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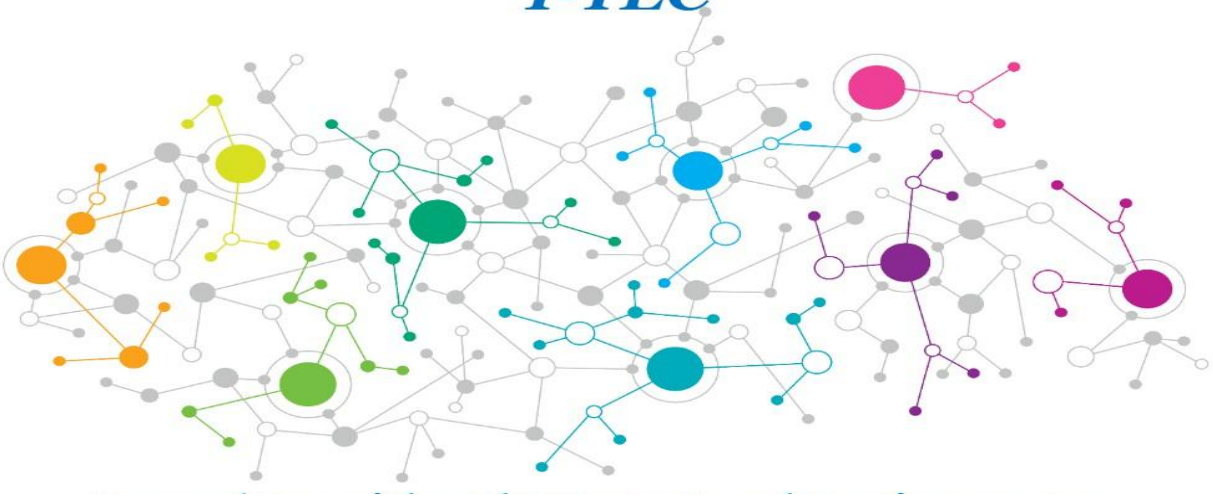

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Empowering Learners & Unlocking Their Potential

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Universal Design for Learning in the Era of Artificial Intelligence: Applications, Challenges and Future Prospects

Brahim Ouhra [a] ✉ , [2] ***Isam Mrah*** [b]

[a] *Faculty of letters & Human Sciences, Mohammed I University, Oujda, Morocco*

Email: *brahim.ouhra.d24@ump.ac.ma*

[b] *Faculty of letters & Human Sciences, Mohammed I University, Oujda, Morocco*

Email: isam.mrah@ump.ac.ma

Abstract

Universal Design for Learning (UDL) creates an educational environment through which educators account for various learning styles and differences. It establishes personalized teaching and learning environment. Accordingly, this study examines the efficiency of this innovative educational approach in real life situations. A mixed methods approach was used to collect and sift the data. The study relied mainly on exclusive classroom observations, questionnaires and interviews, all of which target teachers' attitudes towards, assumptions about and expectations for the application of this innovative approach. The preliminary results of the research unveil how teachers and practitioners implement the UDL within their classroom practices. This instructional design framework proves relevant and applicable as claimed by several teachers as it enables students to engage with the content of the lesson, and maintain motivation and interest.

Nevertheless, standpoints about the UDL in Moroccan classrooms are still fluctuating as the analysis of teachers' attitudes and practices shows that UDL is time consuming, pervasively relying on technology and most importantly lacking adequate professional development and teacher training. Following an in depth multidimensional analysis of the findings, some recommendations for effective practices using UDL are presented and discussed.

Keywords: Universal Design for Learning, inclusive practices, innovative teaching, differentiated instructions

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1. Introduction

Universal Design for Learning (UDL) is an instructional design framework developed by the Centre for Applied Special Technology (CAST) (Frolli et al., 2023, p.3). It aims at addressing the needs of all learners through enhancing engagement and maintaining motivation. That is, UDL promotes inclusive education across varying abilities. More precisely, this innovative approach when best tailored with AI, it lays the foundation for personalized learning and teaching, as the assistive technologies facilitate designing content that caters for various learning styles. Nevertheless, administrative polices and guidelines often hinder the application of the UDL principles, particularly in limited funding educational settings. To implement its principles, establishing partnerships among scholars and decision makers paves the way to foster innovative instructional design in state standards and policies.

1.1 Background of the study

Students with disabilities; be it mental or physical, have always struggled to fit in the educational system provided by the state. However, the process of integrating such students faces several hindrances, the first of which is the inability of the teachers to understand their needs and adjust the leaning accordingly. The number of students with disabilities joining schools is increasing every year. This situation places teachers and educators in difficult position to provide fine-tuned content and encourage those students to engage and express their learning effectively. Thus,

integrating the UDL is essential. It combines the use of three principles to offer multiple ways of representation, engagement and expression.

1.2. Problem statement

Accounting for students learning styles plays a significant role in education: language learning is no exception. The need for new pedagogical innovations is increasing because the system of education focuses more on the student as an important element within the process of learning. Universal Design for learning (UDL) brings about differentiated instructions and caters for students needs which results in effective learning. Therefore, understanding its principles and applications, and exploring its future prospects falls within the significant importance of the current study.

1.3 The purpose and significance of the study

The research objective is to examine the efficiency of the Universal Design for Learning (UDL) in the Moroccan context. The study aims at understanding the intersection of the AI and UDL. Throughout the research, the researcher seeks to describe and explain the application of this innovative approach in real contexts. Moreover, the study aims to explore what teachers and students think about UDL, how teachers apply its principles before and while teaching students, and therefore identify the challenges that hinder its implementations. Then, constructive guidance and recommendations for effective implementation of the UDL will be discussed.

1.4. Research and questions hypotheses

The current study presumed that AI facilitates the implementation of the UDL, and assumed that it accelerates the creation of differentiated content that caters for learners' difference and styles. The study also tends to find relevant answers and justifications to the following research questions:

1. How does AI supplement the application of Universal Design for Learning?
   Hypothesis: AI-driven tools significantly improve the personalization of learning experiences in classrooms implementing Universal Design for Learning principles.

2. To what extent the UDL principles ensure inclusion and personalized learning?
   Hypothesis: the implementation of the UDL principles fosters inclusion in education throughout addressing students' diversity and preference.

3. How do teachers and students perceive UDL as a new approach to learning and teaching?
   Hypothesis: teachers and students alike perceive UDL as an applicable approach that elevates flexibility in learning.
4. Where do the challenges of the UDL emanate?
   Hypothesis: The core hindrances of the implementation of the UDL derive from inadequate training, state standards and insufficient technological resources.

2. Literature Review

2.1. Overview to the UDL

The idea of Universal Design was primarily coined in the early nineties. The word signifies a barrier free design that staves off any obstacle hindering everyone's capacity to learn. The National Center on Universal Design for learning (2011) defines UDL as asset of principles to follow when designing a curriculum so that the curriculum meets the needs of every student, giving all students equal opportunities to learn (p2). They argue that "it was originally developed to assist those learners most vulnerable to classroom segregation due to inadequately designed curriculum". That is, the case is not that practitioners fail to apply solutions to the arising learning issues, but it is rather deviating from the source where students' struggles emanate.

Although Smith (2020) supports the UDL critical role in advocating inclusion, Watters (2021) criticizes its limited scope in AI integrated contexts. This comparison brings about the need to unveil the extent to which advancing technologies can bridge this limited adaptability. He argues that AI has more to do with automating instructions and changing behaviour instead of encouraging autonomy and critical thinking.

In 2024, Song et al developed a UDL based framework for 12 years old students, they emphasize that despite the recent efforts in developing AI curricula and guiding frameworks in AI education, the educational opportunities often do not provide equally engaging and inclusive learning experiences for all learners. To promote equality and equity in society and increase competitiveness in the AI workforce, it is essential to broaden participation in AI education.

There are various theories in the field of educational pedagogy that have long approached the learner differences and needs, and practically UDL concords with Gardner's theory of Multiple Intelligence. Gardner suggests that the human organism has seven distinct units of intellectual

functioning, which he labels as "Intelligences". He also asserts that these separate intelligences have their own specific sets of abilities that can be observed and measured (Gardner, 1983).

In 1987, Ron Mace coined the term ‘‘universal design’’ to try to differentiate from accessible design. He said, ‘‘it’s not a new science, a style, or unique in any way. It requires only an awareness of need and market and a commonsense approach to making everything we design and produce usable by everyone to the greatest extent possible.’’ In this sense, Rose and Meyer emphasize that “barriers to learning are not, in fact, inherent in the capacities of learners, but instead arise in learners’ interactions with inflexible educational materials and methods’’ (2002). They associate learners’ inability to acquire knowledge with the educational system, for they are judgmental and inflexible.

The call for UDL is going viral along with the development of technology, as the AI paves the way to refine material and content that suit everyone. Having the AI advancement into work, UDL wavers a pathway that advocates autonomy and inclusion in education. Walker (2019) addresses the importance of leveraging emerging technologies to design an inclusive educational future through UDL.

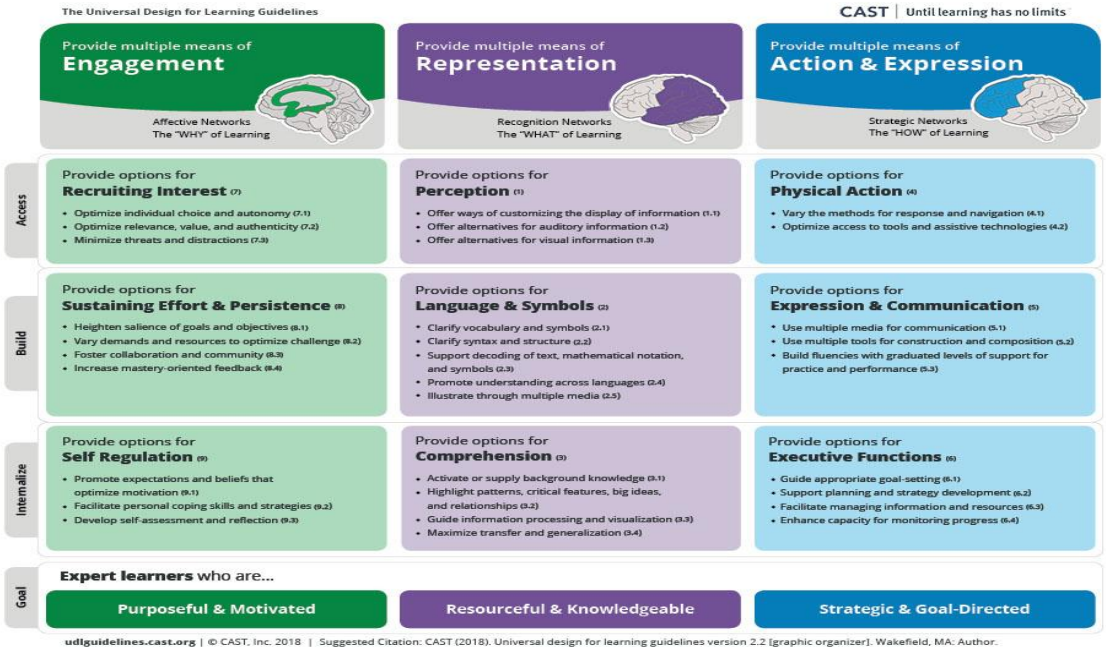
With the AI revolution, educational content has become more accessible. Multiple modes of instruction assist teachers reach inclusive education, which in its turn offers equitable learning. Grand Clemen argues how AI transforms education policies; he claims that education in all its various aspects is experiencing a growing influence from the digital world, where technology is progressively employed to impart education, knowledge, and skills through novel and innovative approaches (Grand-Clement, 2017).

In the Moroccan context, professor Mustapha Aabi along with a team at the faculty of humanities in Agadir integrated the UDL into online platforms in order to foster inclusion for students. The Ministry of Education has also supported this roadmap, as it facilitated to set up an international journal for universal design for learning (Jamyly, 2024). This endeavor implies that the research in this regard is still in early stages. As a result, teachers in the field of education may lack sufficient knowledge to integrate the UDL into their teaching practices. Machkour 2024, purports to integrate ICT into the teaching experiences in order to facilitate an equitable education for everyone. His model incorporates providing multiple ways of representation as one of the UDL principles (pp. 235–243). The idea was later more refined and covered assessment.

2.2. UDL Principles

As discussed by Rose and Meyer (2002) and later supported by the National Center on Universal Design for Learning (2011), the core principles of the Universal Design for Learning (UDL) constitute the provision of multiple means of engagement, multiple means of representation, and multiple means of action and expression. These techniques permit flexibility in the process of learning and teaching practices in a way that accounts for the diverse style and learners preferences.

The graphic organizer below demonstrates the intersection among the UDL principles in details:



The principles of UDL can be applied to course objectives, teaching techniques, learning materials, and assessment methods, so that no matter what skills, needs, motivations, or interests an individual student brings, she will be able to learn. (Rogers Shaw, 2017, p8). In his endeavor to apply UDL, he redesigned a course to include the representation of individual speeches, videos and other common forms of educational communication. This is because the syllabus did not multiple offer means of representation and engagement. He added that "The original syllabus was entirely textual, presented in paragraphs and lists; it required constant scrolling to identify needed information. It did not engage the students. Visual elements, such as book cover images, were added to engage the students." P.8

3. Methodology

3.1. Sample, Participants and instruments

The study employed convenience sampling because there are limited schools and teachers in the cities of Taourirt and El Aion, Morocco. Non-probability sampling method was chosen also due to ease of access to the participants, targeting teachers from local schools. The rationale behind opting for this type of sampling relates to time constraints and teachers willingness and readiness to take part in the study.

The target participants are Moroccan teachers of English in the field of education and students in both public and private schools. The population are currently teaching in high schools in Taourirt and El Aion in Morocco. They will be selected based on their availability and readiness to take part in the study. The researcher explained the process of the study in advance and embarked on the study accordingly. The research relied mainly on observations in which the research observes several teachers practices while teaching. The activities were predesigned according to the UDL principles. If necessary, the researcher himself indulged in the experiment as a practitioner and participant given that he already teaches in a public school.

The study used a questionnaire to explore teachers and students perception of the UDL. To consolidate and ensure reliability, the research also carried out interviews with teachers. There is also variety in terms of the questions used; open ended questions, yes/ no questions and open questions.

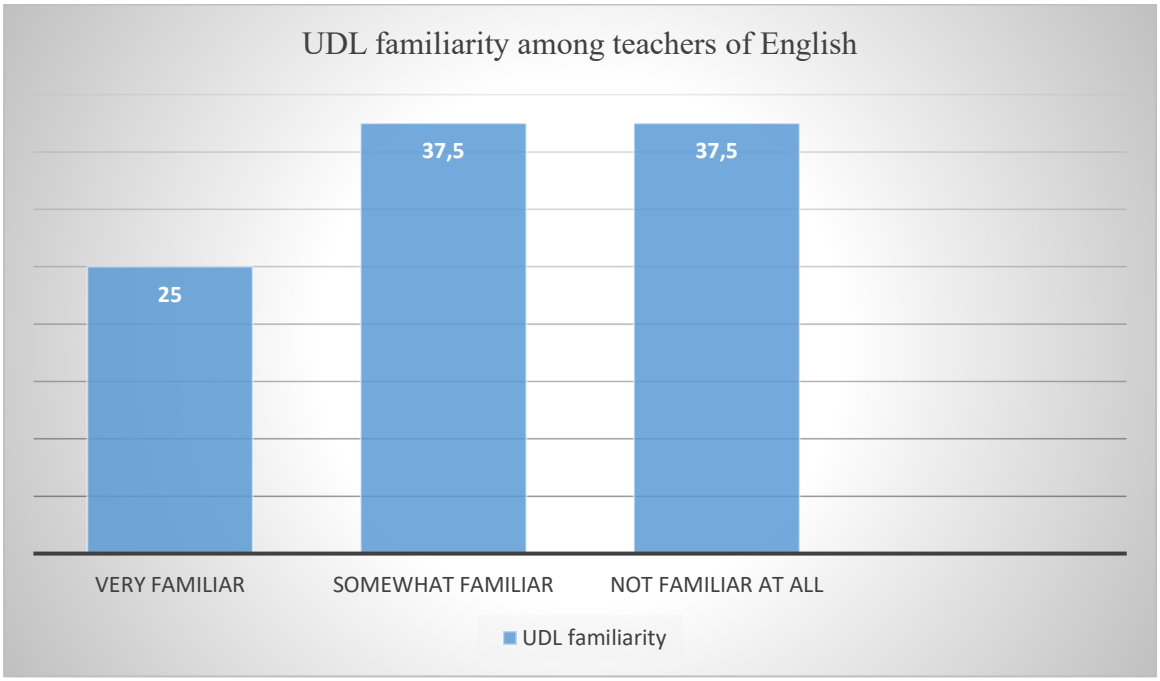
The study also adopted a mixed methods approach, as both quantitative and qualitative complement each other. The first yielded numerical data whereas the latter provided comprehensive explanations of the results attained by the questionnaire and the survey.

4. Results and Discussions

This chapter unveils the results obtained from the questionnaire administered to high school teachers of English. The first question implies that the majority of the participants are not familiar at all or somewhat familiar with the UDL, which at first instance shows inadequacy in terms of teacher training and awareness about new pedagogical approaches.

Figure 1

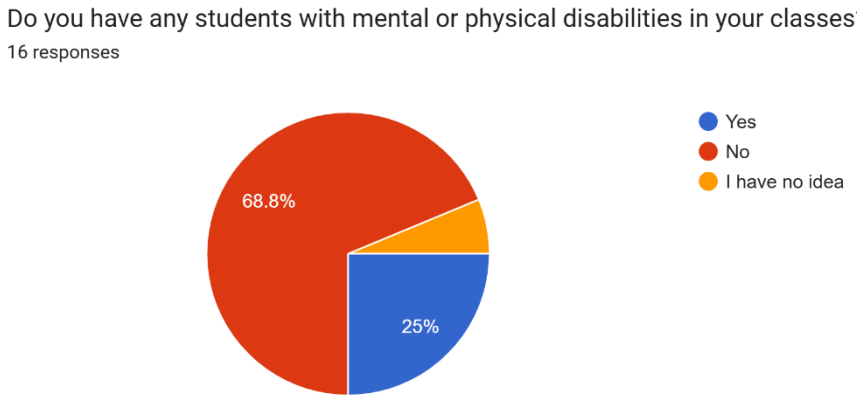
UDL Familiarity among Teachers of English



Overall, the analysis of both questionnaire data and classroom observations reveals a significant lack of knowledge about Universal Design for Learning (UDL) among English teachers. Even though the number of the participants is limited, there have been discussions and interactions. Participants' responses were coherent. This is because they believe the UDL is still new for them and they lack training related to innovative approaches. Their argument proves to be logical as question N2 indicates that 93.8 percent of the participants have never received any training regarding the UDL neither in the training or as a professional development. At this point, the researcher has taken laps of time to explain and demonstrate how UDL advocates inclusiveness. The targeted teachers have benefited for intensive sessions regarding the principles of the UDL and their lessons planned to cater for different needs of the students. The short span training enabled teachers to take into account differentiated instructions while teaching.

Figure 2

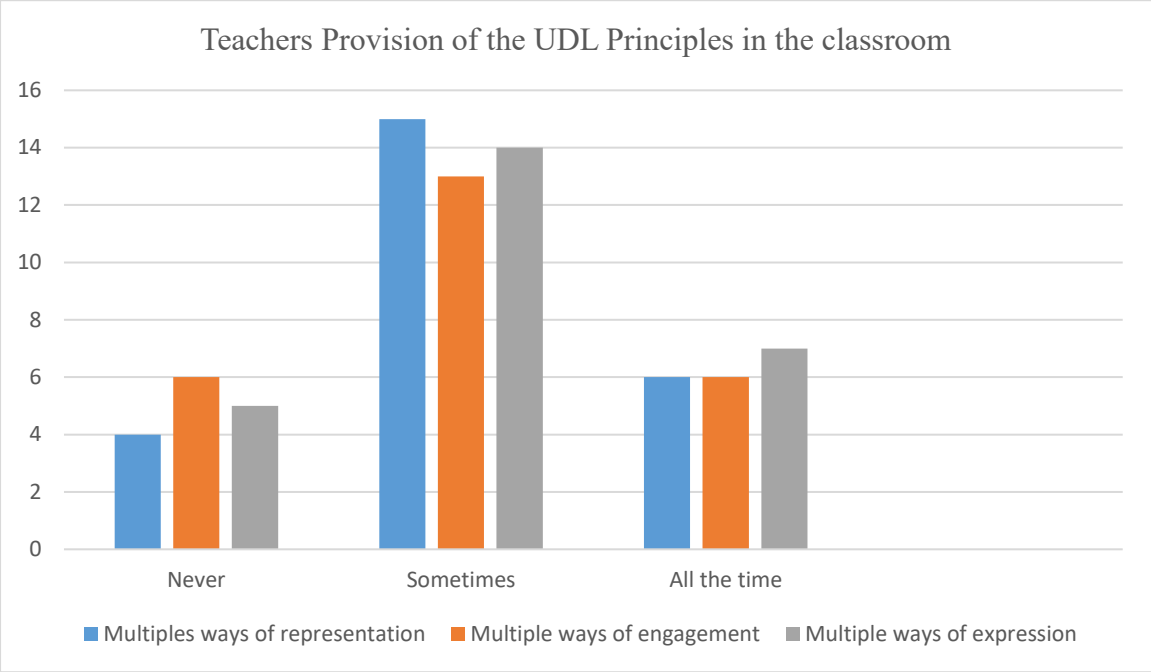
Teachers' Awareness of Students' Disabilities



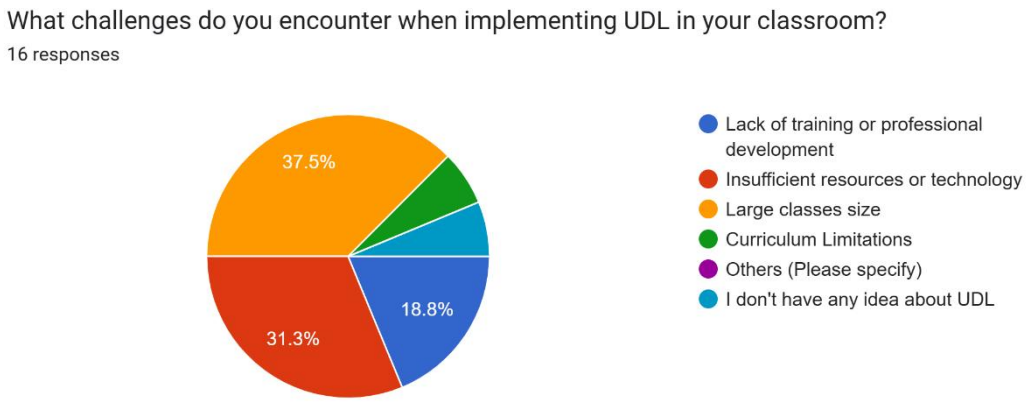
The following question justifies the hypothesis that the Moroccan classes are heterogeneous, as they constitute various students with physical and mental disabilities. All of which supports the call for an inclusive paradigm such as the UDL. The participants' responses assert that teachers are not equipped with sufficient tools to identify or diagnose students' disability. Most of the time, they refer to disability as physical but never mental. Conversely, even though they are aware of the disorders like Attention Deficit Hyperactivity, teachers are unable to deal with this issue effectively. All the participants emphasized that they have never received any training concerning mental disorders. Consequently, the implementation of the UDL seems out of reach.

Figure 3

Teachers Provision of the UDL Principles in the classroom



Question N4 is the continuity of the previous ones. It is noteworthy that some teachers do partially integrate various aspects of the UDL especially multiple means of representation, including but not limited to visuals and audio tracks. Yet, it remains insufficient, as it does not totally account for students with mental disabilities. In the observed classes, there were instances where teachers present the content of the lesson in various ways, but these methods remain inadequate. This is due to lack of training on how to plan lessons according to the universal design for learning. Adopting such innovative methods into the class prerequisites complete mastery of the principles as dictated by the UDL.



In order to gain more insights on the topic and offer more space for interaction, participants were given open questions. The main reason for the implementation challenges of the UDL in the classrooms is intrinsic to insufficient resources or technology, large classes' size and lack of training or professional development. The data shows the interconnectedness of a cluster of challenges that hinder the application of the UDL especially in short budget communities. To mention but a few, the schools where the study took place do not have access to advanced technologies, the classes are overcrowded and the infrastructure itself is rigid which leaves no room for creativity and application. Besides, the curriculum used for teaching students is text based and rule based neglecting the other aspects of learning. Surprisingly, although the endeavour to implement UDL proves successful, teachers find themselves unable to consistently integrate it because it is not included within the standards. That is, UDL is time consuming and resource demanding which makes it hard for them and eventually recourse back to the old-fashioned method of teaching.

Unlike what the Moroccan ministry alleges, the results of the analysis unveil that lack of awareness on the UDL significantly influences the integration of any innovative approach that advocates inclusive education. Theoretically, several teachers' interactions and beliefs assert positive and promising potentials of this approach. Yet, limited training and resources make it difficult to benefit both for teachers and for students alike.

Overall, the obtained findings are consistent with the hypothesis suggesting that the UDL enhances inclusion. The collected data proves that dives students have benefited from the flexible content promoted by the UDL. In addition, the questionnaire and observations responses reflect a common

recognition as well as positive perception of the UDL among the participants. The data as well aligns with the hypothesis regarding the challenges of the UDL implementation as it supports the previous studies exploring insufficient training and lack of technological resources.

The study findings as illustrated in the analysis concord with the previous studies mentioned in the literature review. As argued by Benmarrakchi et al (2019), innovations have fostered the development of assistive technologies which have contributed to making the learning environment and information more accessible to learners with learning difficulties.

5. Limitations

Although the study covers different parts of the questions asked above, it is not liable to any generalization especially with the immense distinction between private and public schools. UDL application requires availability of technology. Therefore, the results may be different from a school to another. Certain schools, despite being knowledgeable of the UDL, expressed their inability to implement it as they lack the technological resources. On the other hand, the study also reveals that schools in the urban areas provide more technology based material unlike school in rural areas, which made it difficult to set the ground for fair measurement.

6. Implication and Conclusions

The pervasiveness of AI has brought inevitable changes in education. It represents a two-edged sword as it enables the implementation of different methods, however, AI brings about drawbacks such as the overall reliance over technology, and students passiveness and reluctance to use their reasoning. Unlike other methods, Universal Design for learning has sought to integrate AI effectively. It caters to the different learning styles of the students throughout providing multiple ways of representation, engagement and expression.

This study aimed at exploring how UDL can be applied to Moroccan education system, identifying its application challenges and unveiling future prospects. It started by presenting the principles of this innovative approach, and accordingly administering a questionnaire to teachers in high schools. Beyond the quantitative method, the research supplements the interpretation of the data by in-class observations: classes that plan lessons based on the UDL principles.

Despite the implementation of the UDL remains in early stages, the endeavour demonstrates the efficiency of creating an inclusive environment to ensure better learning. The success of such innovative approaches depends mainly on continuous investment and technological resource. The two elements are essential to outgo the hindrances that imped putting UDL applications into practice in Moroccan schools.

Among the striking obstacles for successful integration of the UDL are mostly technical and theory based. As the study has shown, teachers have no consistent understanding of the principles that the UDL advocates. They often employ irrelevant and random instructions which proves unclear understanding of differentiated instructions aspired by the UDL. Accordingly, the study calls for the provision of preservice and continuous professional training on UDL for teachers, as well as the promotion of awareness and policies that support the inclusion of learners regardless of their needs.

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