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Leveraging Technology for Seamless Learning Transfer: A Position for Enhanced Educational Outcomes

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Abstract. *The effective transfer of learning whereby acquired knowledge, skills and competencies are applied in real-world situations remains a crucial goal for teachers and instructors. With the fast advancement of digital technologies, new opportunities have emerged to improve and support this process. This paper examines the role of technology in providing seamless learning transfer across educational settings. It explores how tools like learning management system (LMS), mobile learning applications, and data analytics create adaptive, engaging, and relevant learning experiences. These technologies not only improve knowledge retention and engagement but also enables just-in-time learning and performance support in real-world environment. The paper further considers the pedagogical and theoretical frameworks underpinning technology-enhanced learning transfer. Challenges such as digital fatigue, resistance to new digital tools and over reliance on technology were also discussed. It recommended among others that Institutions should ensure that learners are trained in digital skills that will enable them leverage the use of digital tools for learning transfer.*

Key words: *Learning Transfer, Leveraging Technology, Mobile Learning, Simulation-based Learning, Personalized Learning.*

Introduction

In today's rapidly evolving educational landscape, the effective transfer of learning from context to another remains a challenge. As learners navigate diverse learning environments, leveraging technology can play a pivotal role in facilitating seamless knowledge transfer. Traditional classroom instructions fall short of providing an immediate learning environment, faster evaluations, and more engagement. Haleem, (2022), said, in contrast, digital learning tools and technology fill this void. Some of the efficiencies such technologies provide are simply unrivalled by traditional learning methodologies. As Smartphones, Andriod phones and other wireless technology devices have become popular among the general public, it only makes sense that schools and educational institutions make efficient use of them by putting technology in the classroom. The technology adaptability of today and their non-intrusive character make learning more appealing to the present-day generation. The acquisition of a new knowledge or skill is aimed for one to be able to use the knowledge and skills in the real world. Thus, a successful learning process is measured by applying

the knowledge gained from previous learning in one's daily tasks**.** This is what is called Transfer of Learning.

Edward Thorndike and Robert S. Woodworth in (1901) postulated that the transfer of learning was aided or assisted by the elements in common between the original context and the next context. The notion was originally introduced as Transfer of Practice. Thorndike, and Woodworth, (1901) examined how individuals would transfer learning in one context to a similar situation and how "improvement in one mental function" could influence a similar and related mental function. Their theory implied that the transfer of learning depends on how similar and related the learning task is to the transfer tasks, this they called the Identical Element Theory. Thorndike urged schools and governments to design curricula that will contain tasks that are similar to those learners would encounter outside of school to aid the transfer of learning.

In B. F. Skinner's (1922), concept of a response to a stimulus occurring to other stimuli, he affirmed that Transfer may also be referred to as Generalization. Thus, he explained that, people store propositions, or basic units of knowledge, in long-term memory and when new information enters the working memory, in the long-term memory there will be a search for associations which combine with the new information in working memory. These associations when found reinforces the new information and helps the person give meaning to information. Learning that takes place in varying contexts can create more links and encourage generalization of the skill or knowledge. Links between previous learning and new learning can provide a context or framework for the new information, helping learners to make sense and meaning to information they receive, this encourages retention of the new information. These connections can build up a framework of associative networks that learners can call upon for future problem-solving.

Concept of Transfer of Learning

Transfer of learning refers to the application of knowledge, skills, and information acquired in one context to a new or different context. Okunlola (2023), posit that it is essentially the ability to use what you have learned in one situation to perform better or more effectively in another, related situation. Learning transfer is the process of moving from theoretical concepts to actual applications to assess the efficacy of learning. It is a practice of recalling or accessing past information or knowledge from memory that enables one to utilize past learning experiences in new situations or learning opportunities. It is a core goal at ensuring that learning or training leads to improved performance or better skills application (Ellis, 2021). Transfer occurs when knowledge is used in a practical context, highlighting knowledge retention and information processing. That is, when people apply information, strategies, and skills they have learned to a new situation or context.

Key aspects of transfer of learning according to Mdhlalose and Mlambo, (2023):

1) **Application of acquired knowledge:** It involves using previously learned concepts, skills, and information to solve new problems or perform new tasks.
2) **Integration of learning**: Transfer is not a separate event, but rather an integral part of the overall learning process.
3) **Successful transfer of performance**: can lead to improved performance in a new context, as learners leverage their existing knowledge and skills.
4) **Positive and negative transfer:** Transfer can be positive (facilitating learning in a new context) or negative (hindering learning in a new context).
5) **Near vs. far transfer:** Near transfer involves applying knowledge to closely related situations, while far transfer involves applying it to more distant or different situations.

Examples of Transfer of Learning:

I. Learning to ride a bicycle and then learning to riding a motorcycle: The skills and balance learned on a bicycle can help you learn to ride a motorcycle more easily.

II. Studying grammar in English class and applying it to writing assignments in other subjects: The knowledge of grammar can help you improve your writing skills across different disciplines.

III. Using a spreadsheet program for one task and then applying your knowledge to a different, but similar, task: Your understanding of spreadsheets will help you learn the new program more easily. (Jajian, 2019).

How Can Technology Enhance the Application of Learning in Real – World Context

Al-Labadi, & Sant, (2021), noted that, majority of the students in secondary and higher education levels now have access to portable devices that can provide countless information at their fingertips through various resources such as learning games and interactive applications., and that these resources allow them gain immediate communication and interaction between them and their teachers or instructors. Mobile learning (M-learning) or use of technology in class refers to using educational applications on laptops, phones, personal computers and tablets (Traxler, 2005). These technological applications facilitate the interaction between teachers and students in real time, as students can instantly answer and ask questions while using them. Moreover, teachers and instructors can clear students' misconceptions before moving onto the next topic or can focus on topics students find difficult to understand. They can also create short quizzes or learning games to test for students' understanding of a topic. Thus, by including technological applications into classroom instructions and live teachings, teachers can have the opportunity to optimize students' learning experiences. Some notable educational applications include the use of Piazza and Kahoot (Wang & Tahir, 2020). The advantages of the use of digital devices for learning is that it provides teachers with immediate feedback from students, creates incentives for students to learn by scoring points, and it motivates them collaborating with peers. Technology can enhance the application or transfer of learning in real-world context in several ways:

- **Use of Technology and Reinforcement:** Use of technology in instruction enables learners to revisit and practice learned materials to reinforce their learning. This helps them to embed the lesson or their learning in their long-term memory. E.g. the use of spaced repetition tools like Quilet helps them review key concepts. Learning Management Systems (LMS) is used to schedule quizzes, push reminders or nudges that will encourage learners to revise their lessons. Thus, reinforcement helps strengthen recall of learned materials, this is important when learners need to apply their knowledge in real – world situations. (Bottino at ell 2002).
- **Personalized Learning:** The use of technology for instruction helps teacher to tailor learning to suit individual students' performance, preferences and goals. For instance, AI-based platforms (knewton or Smart Sparrow) help adjust learning content difficulties or pacing in real time. This is important for learning transfer because, when learners get the learning content adjusted to suit their needs, they tend to engage more deeply and are better prepared to apply their learning later. (Steenhuis and De Bruijn 2012)
- **Simulation - Based Learning:** Virtual simulation and virtual games mimic real – world scenarios making it real for learners and allowing them practice and apply the skills they have acquired. Simulated environment provides safe, hands-on practice that bridges the gap between theory and application; thus, learners can apply their learned skills in a safe and controlled environment.
- **Collaboration and Social Learning:** This involves students learning from their peers, mentors and by social interactions in class and after class. This could be through peer-review platforms or group chats. It helps to promote reflections on their learning, application of their learning, and also sustain their learning through shared experiences.
- **Just-in-Time Learning and Performance:** it means providing the students with the right information, the right tools and guidance at the right and especially at the moment they need to apply their knowledge. Mobile devices and apps come in handy here voice and video tutorials can be used to help them solve problems in real time. Mobile apps also provide access to online resources, tutorials, and interactive learning experiences.

By leveraging these technologies, learners can develop practical skills, they can apply their theoretical knowledge in real-world experiences and context and also enhance their ability to solve problems and make good and informed decisions.

Benefits of Leveraging Technology in Instruction

I. **Increased Engagement**: technology captures learners' attention and keeps them interested in their learning as it makes learning interactive and engaging, leading to active participation of learners in their learning.

II. **Improved Retention**: constant practice reinforces learning which leads to the retention and recall of learned contents.

III. **Enhanced Relevance**: technology helps learners to see the relevance of theoretical knowledge to real-world context.

IV. **Faster time to skill mastery**:

V. **On**-demand support enhances real-time application

VI. **Data**-driven insights into learner behavior and gap

Importance of Transfer of Learning:

- **Enhances learning outcomes:** When learners can effectively transfer their knowledge and skills, they are more likely to achieve successful learning outcomes.
- **Improves practical application**: Transfer of learning ensures that learning is not just **memorization**, but also the ability to apply knowledge to real-world situations.
- **Facilitates continuous learning**: By leveraging past experiences and knowledge, learners can more easily adapt to new situations and continue learning throughout their lives.

Three Common Types of Transfer of Learning

There are three common types of transfer of learning as mentioned by Schunk, (2010,). namely:

Positive Transfer – Positive transfer occurs when one learning situation facilitates another, often due to identical elements. For instance, skills in playing the piano can facilitate learning skills in other instruments as the learner already possesses knowledge of music theory, note reading, and more.

Negative Transfer – Negative transfer occurs when knowledge of one skill can hinder another. This happens when elements or information within two learning contexts conflict with each other, such as expertise in operating automatic transmission vehicles obstructs driving manual or stick shift vehicles.

Neutral Transfer – Neutral transfer, or Zero Transfer, occurs when one learning context does not affect another. For example, knowing how to cook does not facilitate or impede learning how to swim.

In addition to the three types of learning transfer, two categories define the ease of transferring tasks and skills based on the specific learning context which are: near transfer and far transfer.

Classroom Implications of Transfer of Learning

Olson, (2015), outlined the following as some of implications learning transfer as can be done in the classroom:

1) The teacher should know that transfer of learning will not take place when both the old and new are unrelated. Hence, the teacher should endeavor to teach his/her subject-matter in a more meaningful and detailed way rather than by rote.

2) The teacher should provide the opportunity for his/her students to practice a subject-matter being discussed along with him/her. When the learners are allowed to take active part in teaching learning activities, they will be able to repeat the task at another time.

3) For a transfer of learning to take place, the teacher should always emphasize the relationship that exists between one subject matter and another.

4) The teacher should endeavor to develop positive attitudes towards a learning task so that the students can be motivated to like the task rather avoiding it.

5) It is believed that what students see, touch, feel or manipulate will be better remembered than the one they are not familiar with. Hence, for a meaningful transfer of learning to take place, the teacher should incorporate exercises that task the various senses of learners in any learning process.

Challenges involved in Learning Application

According to SRKVCOE, (2023), challenges related to transfer of learning includes:

- ✓ Challenges with learning transfer can originate from difficulties in processing information as individual students struggle to grasp the content presented to them, leading to poor retention of learned materials. Efficient learning transfer means that learners understood the learning content well, followed the learning experiences presented and can apply it in real-life scenarios.
- ✓ Over reliance on technology without pedagogical grounding as prevalent amongst the youth is a huge challenge in utilizing technology to aid learning transfer as the students tend to depend on it for everything even in writing their examinations.
- ✓ Digital fatigue and resistance to new digital tools, frequent and prolonged exposure to digital devices can lead to physical, mental and emotional exhaustion. In the other hand, some students can be technophobic from fear and lack of understanding of new technologies and devices.
- ✓ Accessibility and equity in digital environment are great challenges in leveraging technology for learning transfer as physical, digital and information accessibility are difficult to achieve especially by those with disabilities.
- ✓ To enhance knowledge retention, organizations can optimize their training courses by incorporating adult learning principles, adapting to different types of learning styles for each employee, and conducting routine assessments to ensure workers retain the material.

Implications of Transfer of Learning

SlideShare (2015). Listed the implications of transfer of learning as the following:

- ➢ Teachers would need to pay more attention to the more significant and pertinent aspects of the syllabus. In order to do this, the teacher would also need to know precisely the skills, knowledge, or principles that are to be transferred, and those should be reflected in the objectives.
- ➢ In constructing tests or examinations, teachers would need to consider the individual differences among students and modify them in order to accommodate transfer of lesson objectives.
- ➢ Equal emphasis should also be placed on formative assessment and alternative forms of assessment, such as observation, checklists, and practical exams, since some transfer behaviors are difficult to observe using traditional evaluation methods. Failed transfer usually happens when students are unable to make connections between what was learnt previously and the task at hand.
- ➢ The practice of drawing students' attention to connections, practical applications, and abstract relationships should be a deliberate and conscious strategy on the teacher's part.
- ➢ This practice would also inculcate in students a spirit of transfer and get them in the habit of thinking about what they learn in school and relating it to everyday life.
- ➢ The teacher should know that the relationship between concepts and possible applications of knowledge and skill is not always visible to students. In teaching a lesson, the teacher should assist students in making those connections by emphasizing on similar things during a lesson.
- ➢ The students should be encouraged to dig deeper into conceptual issues and be helped to think about why and how learning is taking place it should become a habit and come naturally to them.
- ➢ Understanding the differences between concepts or principles could help minimize negative transfer.

- Sometimes it is best to highlight the differences between concepts by introducing them at the same time. Implications of Transfer of Learning.
- Students should master the original material thoroughly with the help of the teacher in order for transfer to take place. This means that teachers should allow students time to entirely grasp the concepts. This can be done by allowing them to experience the material in different ways through a range of different examples given by the teacher in the process of instruction.
- Transfer of learning bridges the gap between theory and practice, fostering skills development, critical thinking, and knowledge-building.

In all, learning transfer is not the end of progress or development but it is a stepping stone towards proficiency and growth. (Sousa, 2016). Therefore, it is pertinent that educators at whatever level utilize technology in their teaching as they endeavor to encourage learner participation, and learner active engagement in their learning, and also create opportunities for transfer of their learning in real-world situations.

Conclusion

If there were no transfers, students would need to be taught every act that they would ever perform in any situation, because each learning situation often differs from occurs. All learnings involve transfer based on previous learning. It is the very essence of understanding, interacting and creating that is the importance of transfer of learning. Technology in itself is not a substitute for good pedagogy but when used properly, it can greatly enhance the transfer of learning.

Recommendation

It is therefore, recommended that;

- Educational institutions should integrate technology in ways that supports learning objectives and promotes seamless transfer of learning.
- Institutions should ensure that learners are trained in digital skills that will enable them leverage the use of digital tools for learning transfer.
- Researchers can investigate the impact of specific technologies in supporting learning transfer and can also explore the role of technology in different contexts.

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