities that do not have access to adequate technology, such as stable internet access or the hardware needed for digital learning.
- Digital Divide: Differences in access to and expertise in using technology can create gaps between students, reinforcing educational disparities.

b. Appropriate Curriculum and Learning Material Development
- Proper Integration: Translating existing curriculum into an effective digital format requires significant time and resources.
- Development of Relevant Material: Requires the development of relevant and engaging content that fits the digital learning format.

c. Teacher Training and Readiness
- Lack of Training: Many teachers may not have sufficient technology skills to effectively integrate technology into learning. Adequate training is needed to prepare teachers to use digital tools and strategies.
- Adaptation to Change: Some teachers may feel reluctant or uncomfortable switching from conventional to digital teaching methods. The right support and incentives are needed to encourage adaptation.

d. Data Privacy and Security
- Security of Student Data: With the use of technology, security of students' personal data has become crucial. Maintaining data privacy and security is a major challenge that must be overcome in the digital environment.

e. Evaluation and Assessment
- Measurable Assessment: Determining how to accurately evaluate student progress in digital learning environments can be challenging. The use of appropriate evaluation tools to assess student understanding is crucial

f. Gaps in Accessibility
- Economic Disparities: Students from lower economic backgrounds may not have the same access to advanced technology as more financially advantaged students.

g. Management of Online Study Time
- Time Management and Distortion: Students may have difficulty managing their study time online. Distortion of attention or difficulty in establishing independent study discipline can be a problem.

Implementing digital pedagogy requires great efforts to overcome these challenges. Solutions include providing broader access to technology, proper training for teachers, development of appropriate curricula, and a focus on the safety and privacy of student data.

The effective integration of technology into the curriculum

Effectively integrating technology into the curriculum requires a planned and targeted approach. Here are some steps you can take to carry out successful technology integration:

a. Evaluation of Learning Needs and Goals
- Identify the learning objectives to be achieved through the use of technology.
- Recognize students' needs, their learning styles, and how technology can enrich the learning experience.

b. Selection of the Right Technology
- Select tools and platforms that suit learning objectives and student needs. For example, applications, online learning platforms, or hardware that supports learning objectives.
- Ensure the technology selected is accessible to all students, minimizing accessibility gaps.

c. Training and Support for Teachers
- Provide adequate training to teachers to understand and use the technology that will be integrated into the curriculum.

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- Support teachers with the resources and guidance necessary to develop technology skills and implement the technology in their teaching.

d. Plan Integration in the Curriculum
- Identify how technology can be integrated into each part of the curriculum, identifying materials that are suitable for the use of technology.
- Create a learning plan that includes the use of technology as a tool to achieve learning goals

e. Collaboration between Teachers and Technology
- Increase collaboration between teachers and technologists, ensuring that the use of technology in learning is aligned with effective pedagogy.
- Support collaboration between teachers to share successful teaching strategies using technology

f. Evaluation and Feedback
- Regularly evaluate the effectiveness of the use of technology in learning.
- Obtain feedback from students and teachers to assess the success of technology integration and make adjustments if necessary.

g. Prioritizing Creativity and Innovation
- Encourage the use of technology to stimulate creativity and innovation in learning. Use a variety of tools and platforms to make the learning experience more interesting and varied.

h. Digital Safety and Ethics
- Teach students about digital ethics, privacy rights, and online safety.
- Ensure that the use of technology in learning is always carried out with attention to student safety and security.

Integrating technology into the curriculum requires careful planning, collaboration between various related parties, and focus on approaches that suit learning needs. With the right approach, technology integration can significantly improve the quality of student learning.

Application of Digital Pedagogy in Education

The use of technology in the learning process has changed the way we learn and teach. Here are some ways in which technology is used in the learning process:

1. Access to Extensive Information:
- Digital Library: Students can access various information sources such as e-books, journals and online articles to get the necessary information.
- Search Engines and Databases: Search platforms and databases provide quick and easy access to information from a variety of sources, enabling in-depth searches on specific topics.

2. Interactive and Multimedia Learning:
- Learning Videos: Use of videos to explain difficult concepts, presenting information in a more visual and engaging way.
- Simulations and Interactive Applications: Simulations allow students to experience concepts in a virtual environment, while interactive applications can be used for practice or deeper learning experiences.

3. Online Learning Platforms:
- LMS (Learning Management System): An online platform such as Moodle, Canvas, or Google Classroom is used to organize materials, assignments, and interactions between students and teachers.
- Discussion and Collaboration Forums: These platforms facilitate discussions between students and teachers as well as collaboration on projects or assignments.

4. Adaptive Learning:
- Artificial Intelligence-Based Learning: Adaptive learning systems use artificial intelligence to adjust curriculum and difficulty levels based on student abilities and needs.

5. Technology Skills Development:
- Programming and Coding: Teaching technology such as programming prepares students to understand more

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deeply about technology and the logic behind it.
- Use of Creative Tools: A variety of applications that allow students to create creative projects such as videos, multimedia presentations, or graphic designs.

6. Assessment and Evaluation:
- Use of Digital Assessment Tools: Online quizzes, online assignments, or collaborative projects are assessed using digital tools that allow for more measurable and objective measurements.

7. Distance Learning and Flexibility:
- Virtual Classroom: Teachers and students can engage in teaching and learning online, allowing for distance learning and flexibility in study time.

The use of technology in education does not only focus on the tools, but also on how the technology can support and enrich the learning process. This enables a learning experience that is more interactive, adaptive, and relevant to students' needs in the digital era.

Case studies or concrete examples of digital pedagogy implementation

The following are some concrete examples of the implementation of digital pedagogy in an educational context:

1. Adaptive Learning with the Use of Applications or Platforms:
- Khan Academy: An online learning platform that adapts materials and difficulty levels based on student abilities. This helps students learn new concepts at a pace of their own choosing.
- Duolingo: A language learning app that uses adaptive learning to adjust the level of difficulty and type of exercises based on the student's ability to understand a foreign language.

2. Simulation and Virtual Labs:
- PhET Interactive Simulations: An online platform that provides interactive simulations on a variety of scientific topics, helping students understand physics, chemistry, mathematics and other concepts through virtual experiments.
- Virtual Labs in Biology or Chemistry: Replace or complement traditional laboratory experiences by allowing students to conduct virtual experiments, explore chemical reactions, or view organisms in a virtual environment.

3. Use of Multimedia Tools and Interactive Learning:
- KurzGEsagt – In a Nutshell: A YouTube channel that uses animation and visualization to explain complex scientific topics in a simple and engaging way for students.
- TED-Ed: A platform that provides short videos and interactive quizzes to deepen students' understanding of specific topics.

4. Collaborative and Project Learning:
- Google Docs or Google Slides: A collaborative platform that allows students to work together in real-time on documents or presentations.
- Collaborative Projects using Padlet: A platform that allows students and teachers to share ideas, post materials, or participate in discussions collaboratively.

5. Evaluation with Digital Tools:
- Quizizz or Kahoot: Online quiz platforms that allow teachers to create interactive quizzes to evaluate student understanding.
- Digital Rubrics for Grading: Use of digitally accessible rubrics to provide more detailed feedback on student assignments or projects.

6. Remote Teaching and Virtual Presence:
- Learning via Zoom or Google Meet: Use of video conferencing platforms for remote teaching, allowing direct interaction between teachers and students from different locations.
- Virtual Learning Environment (VLE) platforms: Such as Blackboard or Canvas, which provide a

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comprehensive online learning environment for hosting classes, assigning assignments, and managing materials.

7. Utilization of Creative Applications for Student Projects:
- Adobe Spark: Enables students to create presentations, videos, or web pages creatively and interactively.
- Canva: A design app that allows students to create infographics, posters, or other visual materials for their projects.

The implementation of digital pedagogy through various tools and platforms combines technology with an effective learning approach, providing a more interactive, adaptive and interesting learning experience for students.

Challenges and Solutions

• Obstacles faced in implementing digital pedagogy.

Implementing digital pedagogy brings a number of obstacles that need to be overcome for its implementation to be successful. Here are some obstacles that are often faced:

1. Availability of Infrastructure and Access to Technology:
- Unstable Internet Connection: In certain areas, inconsistent or weak internet access can be a serious obstacle to the accessibility of online learning.
- Hardware Availability: Not all students have access to the computer or mobile devices required for online learning.
2. Teacher Readiness and Training:
- Limited Technology Skills: Many teachers may not have enough technology skills to integrate technology into their teaching.
- Lack of Training: Inadequate training in the use of digital tools and platforms can also be an obstacle.
3. Gaps in Accessibility:
- Economic Disparities: Students from lower economic backgrounds may not have the same access to advanced technology as more financially advantaged students.
- Digital Skills Gap: Differences in technology usage skills between students can also be a significant barrier.
4. Privacy and Data Security Concerns:
- Personal Data Protection: Using technology in online learning raises concerns about the security and privacy of student data.
- Cybersecurity Threats: The possibility of cyberattacks and security breaches is also a concern in the digital environment.
5. Online Study Time Management:
- Distortion of Attention and Time Management: Students may have difficulty dividing study time efficiently and getting the most out of online learning.
- Possible Distortion of Information: The abundance of online resources can cause difficulty in sorting out relevant information.
6. Proper Evaluation and Assessment:
- Unmeasurable Learning: Properly assessing student progress in digital environments can be challenging, especially in determining how effective learning is.
7. Dependency Factor on Technology:
- Over-Dependence: Being completely dependent on technology can make students lose interpersonal skills or traditional problem-solving abilities.

Resolving these obstacles requires collaborative efforts from various parties, including the government, educational institutions, and society at large to ensure that the transformation towards digital pedagogy can be carried out comprehensively and evenly.

Solutions or strategies to overcome these obstacles

To overcome obstacles in implementing digital pedagogy, there are a

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number of strategies and solutions that can be considered:

1. Infrastructure and Technology Access:
   - Wide Internet Access: Efforts to provide wider internet access, especially in remote or rural areas.
   - Device Subsidy Program: Provides subsidies or low-cost access to hardware such as laptops or tablets to students who need it.
2. Teacher Training and Readiness:
   - Intensive Training: Ongoing training programs to improve teachers' technology skills in using digital tools and platforms.
   - Support and Guidance: Provide guidance or mentoring for teachers who need further assistance in integrating technology into their teaching.
3. Spreading Equality in Accessibility:
   - Technology Access Equity Program: Efforts to ensure that all students have equal access to hardware and adequate internet connections.
   - Partnerships with the Private Sector: Collaboration with technology companies to provide devices or internet access at affordable prices.
4. Data Security and Privacy:
   - Security Standards Compliance: Implement strict data security policies and standards to protect students' personal information.
   - Digital Ethics Education: Strengthen understanding of online privacy and digital ethics among students, teachers and parents.
5. Proper Management of Study Time and Evaluation:
   - Scalable Approach: Train students to manage study time effectively in a digital environment.
   - Development of Appropriate Evaluation Tools: Create appropriate evaluation tools to accurately measure student progress and understanding.
6. Parental and Community Involvement:
   - Education and Information for Parents: Engaging parents in understanding the importance of digital pedagogy and how they can support their children's learning.
   - Partnerships with Local Communities: Collaboration with institutions or organizations in local communities to support broader access to technology and learning.
7. Integration of Digital Pedagogy in the Curriculum:
   - Integrated Learning Plan: Incorporate lessons on digital ethics, technology problem solving, and relevant skills in the curriculum.
   - Use of Interactive Learning Platforms: Utilize online platforms that enable interaction, collaboration, and curriculum customization.

Implementing these solutions requires collaboration between government, educational institutions, the private sector, and society to create a supportive environment for effective digital pedagogy.

Solution and hope: Benefits of Transforming Education with Digital Pedagogy

Benefits obtained from the use of technology in the teaching and learning process.

The use of technology in the teaching and learning process provides a number of significant benefits for students, teachers and educational institutions as a whole. Here are some of them:

1. Access to Extensive Resources:
   - Access to Global Information: Students can access information from various sources around the world, expanding their horizons and knowledge.
   - Availability of Learning Materials: Through the internet, resources such as e-books, videos, articles and interactive materials are easily available, enriching the learning process.
2. Interactive and Interesting Learning:
   - Using Multimedia: Videos, images, animations and interactive presentations make learning material

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more interesting and easier to understand.
- Simulation and Virtual Reality: Allows students to learn through direct experience or simulations that are difficult to do in real life.

3. Adaptive Learning:
- Curriculum Customization: Adaptive learning systems adjust difficulty levels and learning styles to meet individual student needs.
- Personally Measured Progress: The use of analytical tools allows teachers to track individual student progress and provide more targeted feedback.

4. More Active Student Involvement:
- Interactive Learning: Students are more engaged in the learning process, whether through online quizzes, forum discussions, or collaboration on online projects.
- Wide Participation Opportunities: Using online platforms, every student has the opportunity to participate and contribute to learning.

5. Technology Skills Development:
- Preparation for the World of Work: Students gain essential technology skills to face the challenges of an increasingly digitally connected world of work.
- Creativity and Innovation: The use of creative tools allows students to express their ideas in new and innovative ways.

6. Flexibility in Learning:
- Distance Learning: Enables access to education remotely, opening doors for those who find it difficult to access conventional education.
- Flexible Time and Place: Students can study according to the time and place that is most convenient for them.

7. More Efficient and Effective Teaching for Teachers:
- Easier Presentation of Material: Teachers can present material more efficiently through multimedia and interactive tools.
- Measurable Assessment: Implementing digital assessment tools makes it easier to objectively measure and evaluate student progress.

The use of technology in education provides an opportunity to change the way we learn and teach by providing more engaging, adaptive and relevant learning experiences for students in the digital era.

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