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The impact of digital learning interventions on vocational training

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Abstract
Our study investigates the integration of Universal Design for Learning (UDL) within vocational education in the digital age. We assessed both trainer implementation of UDL and student interns needs at OFPPT Inzgan Ait Melloul-Agadir-Morocco. By employing a mixed-methods approach utilizing quantitative and qualitative questionnaires alongside a case study, we explored the potential benefits of UDL in enhancing the learning experience and fostering inclusion.
A significant portion of trainers, as evidenced by our findings, implicitly employ UDL principles into their teaching. Furthermore, student interns expressed a clear need for a UDL-based approach to enhance their learning. This research provides recommendations for optimizing UDL integration across diverse vocational education contexts, emphasizing its crucial role in addressing students learning needs in the digital age.

Keywords: Digital learning, universal design for learning (UDL), vocational education, learning needs, inclusive education

Introduction
Professional training is a fundamental pillar in preparing individuals to face the challenges of an ever-evolving job market. In the digital age, it is essential to adopt innovative pedagogical approaches that meet the learning needs of students and promote their inclusion. In a context where many students, especially student interns in vocational training institutions such as the Office of Vocational Training and Job Promotion (OFPPT), face learning and adaptation difficulties, it is crucial to rethink pedagogical approaches to enhance their engagement and success. Previous studies have shown that non-adaptation or non-integration in professional training, often caused by learning difficulties or issues related to teaching methods, can lead to premature dropout. It is within this context that we undertook this research. Our objective is to explore the possibilities offered by Universal Design for Learning (UDL) in the field of vocational training.
UDL guides trainers in designing curriculum, learning environments, and assessments that are "Smart from the Start" (Pisha & Coyne, 2001) [8]. This approach promotes inclusivity from the very beginning of the learning process. It builds flexibility directly into the learning materials and activities "so that all students with differing abilities can use the same material, but in a way tailored to their strengths and instructional needs" (Freund &Rich, 2005) [5].
Rose and Meyer (2002) [9], affiliated with CAST (Center for Applied Special Technology), pioneered Universal Design for Learning (UDL). UDL provides a framework to assist students at all skill levels in overcoming challenges and realizing their greatest learning potential. (Thomas, Garderen, Scheuermann & Lee, 2015) [10].
Based on research in developmental psychology, neurology, and learning differences, the UDL recommends that educators incorporate three guiding principles into their lesson plans and evaluation processes (Rose & Meyer, 2002) [9].

Multiple Means of Representation: (**The what** of learning)
The first principle emphasizes presenting information and content in different ways (Dalton & et al., 2012) [3]. Educators can use text, pictures, videos, audio, or even practical activities to explain a concept. This variety helps all students access and understand the material in a way that works best for them.

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Multiple Means of Action and Expression: (The how of learning)

The second principle encourages teachers to move beyond traditional assessments and provide a range of ways for students to demonstrate what they have learned. This can involve projects, visual presentations, essays, drawings, creating a video, group assignment, etc.

Multiple Means of Engagement: (The why of learning)

The last principle focuses on capturing student interest and motivation. It encourages educators to provide a variety of ways for students to connect with the learning material. This can involve offering choices in activities, providing options for different learning styles (visual, auditory, kinesthetic), and incorporating real-world applications to make learning relevant.

By implementing these three principles, educators can create learning environments that are inclusive and accessible to all learners, regardless of their individual differences. UDL proposes principles and strategies to create a flexible and adaptive learning environment, enabling learners to actively engage and develop their skills significantly. UDL emphasizes the provision of multiple means of representation, action, and expression to address diverse learning styles and specific learner needs.

Several theories and models underlie UDL. For example, the information processing theory highlights the importance of presenting information in varied ways to facilitate understanding and cognitive processing (Atkinson & Shiffrin, 1968) [1]. Vygotsky's sociocultural theory emphasizes the significance of social interaction and mediation in supporting learning and skill development (Vygotsky, 1978) [12]. Furthermore, Kolb's experiential learning theory highlights the importance of practical activities and reflection in promoting meaningful learning (Kolb, 1984) [6].

The problem of this study lies in evaluating the use of UDL by trainers and the needs of student interns in the specific context of the Office of Vocational Training and Job Promotion (OFPPT) in Inzgan Ait Melloul. The objective is to determine whether UDL can address the learning and inclusion needs in vocational training in the digital age.

To achieve this objective, the following research questions will be explored

1. What extent do trainers at OFPPT Inzgan Ait Melloul integrate the concepts and principles of UDL into their pedagogical practices in vocational training?
2. Have student interns at OFPPT Inzgan Ait Melloul already experienced UDL-based learning, and do they express a need for this approach to enhance their learning experience?
3. What are the potential benefits and challenges associated with integrating UDL into vocational training in the digital age, in the specific context of OFPPT in Inzgan Ait Melloul?

Based on a thorough literature review and key concepts of UDL, we formulate the following hypotheses

▪ **Hypothesis 1 (H1):** Trainers at OFPPT Inzgan Ait Melloul implicitly use the principles of UDL in their pedagogical practices in vocational training.

▪ **Hypothesis 2 (H2):** Student interns at OFPPT Inzgan Ait Melloul express a need for UDL-based learning to improve their learning experience and inclusion.
▪ **Hypothesis 3 (H3):** The integration of UDL into vocational training practices in the digital age offers potential benefits such as improved learning experience and student inclusion, but it also presents challenges to overcome.

To confirm or refute these hypotheses, we will adopt the following methodology.

Methodology

The methodology adopted for this study action research, given our dual role as part- time trainers at OFPPT and student-researchers. To ensure a comprehensive approach, we used a mixed-methods approach combining quantitative and qualitative aspects.

In the quantitative part of our study, we designed a questionnaire consisting of 15 questions, which we distributed to the trainers at OFPPT Inzgan Ait Melloul. We were able to collect a total of 22 responses, representing 68.2% of male trainers and 31.8% of female trainers.

These education professionals have varied experience, ranging from less than 5 years to between 10 and 15 years. It should be noted that the sample of trainers is mainly composed of part-time instructors, which influenced the number of official trainers who responded to our study.

In parallel, we also administered another questionnaire to the students of our institution. We managed to collect 132 responses from a representative sample. Among these responses, 52.3% were from women and 47.7% were from men, representing different branches of education.

Data analysis from our research revealed a distribution of trainer experience. The largest portion, representing 40.9%, has less than 5 years of experience. Trainers with experience between 5 and 10 years make up 22.7% of the group. The next category, trainers with 10 to 15 years of experience, accounts for 27.3%. Finally, the least populated group, with 9.1%, consists of trainers who have been in the role for over 15 years.

Furthermore, our study examined the enrollment duration of students at this institution. Interestingly, a significant majority, representing 56%, have been enrolled for less than a year. The remaining 44% of students have been enrolled for a period between 1 and 2 years.

In addition to these questionnaires, to further enrich our study, we opted for an in- depth case study of a student intern with reading difficulties, specifically dyslexia. This case study will allow us to better understand the specific challenges faced by learners in the context of UDL.

Now, let us delve into the data analysis phase to extract meaningful results and deepen our understanding of the key emerging themes from our study.

Analysis and Interpretation of Results

The analysis of the collected data in this study was conducted using both quantitative and qualitative methods, allowing us to gain a comprehensive understanding of the perceptions and practices of trainers and student interns regarding the adoption of Universal Design for Learning (UDL) approach in the context of OFPPT Inzgane AIT Meloul.

For the analysis of quantitative data, we performed statistical analyses to quantify the results and provide insights into the identified trends and relationships. The questionnaire responses were analyzed using appropriate statistical methods. Frequency calculations were used to determine the distribution of responses for each question, highlighting the overall trends. Means were calculated to assess trainers' preferences regarding teaching methods and the use of technology. Standard deviations provided indications of the dispersion of responses within the sample. Additionally, correlation analyses were conducted to identify potential relationships between certain variables.

In the table below, we present the key results related to the understanding of UDL, its usage, as well as the perception and openness of trainers and student interns towards its adoption.

Table 1: Key Results of the Analysis

Knowledge and Use of UDL Concepts	
Trainers	**Student internes**
72.7% use UDL implicitly in their pedagogical practice.	27.6% have a basic understanding of UDL. "Occasional use"
Perception of UDL adoption	
Trainers	**Student internes**
Openness to UDL adoption.	Openness to UDL adoption.
Willingness to diversify tools and methods.	Positive perception regarding the improvement of learning experience and engagement through the integration of UDL.

The results indicate that nearly two-thirds of the trainers have some knowledge of UDL, while a minority of the student interns have basic knowledge. This highlights the need to enhance awareness and training efforts to ensure a better understanding of UDL among students. Regarding the use of UDL concepts, over half of the trainer's report using them in their pedagogical practice, while student interns mention occasional use only.

The perception of trainers towards UDL is generally positive, with an openness to its adoption and a willingness to diversify teaching tools and methods. This reflects recognition of the importance of pedagogical adaptation to meet the diverse needs of learners.

Student interns, although reporting occasional use of UDL concepts, also expressed a certain openness to its adoption. This suggests that they recognize the potential of this approach and are willing to further explore its application in their educational journey.

The analysis of correlations between certain variables has also revealed interesting findings. For example, a positive correlation was observed between the use of captioned videos in the classroom and the adoption of UDL by trainers. This suggests that the use of visual supports and the integration of accessible materials can facilitate the application of UDL principles in teaching.

Assistive technology, compensation tools, and software play a crucial role in implementing Universal Design for Learning (Mangiatordi, 2017) [7]. In this study, the results indicate that both trainers and student interns recognize the importance of technology in the context of UDL. Trainers expressed a diversification of pedagogical tools and methods, indicating their willingness to explore and leverage the opportunities offered by technology to meet the diverse needs of learners. This may include the use of visual aids, interactive applications, online learning platforms, and other digital resources tailored to individual needs.

Similarly, student interns mentioned limited use of UDL concepts but also expressed a positive perception regarding the integration of UDL and its potential impact on their learning experience. In this context, technology can play a crucial role in facilitating access to learning content, providing additional supports, and promoting greater personalization of instruction. For example, the use of online learning platforms allows students to progress at their own pace, access supplementary resources, and benefit from instant feedback.

It should be noted that the successful integration of technology into UDL requires a deep understanding of learners' needs, as well as adequate pedagogical and technological skills on the part of the trainers. Technology should not be used merely to add a technological dimension to learning, but rather to create inclusive, flexible, and adaptive learning experiences that cater to different learning styles and diverse learner abilities.

Therefore, trainers must discern the diverse aptitudes, deficiencies, and preferences of their students. Understanding these variations enables them to select the most influential technology for each student.

Simply having technology in the classroom isn't enough. Educators need to know how to use it effectively in order to properly instruct and assist their students. This includes using the technology in a manner that aligns with learning objectives and pedagogical strategies.

In summary, the findings of this study support our research hypotheses. Firstly, our findings confirm H1, indicating that trainers at OFPPT Inzgan Ait Melloul implicitly integrate UDL principles into their vocational training pedagogical practices.

This demonstrates their commitment to inclusion and accessibility in teaching. Secondly, H2 is confirmed by the responses of student interns, who express a need for UDL-based learning to enhance their learning experience and promote their inclusion. These results highlight the importance of meeting learners' expectations by adapting pedagogical methods and implementing UDL-compatible teaching strategies.

Finally, our results highlight the implications of integrating UDL into vocational training practices in the digital age, thus confirming H3. While this approach offers potential benefits such as improved learning experience and student inclusion, it also presents challenges to address. These challenges include the need to train trainers on UDL concepts and tools, as well as overcoming constraints related to technology availability and accessibility.

Recommendations
Based on the results of this study and our research-action approach, we formulate the following recommendations to promote the adoption of the Universal Design for Learning

(UDL) approach in the context of vocational training at OFPPT Inzgan Ait Melloul:

- Enhance awareness and training of trainers on UDL.
- Develop and deliver interactive workshops for trainers, focusing on practical strategies for integrating UDL principles into their vocational training programs.
- Encourage the creation of online UDL communities where trainers can access and use materials and share best practices. This emphasizes collaborative and resource-sharing aspect.
- Integrate UDL principles into existing trainer development programs, ensuring ongoing awareness and knowledge building.
- Foster collaboration among trainers, students, and information technology specialists.
- Implement self-assessment and reflection tools: Provide students with techniques to actively track their own academic advancement and establish objectives that are in line with the principles of Universal Design for Learning (UDL).

By incorporating these recommendations, trainers can create a comprehensive framework for promoting UDL adoption in vocational training at OFPPT Inzgan Ait Melloul, leading to a more inclusive and effective learning environment for all students.

Conclusion

In summary, this study highlights the importance of promoting and supporting the adoption of Universal Design for Learning (UDL) in vocational training pedagogical practices. It emphasizes the central role of trainers, who can be empowered through dedicated UDL-specific workshops. These workshops can equip them with practical strategies for integrating UDL principles into their programs, fostering inclusive learning environments that cater to diverse student needs and learning styles.

Furthermore, the study emphasizes how important it is for trainees to be involved in the design of the learning environment. Trainees become more motivated to succeed when they have a voice in shaping their learning experience. Technology also emerges as a crucial tool for effective UDL implementation. It can make it easier for trainees with different learning requirements to access a greater variety of resources, personalized learning pathways, and assistive technologies.

However, overcoming some obstacles is necessary for the adoption of UDL to be successful. Future research can explore these challenges in more detail, such as securing necessary resources, overcoming potential resistance to change, and ensuring accessibility of technology for all trainees. By working collaboratively, researchers, trainers, and policymakers can create a supportive environment where UDL principles can flourish in vocational training programs, ultimately leading to a more inclusive and effective learning experience for all.

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