

Digital Learning Platforms for Students with Disabilities: Accessibility and Effectiveness Analysis

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ABSTRACT:

The high rate of development of digital technologies has greatly altered the educational scene especially in enhancing inclusive education to the student disabled. Digital learning platforms such as learning management systems (LMS) and artificial intelligence-based learning algorithms can be used to support the needs of various learners through providing flexible, adaptive and accessible learning environments. In this paper I have extensively discussed the online learning environments with a view towards how effective it can be used by students with disabilities and its accessibility. The study takes a mixed-method approach where the results of the qualitative research are combined with quantitative measures of evaluation like learning performance, user engagement, usability, accessibility compliance and error rates. The architectural design of online learning systems,

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integration of elements of accessibility, assistive technologies and artificial intelligence to facilitate personalized learning will be analyzed in the paper. Comparative analysis of the chosen platforms shows that those systems that are more accommodating in terms of accessibility issues and technologies inspired by AI have an improved learning outcome, more engagement and are more satisfied by users. The results demonstrate the importance of adhering to the suggestions of the accessibility standards such as WCAG and the notion of Universal Design of Learning (UDL) to deliver inclusive learning. Although the digital platforms also have their benefits, such factors as uneven implementation of the accessibility and digital divide or even awareness are critical aspects of concern. The paper also addresses the question of how the future of inclusive digital education can be influenced by the policy frameworks and new technologies. Teachers, developers and education policy makers can find the findings to be of great assistance to develop and embrace more viable and accessible learning systems. The paper is applicable to the developing of inclusive learning as it can determine the most important variables that might impact the accessibility and efficiency of digital learning platforms in students with disabilities.

Keywords: Digital Learning Platforms, Accessibility, Inclusive Education, Students with Disabilities, Artificial Intelligence in Education, Assistive Technologies.

I. Introduction

The fast development of digital technologies has greatly changed the educational environment, establishing new prospects of accessibility, personalization, and inclusivity. Online learning systems, such as Learning Management Systems (LMS), AI-based tutoring systems, and online educational tools have proven to become important facilitators in contemporary education. These platforms have gained significance particularly to students with disabilities as they have been found to provide a flexible and adaptive learning experience to suit the needs of students with disabilities. Having such disabilities as visual, auditory, cognitive and motor impairments can require some special help that is not always available to the traditional education system. In this respect, online learning platforms are crucial in facilitating inclusive learning, providing such assistive options and

individualized learning paths (Acosta-Vargas et al., 2024a; Acosta-Vargas et al., 2024b). The global initiatives on accessibility and regulatory frameworks have further highlighted the significance of digital learning to students with disabilities. As an example, the introduction of the policies of accessibility like the European Accessibility Act emphasizes the increased interest in providing equal access to the digital content and services (AccessibleEU, 2025). Such initiatives help to highlight that there is a need to design digital platforms that are inclusive in nature, not an afterthought. Screen readers, voice recognition systems, automated captioning, and adaptive interfaces are some of the technologies that help students with disabilities to engage with digital content. Moreover, the development of artificial intelligence has provided intelligent learning systems that can tailor the learning experience

according to the profile of the individual learners, thus improving the accessibility and learning outcomes (Airaj, 2024).

In spite of these developments, the traditional education systems are still confronted with a lot of challenges to serve the students with disabilities. Inclusive education is usually hampered by physical infrastructure constraints, absence of assistive technologies, and inadequate training of educators. Most of the classes lack the required equipment to cater to a diverse group of learners and the instructions are often tailored towards a homogenous group of students (Sukhadeve et al, 2025). This causes a decrease in involvement, participation, and academic performance of students with disabilities. Moreover, the standardization of the curriculum and testing does not consider individual differences, thus contributing to educational inequalities. It became evident that accessibility gaps were also revealed during the shift to remote learning when global disruptions occurred, and more inclusive digital solutions were urgently needed (Acosta-Vargas et al., 2024a). Digital learning platforms can provide a transformative approach to these issues through its accessibility features and inclusive design principles. Contemporary platforms are being more in line with systems including Universal Design for Learning (UDL) and Web Content Accessibility Guidelines (WCAG), which focus on flexibility, usability, and accessibility by all users. Individualized user interfaces, multimodal content delivery (text, audio, video) and real time feedback mechanisms are some of the features that improve the engagement and understanding of the learner. To illustrate this, platforms such as Moodle have proved to be able to accommodate various learners with flexible content structures and interactive learning platforms (Al-Fraihat et al., 2025). Moreover, generative artificial intelligence systems are being used to automatically make content more accessible, e.g. by generating alternative text to images, simplifying complex content, and language translation in real-time (Acosta-Vargas et al., 2024b).

Facilitating data-driven and personalized learning is another important benefit of digital platforms. Through the analysis of user interactions and

performance data, such systems are able to determine learning patterns, identify challenges and offer specific interventions. This feature is especially useful to students with disabilities since it allows them to create specialized learning strategies that address the needs of the disabled. Additionally, online platforms facilitate group learning in virtual learning classrooms, discussion groups and peer-interaction tools, promoting a feeling of belonging and community among students. Ethics is another important aspect of implementing AI-based educational tools as the fairness, transparency, and inclusiveness that are vital to instilling trust and effectiveness in online education must be ensured (Airaj, 2024). The only determinants of the effectiveness of the digital learning platforms are not technological capabilities. Problems such as the digital divide, lack of awareness with regards to accessibility and irregular adherence to accessibility standards can diminish their impact. In addition, robust security and privacy safeguarding of sensitive user information that must come with the adoption of sophisticated technologies should be in place (Adams et al., 2025). Accessibility and utility of such platforms, in turn, should be considered to offer the wide range of needs of the students with disabilities.

The primary objective of the study is to investigate the digital learning settings in regards to their accessibility qualities and learning outcomes on the disabled students. The study will measure the extent of adherence of these platforms to the principles of accessibility and will determine the main technological and pedagogical aspects that contribute to inclusive learning and assess the effect that it has on student engagement and academic success. In addition to this, the research will also dwell on making comparisons among various platforms and strategies in an attempt to establish the best practices in the establishment of inclusive digital education systems. The area of this research will be generalized to discuss the most popular digital learning platforms, assistive technologies and AI-based learning tools. It takes into account a variety of disabilities and studies technical and teaching issues of digital learning. Giving a holistic view is done by measures of evaluation such as usability, compliance with accessibility, learning outcomes as well as user satisfaction. The study will

help in creating more convenient, efficient and inclusive online learning environments by tackling these areas.

II. Literature Review

Integration of the digital learning systems in the current education systems has significantly impacted the accessibility and inclusiveness of the learning environment particularly among the learners with disabilities. The literature availed has pointed out the possible and the limitations of these platforms in addressing the needs of different learners. The researches within this field are focused on the quality of accessibility, inclusive pedagogy, artificial intelligence integration, and efficiency of online learning systems. Availability of digital learning environment is one of the important areas of studies. Studies have also depicted that despite the advancement in technology, not all the online platforms have completely adjusted the needed standards of accessibility. Another issue identified by Baldwin and Ching et al. (2021) is that access to online courses in institutions often varies due to the difference in the assessment tools and a lack of standardization. In a similar manner, Baldwin and Ching et al. (2019) focus on the importance of a developed course design model, such as Canvas Course Evaluation Checklist, in the process of improving accessibility and usability. These structures ensure that the contents of the course are well organized, easy to learn and flexible to those who have disabilities.

Also well documented are the predicaments the students with disabilities find themselves in not only with the traditional but also with the digital system of education. Bartz et al. (2020) provides an idea of what it is like to be a student with disabilities in higher education and demonstrates that such obstacles as a lack of support services and accessibility features and social exclusion still persist. Moreover, Anderson et al. (2020) describes the problem of accessibility that increased with the rapid shift to remote learning due to the pandemic and left a large number of students with disabilities under-served. This research paper indicates that the initiation of digital learning platforms which can

be readily accessible at the earliest stage are required. Artificial intelligence (AI) has emerged to be a groundbreaking part of the educational process, offering new prospects of individual and adaptive learning. Chen et al. (2020) focus on the application of AI in the educational process, where it is applied in intelligent tutoring systems, automated assessment and adaptive content delivery. AI-based applications can analyze the actions of students and tailor the educational content to them, and can be particularly helpful with students with disabilities. These technologies, however, can be successful depending on their appropriateness to the principles of an inclusive design and ethical considerations.

Besides AI, assistive technologies and accessibility tools are also essential in providing a better experience in digital learning. The Ally accessibility tool is one of the tools that helps enhance the accessibility of digital material by offering alternative formats, providing accessibility feedback, and educator guidance (Ally, 2025). These aid in making sure that the learning materials are available to students with various needs such as the students with visual, auditory and cognitive disabilities. Embedding these tools into Learning Management Systems (LMS) increases the usability and inclusiveness of online platforms in general. Universal Design of Learning (UDL) has become a popular concept as an approach to inclusive education. Bray et al. (2024) present a systematic review of the UDL implementations with the necessity to focus on the role of technology in helping diverse learners. The principles of UDL support a variety of representation, engagement, and expression that allow learners access and engage with their content in a way that best fits their personal preferences. Online learning environments with the use of UDL principles are more prone to offer equal learning opportunities to students with disabilities. Digital learning platforms also depend on the workings of overall education and institutions. Arredondo-Trapero et al. (2024) mention the transition to the post-pandemic digital education, where the universities play the key role in implementing new technologies to improve the quality of education and competitiveness. According to their research, the concept of digital

transformation in education should be supported by the emphasis on inclusivity and accessibility to make sure that everyone can enjoy the benefits of technological changes in education.

Another impact on the availability and efficiency of digital learning includes demographic and socio-economic factors. Campbell and Wescott et al. (2019) paint a general picture of undergraduate students, giving special attention to the disparities in the access to educational materials, financial aid, and digital infrastructure. Such differences have the potential to affect the overall success of students with disabilities to use digital learning platforms to their full capacity. These problems require a holistic solution, that is, these solutions have to consider not only technological solutions but also policy and institutional assistance. Although there have been advances in the digital learning technologies, there are few gaps in the literature. The majority of the research is focused on either or one of the two aspects such as accessibility or effectiveness without providing a comprehensive approach to the two. In addition, the studies of the long-term impacts of digital learning platforms in students with different disabilities are also limited. The fact that there are no standardized measures of evaluation makes the comparison of different platforms and approaches even more difficult. Digital learning platforms can make significant contributions to the education sector as the literature indicates, in both regards of accessibility and inclusivity. AI, assistive technologies, and UDL principles integration will help create more adaptable and customized learning experiences. Nevertheless, issues concerning the compliance with accessibility, institutional preparedness, and socio-economic differences have to be resolved in order to maximize the benefits of digital learning to students with disabilities. This research will fill these gaps by offering a detailed discussion of the two factors of accessibility and effectiveness on digital learning platforms.

III. System Framework and Accessibility Design

Design and development of on-line learning spaces to accommodate students with disabilities will need to be holistic and comprehensive with the element

of accessibility, usability and adaptability. An appropriate system architecture will help in ensuring that not only will the provision of educational content be made, but also accessible and effective to various learners. It is in this section that a detailed description of online learning platforms design, important aspects of accessibility, and integration of assistive technology and inclusive design principles that will underpin the equal opportunities of learning will be described.

- **Architecture of Digital Learning Platforms**

The digital learning platforms usually have a multi layered architecture that comprises of the presentation layer, application layer and the data layer. The presentation layer is the user interface, which enables the interaction between the learner and content using web or mobile applications. In the case of students with disabilities, this layer should be designed in an accessible way, with the following features: high-contrast interfaces, keyboards navigation, compatibility with the screen reader, and custom layouts. Application layer deals with the fundamental services of the platform, such as content delivery, user services, assessment, and communication applications. This layer has the tendency to incorporate artificial intelligence elements in order to deliver a customized learning experience. With the help of AI algorithms, user behavior is analyzed, the progress is monitored, and the content is adjusted to the individual requirements of the learning process, thus increasing its accessibility and engagement. The data layer is tasked with the responsibility of storing and managing user data, learning materials and analytics. It also favors the use of data to make decisions, as it gives information on the performance and accessibility issues of learners. This layer should have secure data storage and privacy protection measures to guarantee the confidentiality and integrity of the information of users.

- **Key Accessibility Features and Design Principles**

The nature of digital learning platforms is that of accessibility, making sure that all users of the

platform, irrespective of their capacities, can comfortably operate the platform. Accessibility features are:

- Screen Reader Compatibility: Gives visual impairments users the capability to read and listen to textual and multimedia information.
- Captioning and Transcripts: Present audio and video information in text to hearing-impaired learners.
- Keyboard Navigation: Provides people with motor disabilities the opportunity to use the platform without a mouse.
- Customizable Display Settings: Users can have the option to customize font, color contrast, and layout to their liking.

The Ally accessibility tool is one of the tools that can assist these features, as it can automatically assess and enhance the accessibility of digital content (Ally, 2025). The tools can give the instructors feedback and suggestions on how to make sure they meet the accessibility standards. Simplicity, consistency, and flexibility are the key principles of design that are needed to develop accessible platforms. Interfaces must be easy to use and navigate, which will lessen the cognitive burden on learning disabled users. The presence of consistent design elements can assist users in anticipating the behavior of the system, whilst flexible layouts can meet the needs of different users.

- **Integration of Assistive Technologies**

Assistive technologies are very important in improving accessibility of digital learning platforms. The technologies help to fill this gap between the learners and digital contents and offer alternative forms of interaction. Assistive technologies such as:

- Screen Readers (e.g., NVDA, JAWS): Converts text into speech which is read out to the blind.
- Speech-to-Text Systems: This allows the user of speech or motor impaired to feed text 7 voice commands.
- Text-to-Speech: Reading difficulties: Assist the reader by reading the text and converting it to audio.

- Augmentative and Alternative Communication (AAC) Devices: It helps in communication with individuals possessing severe speech disorder.

These technologies are easier to use and students with disabilities can be able to participate in the learning process in their entirety due to the ease with which they can be converted into digital technology. Additionally, AI-based assistive technologies can provide real-time support, such as automatic captioning and language translation, that will also make accessibility improved (Acosta-Vargas et al., 2024).

- **User-Centered and Inclusive Design Approaches**

User-centered design (UCD) is one of the key methods of the creation of digital learning platforms to meet the needs of different learners. Such a methodology will also involve the users in the design and development process to ensure that their needs are well catered. The feedback of students about the experience of students with disabilities is particularly significant to comprehend where the issues with usability lie and how to improve the design. Inclusive design is more than accessibility as it takes into account the entire spectrum of human diversity, which involves various abilities, learning styles and social-economic background. Universal Design for Learning (UDL) principles offer the guidelines of executing the inclusive design in online learning.

- **Accessibility Evaluation and Compliance**

To make it accessible, constant reviews and compliance with the set of standards, in particular, the Web Content Accessibility Guidelines (WCAG), are necessary. These standards offer a detailed structure in the development of accessible web content, and the variables include principles of perceivability, operability, understandability and robustness. The evaluation techniques are automated testing tools, user testing with individuals with disabilities and expert reviews.

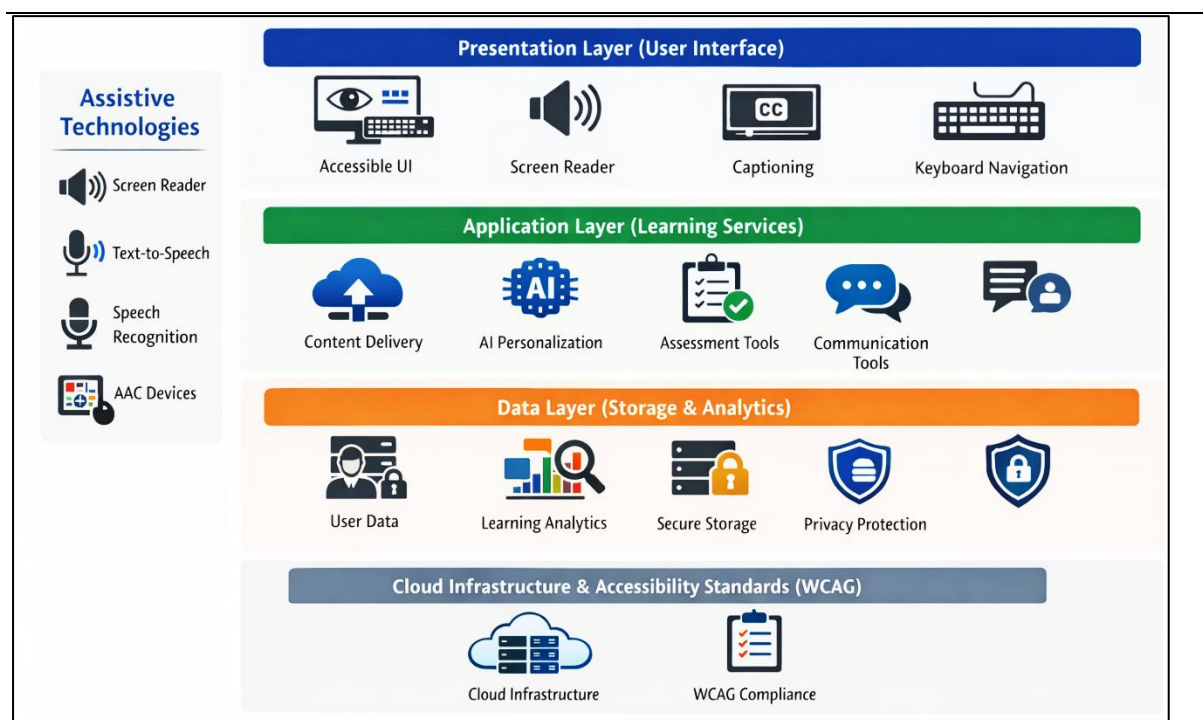


Figure 1. Architecture of Digital Platforms for Accessibility

Figure 1 shows the architecture of the digital learning platform that is planned to be a layered and integrated system providing students with disabilities with accessibility, adaptability and efficiency. The highest level of presentation provides a friendly user interface where learners can use the platform by utilizing a screen reader, capturing, keyboard navigation and custom display features where anyone with diverse needs can use the platform. Beneath this is the application layer which manages the basic learning services, including content delivery, AI-supported personalization, assessment technologies and communication features, and enables adaptive and interactive learning. Data layer allows storing and analytics, such as user data and tracking learning progress, data processing security and privacy control. Along with these layers, there are assistive technologies to facilitate the degree of accessibility and user-interaction, which include text-to-speech, speech recognition and AAC devices. The entire system is supported by a cloud infrastructure, which can be scaled, accessed remotely, and operate without any issues and in compliance with the accessibility guidelines, including WCAG that ensures an inclusive design. This architecture, in general, develops a well-rounded and user-friendly digital

learning environment that is very accommodating to the students with disabilities. Digital learning platforms can be enhanced by designing its accessibility and system structure to facilitate an inclusive learning experience. Effective accessibility control, proper architecture and assistive technology and user oriented design techniques could make a tremendous difference in the learning experience of students with disabilities. Despite the existing setbacks, the technological advances we have had now and the recognition of the issue of accessibility have given us hopeful possibilities of further development of more inclusive and effective systems of digital learning.

IV. Methodology and Evaluation Metrics

In this part, the research strategy that is used in the study to evaluate the accessibility and utility of the digital learning platforms to students with disabilities is discussed. The study design is a qualitative and quantitative research, a mixed-method, which offers an in-depth analysis. The research design, data collection process, nature of participants, evaluation criteria and performance measurement metrics are the structure of the methodology.

The study is both a descriptive and analytical study whose objective is to determine the suitability of the online learning platforms to inclusive education. Comparative evaluation approach is applied to provide a comparison between various platforms and pre-determined parameters of accessibility and effectiveness. The analysis includes both experimental measurements and user feedback in order to give a comprehensive perception of the performance of the platform. Quantitative data are used to measure the learning outputs and usability, and the qualitative responses, to indicate the user experiences and satisfaction levels. To achieve reliability and validity of the data, we use several sources to collect the data. Formal surveys, interviews as well as usability tests with the assistance of students with disabilities will be utilized to gather the primary data. The questionnaires will be constructed to capture the perception of the users in terms of accessibility, ease of use and engagement and overall learning experience. Interviews will provide a greater amount of information regarding individual issues and interests. Besides, interactions of users with the selected digital learning platforms are monitored to gather the experimental data. Other measures such as time taken to perform an activity, the rate of error and efficiency of navigation is recorded. The analytics of the platform that are used to achieve secondary data include the number of logins, time on learning modules, and the assessment scores. This type of combination of data sources will make it possible to make a fully-fledged evaluation of technical performance and user experience.

The sample size of the study is representative as it entails people of different backgrounds. The sample includes students, but these students have various types of disabilities, including the visual, auditory, motor and cognitive disabilities. The participants will be selected in the online learning platforms and institutions of higher learning. Demographic characteristics such as age, gender, educational level, kind of disability and past experience by using digital learning platforms are considered.

Accessibility is measured on the basis of the standards that have been put into place like the Web

Content accessibility guidelines (WCAG). The evaluation is made on four principles:

- Perceivability: It is necessary to have information and user interface elements that can be perceived by users (e.g., text alternatives, captions).
- Operability: The ease with which users can navigate and move about the platform (e.g. keyboards are available).
- Understandability: Designing content and interface to be understandable.
- Strength: Making sure it can be used with assistive technologies.

The platforms are evaluated according to these criteria with the help of both automated and manual testing. The assigned scores are based on the level of compliance and it is possible to compare the platforms.

The quality of digital learning platforms is measured based on various performance metrics that reflect the learning outcomes, engagement and usability. Key metrics include:

- **Learning Performance (LP):**

Measures improvement in student knowledge and skills through pre-test and post-test scores.

$$LP = \frac{Post-Test - Pre-Test}{Pre-Test}$$

- **User Engagement (UE):**

Measures the degree of engagement with the platform in terms of time spent, engagement in the activities, and access frequency.

$$UE = \frac{Time\ spent + Interaction\ count}{Total\ sessions}$$

- **Usability Score (US):**

Evaluates user-friendliness on the basis of user feedback obtained via survey.

$$US = \frac{\sum User\ ratings}{Number\ of\ users}$$

- **Accessibility Compliance Score (ACS):**

Quantifies adherence to accessibility standards.

$$ACS = \frac{\text{Number of accessible features}}{\text{Total features}} \times 100$$

- **Error Rate (ER):**

Measures the frequency of user errors during interaction.

$$ER = \frac{\text{Number of errors}}{\text{Total tasks}}$$

Such metrics have a quantitative foundation to estimate the performance of the platform and determine strengths and weaknesses.

The multicompared analysis is created to compare the different digital learning platforms against the stated measures. The platforms will be selected based on their popularity, their characteristics of being accessible, and their worth to inclusive education. All the platforms are subjected to similar conditions in order to be consistent. In form of bar charts and radar charts, results are provided in tables and graphical format. Such visuals are used in determining the differences and trends in performance of platforms. Statistical techniques are also used in order to find out the significance of observed differences. Various validation methods are used to assure reliability of the study. The application of system analytics, interview data and survey data combine to embrace triangulation. Pilot testing is also carried out to refine survey instruments, and evaluation procedures. Additionally, accessibility tests are also confirmed with reviews of experts. The suggested methodology will be an in-depth and systematic way of assessing digital learning platforms among the students with disabilities. The study offers accessibility assessment and effectiveness measures, which will give an equal balance between technical and educational aspects. The qualitative data and numerical model enable the results to be more accurate and credible, leading to evidence-based recommendations of inclusive digital education.

V. Results and Comparative Analysis

The findings of the experiment, as well as the comparative analysis of the chosen digital learning platforms according to the approach and assessment parameters outlined in the previous section are discussed in this section. The variables of interest will be the accessibility, usability, engagement and learning effectiveness of students with disabilities. The findings will be based on the user testing, survey data and the analytics generated by the system which will provide quantitative and qualitative data.

- **Experimental Results and Observations**

The experimental evaluation incorporated a number of digital learning solutions which are typically used in the higher educational setting, including Learning Management Systems and AI-based educational technologies. The respondents used these platforms over a given period where the key performance indicators such as the time taken to accomplish a particular task, adherence in accessibility and user satisfaction were observed. The results indicate that those platforms that have incorporated both the aspects of accessibility and assistive technology support have been significantly more successful in all types of users. The platforms that were inclusive of screen readers, alternative text descriptions and keyboard navigation enabled visual impaired students to interact better. Similarly, hearing impaired learners were also given the advantages of captioning and transcript that enhanced their comprehension and interest in information. Learning through personalization through AI also resulted in better learning. The content adaption platforms that altered and modified on the user behavior and preferences assisted the students to learn at their own pace resulting to greater retention and improvement in exams. The participants said that adaptive learning pathways lowered the cognitive overload and enhanced attention, especially among the cognitively disabled students.

However, a few challenges were observed during the evaluation. The accessibility conformed unevenly on certain platforms, with issues such as the improper labelling of interface items, lack of

key-board navigation, and lack of support of assistive technologies. These limitations had negative impact on user experience and consumed more time to undertake tasks by students with disabilities.

• Comparative Analysis of Platforms

A comparative assessment was made based on the metric defined, Learning Performance (LP), User Engagement (UE), Usability Score (US), Accessibility Compliance Score (ACS) and Error Rate (ER). It was found that there were platform performance differences in the comparison. The sites with better scores on the accessibility compliance criteria (more than 85) were always simpler to work with, and had fewer errors. These platforms were user-friendly, and their content had a good arrangement and easy integration with assistive technologies. On the other hand, the less accessible websites obtained lower scores on the

compliance criteria of accessibility and contained more mistakes and decreased user satisfaction. The interactive aspect of the learning programs that were in the form of discussion forums, real-time feedbacks and gamified learning were critical in determining the degree of user engagement. Websites that had these inbuilt functions acquired more engagement rating which implies that, there is more learner involvement and engagement. Conversely, the sites with less engagements were those that contained only the static information and were not the most interactive sites. The performance on learning, as assessed by pre-test and post-test, had a positive relationship with accessibility and personalization features. The students who used platforms that had adaptive learning capabilities had better performance increases than the conventional ones. This underscores the need to incorporate intelligent technologies in order to facilitate various learning requirements.

Table 1. Comparative Analysis

Platform	LP (Learning Performance)	UE (User Engagement)	US (Usability Score)	ACS (%)	ER (Error Rate)
Platform A (AI + Accessible LMS)	0.82	0.78	4.5/5	92%	0.08
Platform B (Standard LMS)	0.65	0.60	3.8/5	75%	0.15
Platform C (AI-based Tool)	0.88	0.83	4.7/5	90%	0.06

As Table 1 shows, Platform C, offering a combination of AI-based personalization and powerful accessibility features, has obtained the best results on most metrics. Platform A also fared well as it had a high accessibility compliance and usability. Platform B, which did not feature

advanced accessibility and AI functions, had a lower performance.

Graphical representations are made to further explain the comparative results.

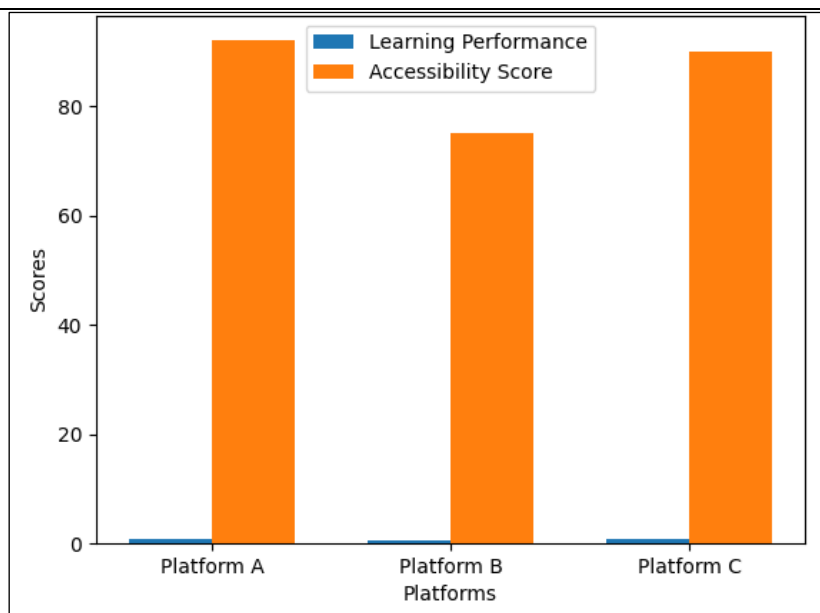


Figure 2. Learning Performance and Accessibility

Figure 2 shows that the performance of learning (LP) and compliance with accessibility (ACS) between the platforms vary. It demonstrates that Platform C scores the highest points in both

measures as well as Platform A, and Platform B trails after. It means that platforms that have greater accessibility characteristics are likely to deliver good learning outcomes to students with disabilities.

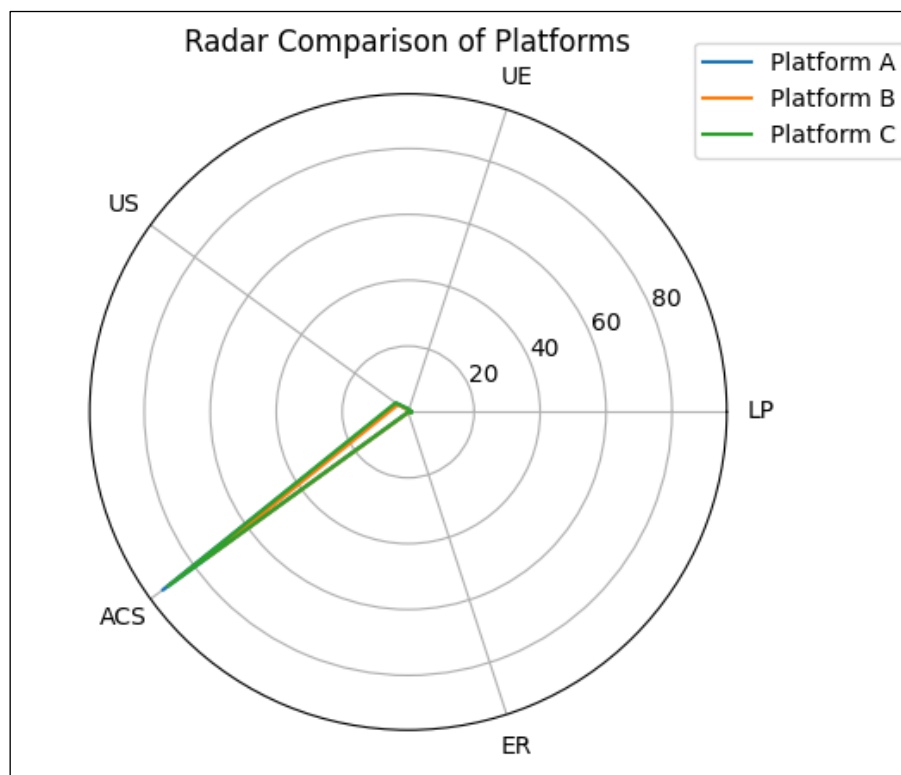


Figure 3. Comparison of Platforms

Figure 3 is a multidimensional comparison between all five metrics, namely, learning performance, user

engagement, usability, accessibility, and error rate. Platforms A and C have more sizable and balanced

shapes signifying excellent aggregate performance. Platform B, on the contrary, has a smaller and distorted form, which represents a low level of effectiveness and increased rates of error.

The keys findings are: The High accessibility compliance results in better usability and fewer errors, AI-based personalization can greatly improve learning performance and user satisfaction, Platforms with no accessibility options are less productive and less satisfactory to users, User-centered design is a key factor in creating inclusive digital learning systems. The comparative analysis shows how the accessibility and intelligent technologies are crucial in improving digital learning platforms among students with disabilities. Social networks that are well-designed, incorporate accessibility and assistive technologies, and personalization with AI can be evaluated as the most successful in all assessed metrics.

VI. Conclusion and Future Work

The increased adoption of online learning platforms has changed the learning system and introduced new opportunities to enhance accessibility and inclusivity of students with disabilities. This paper discussed the availability and effectiveness of such platforms, how they can support a diversity of learning needs, through technological innovation, inclusive design, and adaptive learning processes. The results underscore the fact that in case they are designed and implemented correctly, digital learning platforms can greatly alleviate the educational barriers and facilitate fair learning. Among the key conclusions of the current paper, it is possible to mention such critical element as accessibility as a critical determinant of the effectiveness of digital learning platforms. The more accessible learning platforms, such as WCAG, and assistive technologies help to make learning platforms more usable, reduce errors and increase satisfaction in the learners. The ability of screen readers to be compatible, the presence of captioning, keyboard navigation and personalized interface enable students with disabilities to access the digital content in a more productive way. These sites are even more inclusive as such devices as accessibility

checkers, automated content improvement systems, etc., are included. The other valuable discovery is that artificial intelligence can be used to promote individual learning processes. The systems based on AI can provide the ability to deliver the content in an adaptive way, provide feedback in real-time, and conduct intelligent assessment, enabling students to learn at their own pace and based on their personal needs. The focus on the user-centered and inclusive design strategies is also incorporated in the study. Developed services based on the feedback of people on the disabled are more prone to find solutions to the real life issues and offer effective solutions. The implementation of the Universal Design Learning (UDL) principles makes sure that digital learning environments are designed to suit a diverse group of learners with the provision of various means of representation, engagement, and expression. Such designing plans get involved into enhancing accessibility and general effectiveness of education. Despite the importance of the advantages posed by digital learning platforms, they have several challenges. Among the greatest concerns is the lack of standardization when it comes to the adoption of the accessibility standards on the platforms. In contrast to other systems which are highly compliant, the others do not have the accessibility features needed resulting in diversity in user experience. Another factor is also the digital divide that puts an advantage over not all students since not all have an equal access to good internet connectivity and digital equipment. The absence of awareness and training of educators and developers is also a factor in the inability to successfully use accessible technologies. Security and privacy are also a significant issue as far as implementing digital learning platforms is concerned. Such systems are becoming more based on the data-driven approach and consequently, the information of users must be secured. To build trust and safety of sensitive data, especially in the context of the vulnerable groups of users, secure data storage, encryption and ethical application of AI is required.

The research should be guided in the future with the perspective of eradicating these difficulties and improving designing inclusive digital learning systems. The introduction of the newest

technologies including the virtual reality (VR), augmented reality (AR) and learning immersions is one of the opportunities. The technologies can provide more interactive and exciting learning activities especially to the sensory and cognitive disabled students. Also, predictive learning and personalization can be further strengthened with the creation of more advanced AI models. Normalisation of accessibility assessment frameworks is the other helpful area that should be involved in the future. Online learning platforms will be assessed and compared in a more standardized way since the use of standardised metrics and assessment tools will allow it. This will

assist in making a wise choice by teachers and schools on platforms to embrace in inclusive education. In addition, the interdisciplinary nature of the work of educators, technologists, policymakers, and experts in the field of accessibility is the key to the innovation in this field. Other policy structures/ regulations like accessibility laws and guidelines among others should also be on-going development to make sure that digital learning platforms can meet the needs of every learner. The education programs and sensitization could be a major source of the use of inclusive practices.

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