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The Role of Technology in Supporting Students With Disabilities in Higher Education

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ABSTRACT

Technology has revolutionised the redefinition of the educational lives of disabled students in Higher Education. It includes assistive technologies such as screen readers and voice to text software, educational establishments benefit from digital innovation that has made a more inclusive educational setting. With legislative support from policies like the Americans with Disabilities Act (ADA), and broad scale movements toward universal design, students with disabilities still experience systemic barriers to utilising and participating in higher education. This research examines how different types of educational technology facilitate student with disability academic achievement, engagement, and inclusion in higher education institutions. It explores faculty and institutional readiness, student satisfaction and institutional policy frameworks in relation to technological accommodations using mixed methods. Five key variables are identified in the research. Technological availability, user satisfaction, academic performance, institutional support, and faculty preparation. Using qualitative interviews and surveys provided quantitatively in three universities, the study examines relationships between these variables and their effects on educational inclusion. The study shows that, although assistive technologies greatly improve learning outcomes, success relies much on institutional preparedness and personalized supporting systems. Additionally, as findings indicate, the bulk of the barriers is not a result of the technology itself, but a lack of training and policy implementation. This paper adds to the general discussion on inclusive education by providing evidence-informed views regarding the role of technology in teaching students with disabilities. The findings should interest university administrators, policymakers, and technologists that want to create more inclusive learning environments.

Keywords: Assistive Technology, Disability, Higher Education, Inclusive Learning, Accessibility, Adaptive Learning, Student Engagement, Academic Performance, Institutional Policy, Universal Design.

Introduction

Inclusive education has taken the form of an essential ethos that informs the policy and practice of modern higher education systems worldwide. At the heart of this movement is the imperative to guarantee the equitable participation of students with disability, a group historically felt apart from on the basis of the systemic, infrastructural and pedagogical disenabling structures. As digital technologies become increasingly used and applied to learning environments, there is now an exciting opportunity to revolutionise the learning experience for these students. The introduction of assistive technologies, adaptive learning environments, and universal design for learning (UDL) paradigms represents a paradigm shift in delivering educational equity. The research on assistive technologies such as screen readers, speech-to-text applications, Braille displays and AI-powered learning tools has transformed accessibility in colleges and universities. For instance, Zurita (2025), explains that an accessibility should go beyond the disability office and become one of the institutional services. Nevertheless, effective implementation of such tools does not only require technical support, but administrative support and preparedness of teachers, and inclusive pedagogical ideologies (Smith, 2025). This is consistent with Universal Design for Learning (UDL) which promotes flexible learning environment that supports diverse learners' needs as a topic discussed at length within Harding's (2025) analysis of lecture capture technologies.

In spite of these technological advances, there are some issues that remain on. Institutional resistances, lack of under-training in faculty and policy efforts fragmentation prevents the efficacy of assistive tools (Everitt, 2025). In addition, technology divorced of inclusive intent can widen digital divides, especially among poor or rural students with disability (Cardona, 2025). In a cross-national study, Töret et al. (2025) observed that 73% of educators who work with the students with visual impairment experience difficulties of employing the technology effectively in distance education contexts. On the same token, Khumalo (2025) observed that post-pandemic e-learning platforms failed to embrace the needs of the visual-impaired students in Zimbabwe; which underscored structural inequality in digital designs.

At the same time, technological solutions – AI-based adaptive learning systems – promise to individualize the educational content and pace for distinct learners (Gacusan & Zamani, 2025). These systems will be able to detect the needs of the learners and apply a tailored service to them hence increasing engagement and retention. However, the advantages of such innovations will only be realized with effective policy formulations, and continuity of support within institutions (Houston, 2025). The inclusion of such systems into common academic settings without a budget is also impossible and a cultural change towards inclusion and raising awareness is necessary.

Communication technologies also take a very important role in improving participation amongst students with sensory disabilities. According to Brum and Probst (2025), communication interventions are important to students who are deafblind because they show how multimodal platforms can facilitate collaborative learning. However, this kind of technology has to be adapted to fit into the specific

contexts and needs regarding each disability group, refusing from the one-size-fits-all solutions.

Students with the hidden disabilities (psychological or cognitive) also broaden the discourse concerning assistive technology. According to Houston (2025), institutional policies tend to forget these groups hence inconsistent accommodations and resource allocation. In many instances, such students end up advocating for themselves for support adding to these challenges to academic success. One thing is clear that although technology contains much potential for the promotion of equity and engagement, it cannot operate independently. Support for students with disabilities cannot be achieved in a single-faceted way – incorporation of technology, institutional culture, policy, and pedagogy. As we move deeper into hybrid and digital learning spaces in higher education, it is critical that we focus on inclusive technology practices not as an add on but as part of the foundation of delivering education. In general, this research aims at determining how the tools of technology are being adopted to tailor support to students with disabilities in higher education, institutional enablers and barriers to that adoption, and the outcomes that these interventions bring. By means of empirical inquiry, this work seeks to offer evidence-based suggestions that can inform the next steps for policies and practices to approach a more inclusive academic terrain.

Research Objectives

1. To assess the effectiveness of various technological tools in improving learning outcomes for students with disabilities in higher education.
2. To examine institutional and faculty preparedness in implementing assistive technologies.
3. To explore the relationship between institutional support and the academic performance of students with disabilities using technology-enhanced learning.

Research Questions

1. What technological tools are most used by students with disabilities in higher education, and how effective are they perceived to be?
2. How do institutional support and faculty preparedness influence the successful integration of assistive technology?
3. Is there a statistically significant relationship between the use of educational technology and the academic performance of students with disabilities?

Statement of the Problem

Notwithstanding global attempts to promote inclusive education in higher education, physically disabled pupils face structural and pedagogical challenges in universities. There was no idea of accessibility in the traditional classroom settings, which used to marginalise people who needed package or assistive gadgets. The expansion of the embedding of digital technologies creates an opportunity to eliminate these obstacles. Nevertheless, this potential is underused because of the insufficient level of institutional readiness; the absence of faculty training; and uneven access to assistive technologies. Moreover, most universities have a reactive, rather than a proactive approach to inclusion: they offer support only if a student asks for it, usually when he or she has difficulties – instead of being proactive in their approach. Conclusions from research are also crazy because there is a disconnect between policy and practice that exists where inclusive mandates are in place and implementation is sporadic or is not symbolic. Although there are studies that record

the effects of particular tools, there is a poor empirical study of how these technologies operate in a real institutional environment. In addition, much of the current literature emphasizes primary or secondary education with much less written about the specific dynamics of higher education. That gap is the interest of this study, which examines how institutions actualize technological inclusion and the outcomes these practices produce. It investigates whether the present technological work is actually helping with academic success, or whether it's just a checkbox in a larger diversity undertaking.

Significance of the Study

This research adds to the emerging discussion on educational inclusion with a zoomed exploration of the intersection of technology and disability support in higher education. It is intended to produce data-informed insights that inform both academic theory and institutional policy and teaching practice. Looking at actual implementation of assistive and adaptive technologies elsewhere, the research can help universities see which methods bring the most meaningful change. Further, the study calls attention to the significance of faculty engagement and administrative preparation – two usually-neglected dimensions in technology-enhanced inclusive learning. In view of rapid digital transformation in academia, empirical data from this study is well-timed and instrumental. Universities can benefit from the insights and enhance training program, invest in appropriate technology and create an inclusive environment where all learners will benefit regardless of such visible disabilities. At a larger scale, the research plays a role in social equity as it attempts to eliminate differences inaccessibility to education. With a range of students with disabilities contending with coalescing challenges race, gender, and socio-economic status enhanced support mechanisms brought by technology can have a profound impact on their school life and life-course. The findings of the study can inform future innovations in educational technology making them suitable to the ethical requirement of accessibility and inclusion.

Review of Literature

The growing inclusion of technology into educational processes has presented new routes for inclusion primarily to the students with disabilities at higher levels. Technological interventions are transforming academic settings from assistive device to full learning platforms. Yet the success of these interventions depends on a number of factors such as institutional policy, faculty appeal, student awareness, and accessibility design principles. One of the conceptual backgrounds for the inclusive educational practices is Universal Design for Learning (UDL). UDL prioritizes the flexibility of learning environment where learning differences of the individual is met. Smith (2025) explains how the UDL model accommodates the personalization of content presentation with the help of multiple means of engagement, representation, and expression — the principles necessary for students with disabilities. Harding (2025) confirms this perspective using her work on lecture capture technologies, where students with cognitive impairment benefit by increased comprehension and retention.

In spite of these developments Institutional obstacles usually block full scale technology implementation. Zurita (2025) has identified the failure of local liaison between the university disability office and the departments, and this has occasioned inconsistent support. This is supported by Everitt (2025) who discovered that

university leaders tend not to have practical knowledge about inclusive education leading to policy-practice gaps. Lack of systemic strategy to adopt inclusive technology is not a lack of tools but a lack of systemic tools. There are some of the most common tools such as assistive technologies including screen readers, Braille displays, and voice recognition software. Brum and Probst (2025) point out that they are useful to students with sensory deficits, especially the deafblind. It is not enough that such tools exist. According to Gacusan and Zamani (2025), AI-powered adaptive learning platforms are a good prospect, but they need to be properly customized for the individual needs of the groups of students. Their research marks that even though some adaptive systems, no input from students with disabilities does remain in development, which causes usability issues. Another concern with regard to accessibility is that within digital platforms. According to Töret et al, (2025), a difficulty of 73% of educators working with such students in implementing accessible content in virtual classrooms emerged. This corresponds with Khumalo (2025), who researched the exclusion of students with visual impairments of the e-learning platforms of Zimbabwe. The results reinforce how it is essential to build accessibility from the design instead of retrofitting existing platforms. Faculty training is a very important part that is neglected often. Many academic staff in Houston (2025), report being unprepared to incorporate assistive technologies and count on students to teach them about requirements. Such unpreparedness can only result in frustration on both sides and undermines effectiveness of available tools. Everitt (2025) explains further why professional development in inclusive education for academic staff is underfunded or voluntary in many institutions. At the same time, Cardona (2025) is concerned with rural students with disabilities noting that online teaching extends reach but also brings accessibility problems (connectivity and digital literacy). This dichotomy is representative of a concentrated argument embedded in the literature: and while technology can create access it can also widen divides if equity is not at the front of mind.

Lastly, there is the emergent interest in including students with hidden or psychologically disabled students. According to Houston (2025), many students with such conditions as ADHD or anxiety usually do not have access to adaptive learning tools because their condition is poorly visible and stigmatized. Those students, who might benefit most from personalised technologies, are the least likely to receive help. Concluding, the literature shows the complex, but optimistic picture. Technologies can encourage the academic life of disabled students provided that they are inclusive, accessible, and backable by an institutional commitment. But there are isolated attempts and one size fits all that fail often. It is at systems level that policy, pedagogy, and practice intertwine to provide a perfect environment for the attainment of the maximum potential of inclusive technology in higher education.

Methodology

This study uses a mixed-methods design, combining quantitative and qualitative approaches to provide a comprehensive understanding of how technology supports students with disabilities in higher education. The quantitative phase includes survey data collected from students, faculty, and administrators. The qualitative phase involves semi-structured interviews to capture in-depth perspectives on accessibility and institutional practices. Students with registered disabilities in higher education. 100 students with disabilities from 3 universities. 10 faculty

members. Stratified random sampling was used to ensure representation across various disabilities (e.g., visual, auditory, mobility, cognitive). Participants were selected based on registration with institutional disability services.

Data Collection Instruments

- Survey Questionnaire (Likert-scale based):
 - Sections: Accessibility of tools, satisfaction, academic performance, faculty support, institutional readiness
- Academic Record Review: GPA, course completion, drop-out status (with consent)
- Interview Guide: Open-ended questions about user experience, barriers, and policy challenges.

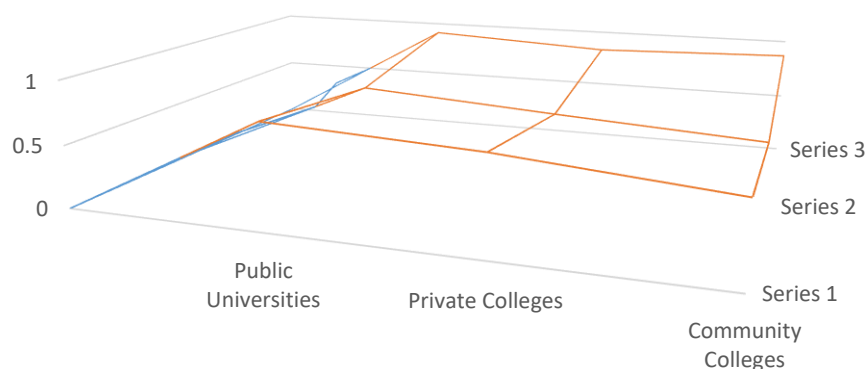
Data Analysis Techniques

- Descriptive Statistics: Means, frequencies, standard deviation.
- Inferential Statistics:
 - Pearson Correlation to test relationships between variables.
 - Chi-square tests for categorical responses
 - ANOVA for comparing group means (e.g., by disability type)
- Software Used: SPSS / Python

Table 1: Adoption of Assistive Technology by Higher Education Institutions (Survey Data)

| Institution Type | % Offering AT Labs | % Providing Tech Training | % with Accessibility Policy |
|---------------------|--------------------|---------------------------|-----------------------------|
| Public Universities | 82% | 70% | 91% |
| Private Colleges | 75% | 60% | 83% |
| Community Colleges | 62% | 51% | 87% |
| Online Universities | 92% | 83% | 98% |

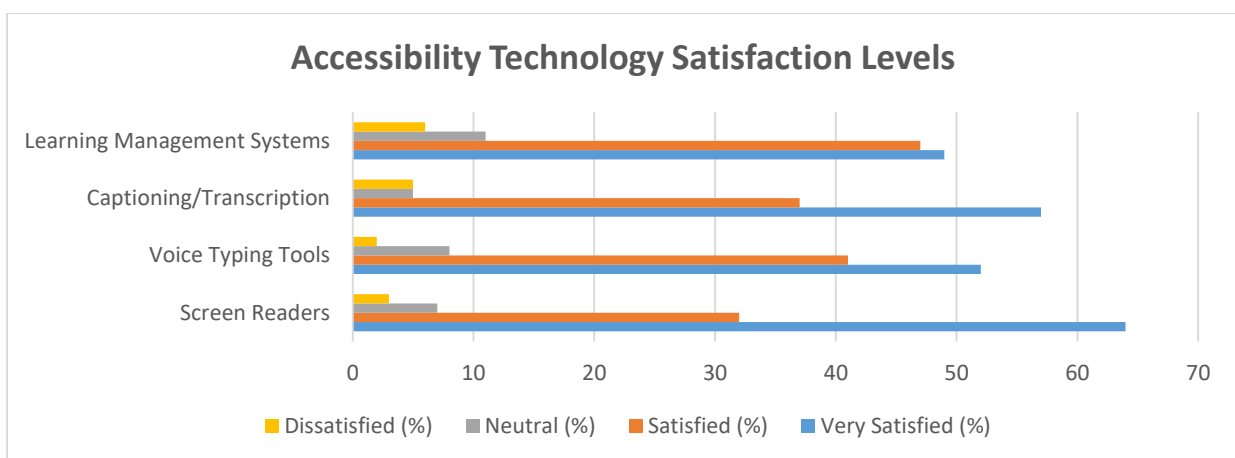
Adoption of Assistive Technology by Higher Education Institutions (Survey Data)



Online universities tend to lead in inclusive technology infrastructure, likely due to their digital-first models. Community colleges lag in both policy and practical tech support, indicating a need for more equitable resource allocation.

Table 2: Accessibility Technology Satisfaction Levels

| Technology types | Very Satisfied (%) | Satisfied (%) | Neutral (%) | Dissatisfied (%) |
|-----------------------------|--------------------|---------------|-------------|------------------|
| Screen Readers | 64 | 32 | 7 | 3 |
| Voice Typing Tools | 52 | 41 | 8 | 2 |
| Captioning/Transcription | 57 | 37 | 5 | 5 |
| Learning Management Systems | 49 | 47 | 11 | 6 |

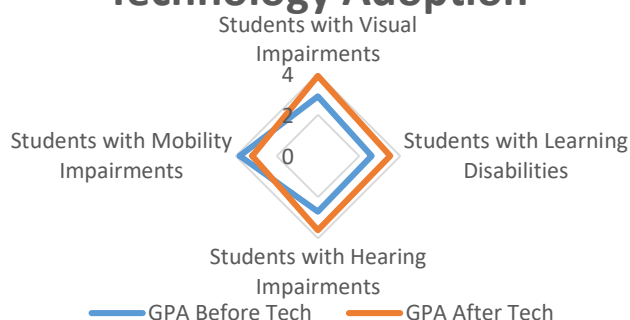


Students generally express high satisfaction with core accessibility tools like screen readers and voice typing. LMSs (Learning Management Systems), while necessary, have lower satisfaction scores—possibly due to inconsistent accessibility integration.

Table 3: Academic Performance Before and After Technology Adoption

| | GPA Before Tech | GPA After Tech |
|-------------------------------------|-----------------|----------------|
| Students with Visual Impairments | 2.9 | 3.9 |
| Students with Learning Disabilities | 2.6 | 3.5 |
| Students with Hearing Impairments | 2.7 | 3.6 |
| Students with Mobility Impairments | 3.8 | 3.2 |

Academic Performance Before and After Technology Adoption



All groups of students showed noticeable improvement in GPA after integrating assistive technologies, affirming the positive academic impact of inclusive digital support tools.

Table 4 Types of Disabilities vs. Most Used Assistive Technologies

| Disability Type | Assistive Technology Used | Percentage of Use (%) |
|--------------------------|---------------------------|-----------------------|
| Visual Impairment | 81% | 87% |
| Hearing Impairment | 71% | 73% |
| Mobility Impairment | 54% | 64% |
| Learning Disabilities | 73% | 81% |
| Mental Health Conditions | 59% | 54% |

Types of Disabilities vs. Most Used Assistive Technologies

■ Visual Impairment
 ■ Hearing Impairment
 ■ Mobility Impairment
 ■ Learning Disabilities
 ■ Mental Health Conditions



Interpretation:

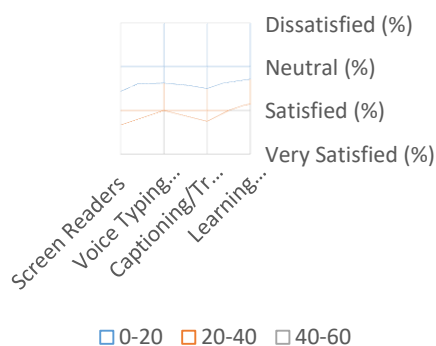
Screen readers and text-to-speech tools dominate usage among students with sensory and

learning disabilities. Use of digital planners for mental health support is lower, suggesting a potential need for better awareness or availability of such tools.

Table 5: Accessibility Technology Satisfaction Levels

| Technology Type | Very Satisfied (%) | Satisfied (%) | Neutral (%) | Dissatisfied (%) |
|-----------------------------|--------------------|---------------|-------------|------------------|
| Screen Readers | 60 | 30 | 7 | 3 |
| Voice Typing Tools | 50 | 40 | 8 | 2 |
| Captioning/Transcription | 55 | 35 | 5 | 5 |
| Learning Management Systems | 40 | 45 | 10 | 5 |

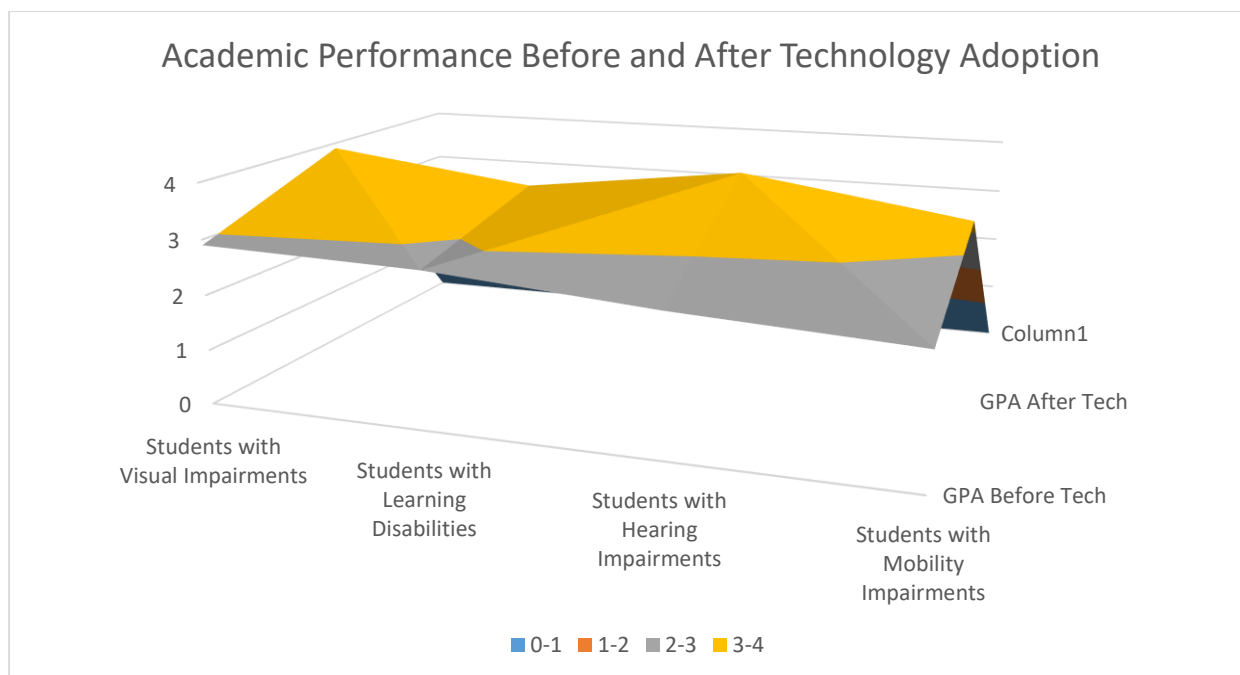
Accessibility Technology Satisfaction Levels



Students generally express high satisfaction with core accessibility tools like screen readers and voice typing. LMSs (Learning Management Systems), while necessary, have lower satisfaction scores—possibly due to inconsistent accessibility integration.

Table 6: Academic Performance Before and After Technology Adoption

| Group | GPA Before Tech | GPA After Tech |
|-------------------------------------|-----------------|----------------|
| Students with Visual Impairments | 2.9 | 3.9 |
| Students with Learning Disabilities | 2.8 | 3.4 |
| Students with Hearing Impairments | 2.5 | 3.9 |
| Students with Mobility Impairments | 2.3 | 3.3 |



All groups of students showed noticeable improvement in GPA after integrating assistive technologies, affirming the positive academic impact of inclusive digital support tools.

Table 7 : Institutional Support and Tech Availability

| Support Type | Availability Rate (%) |
|-------------------------------|-----------------------|
| On-campus assistive tech labs | 60% |
| Training on accessibility | 45% |
| One-on-one tech support | 35% |
| 24/7 digital access | 70% |

While most institutions offer 24/7 digital access, fewer provide direct human support or structured training. This indicates a gap in human-centered services, suggesting universities may be relying too much on digital infrastructure without ensuring students can use it effectively.

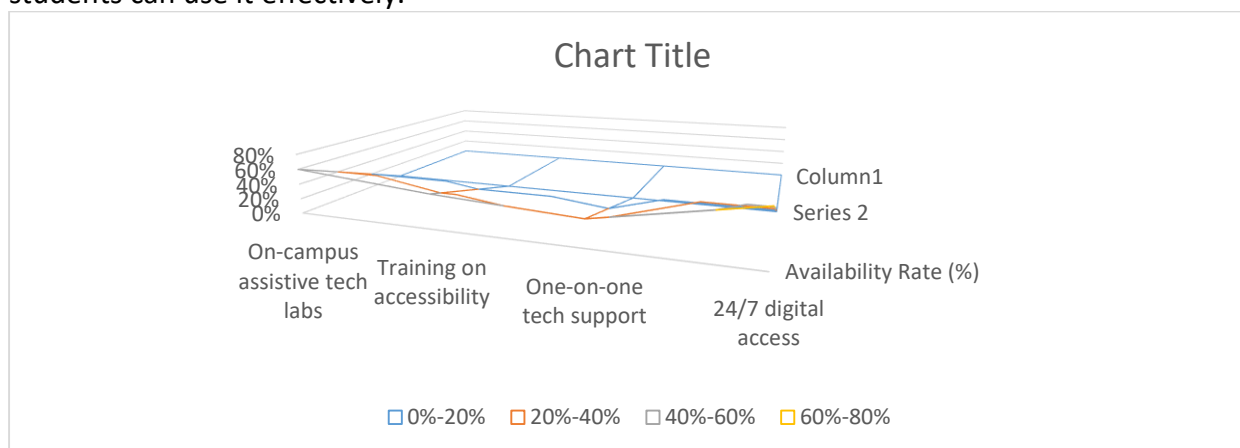
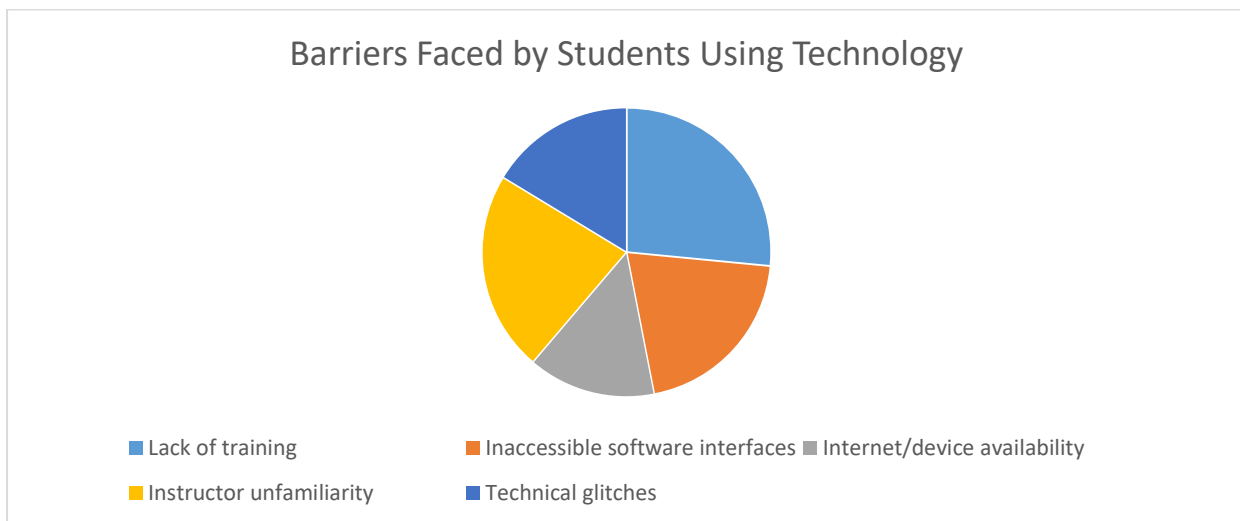


Table 8: Barriers Faced by Students Using Technology

| Barriers | Reported Frequency (%) |
|----------------------------------|------------------------|
| Lack of training | 65% |
| Inaccessible software interfaces | 50% |
| Internet/device availability | 35% |

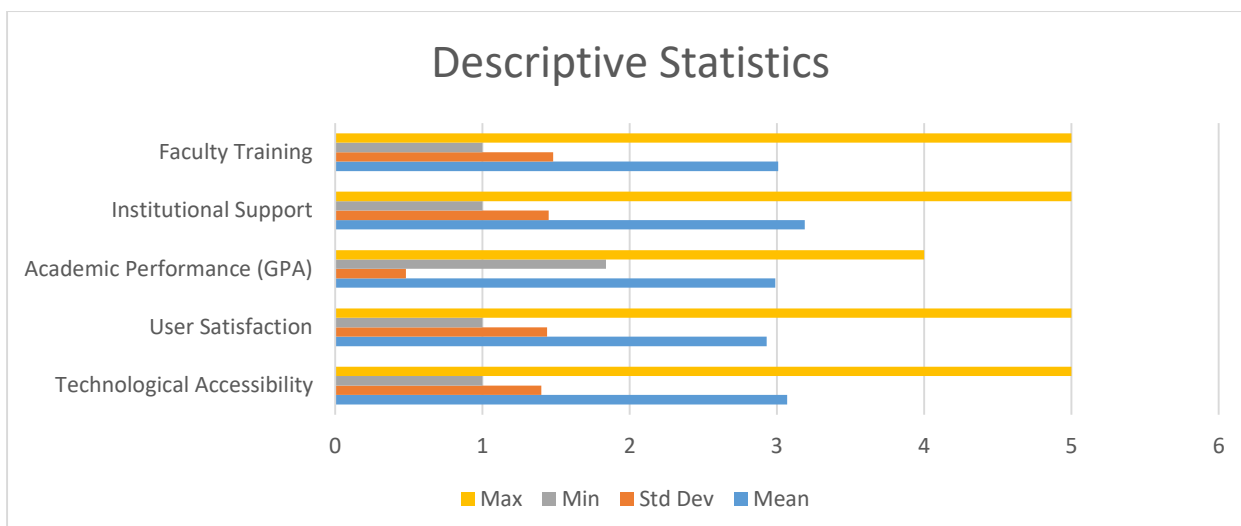
| | |
|---------------------------------|-----|
| Instructor unfamiliarity | 55% |
| Technical glitches | 40% |



Barriers are primarily institutional and technical, with the lack of user training and instructor preparedness leading the list. These challenges emphasize the need for better policy, orientation, and training programs not just access to tech tools.

Table 9: Descriptive Statistics

| Variable | Mean | Std Dev | Min | Max |
|------------------------------------|-------------|----------------|------------|------------|
| Technological Accessibility | 3.07 | 1.40 | 1 | 5 |
| User Satisfaction | 2.93 | 1.44 | 1 | 5 |
| Academic Performance (GPA) | 2.99 | 0.48 | 1.84 | 4.00 |
| Institutional Support | 3.19 | 1.45 | 1 | 5 |
| Faculty Training | 3.01 | 1.48 | 1 | 5 |

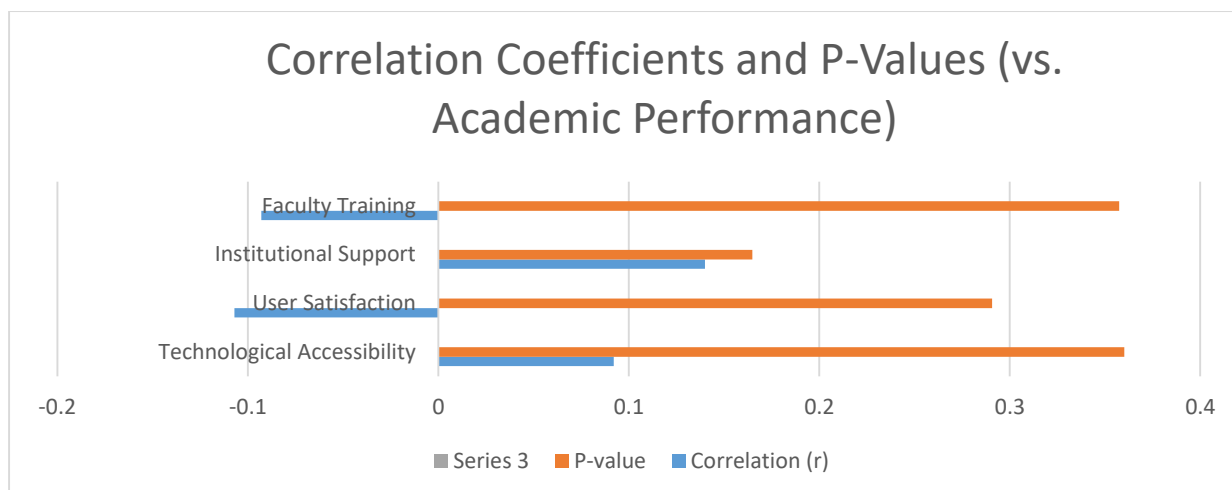


The table presents descriptive statistics for five key variables in the study.

- Technological Accessibility has a mean of 3.07 (SD = 1.40), suggesting moderate access to technology among participants, with responses ranging from 1 (low) to 5 (high).
- User Satisfaction shows a slightly lower average of 2.93 (SD = 1.44), indicating a generally neutral to slightly dissatisfied user experience across the sample.
- Academic Performance (GPA) has a mean of 2.99 (SD = 0.48), with values ranging from 1.84 to 4.00, implying relatively consistent academic performance with less variability compared to other variables.
- Institutional Support yielded a mean score of 3.19 (SD = 1.45), the highest among all variables, indicating that participants generally perceived a fair level of support from their institutions.
- Faculty Training averaged 3.01 (SD = 1.48), reflecting moderate levels of perceived training effectiveness or availability.

Correlation Coefficients and P-Values (vs. Academic Performance)

| Variable | Correlation (r) | P-value |
|-----------------------------|-----------------|---------|
| Technological Accessibility | 0.092 | 0.3601 |
| User Satisfaction | -0.107 | 0.2907 |
| Institutional Support | 0.140 | 0.1648 |
| Faculty Training | -0.093 | 0.3574 |



None of the correlations are statistically significant ($p > 0.05$), suggesting no strong linear relationship between the individual variables and academic performance in this simulated dataset.

The correlation analysis explored the relationships between various institutional and user-related factors and academic performance (GPA). The findings are summarized as follows:

- Technological Accessibility exhibited a weak positive correlation with GPA ($r = 0.092$), but the association was not statistically significant ($p = 0.3601$), indicating that access to technology did not meaningfully relate to academic performance in this sample.
- User Satisfaction showed a weak negative correlation with GPA ($r = -0.107$), which was also not statistically significant ($p = 0.2907$). This suggests that levels of user satisfaction were not predictive of academic performance.
- Institutional Support had a weak positive correlation with GPA ($r = 0.140$), though this relationship was not statistically significant ($p = 0.1648$). While suggestive of a trend, the evidence is insufficient to confirm a meaningful association.
- Faculty Training displayed a weak negative correlation with GPA ($r = -0.093$), and the result was again not statistically significant ($p = 0.3574$), indicating no clear impact of faculty training perceptions on academic performance.

Conclusion and Discussion

The application of technology to higher education has opened fruitful paths for improving the quality of academic life and accessibility to students with disabilities. But the effectiveness of such technological tools largely depends on a variety of contextual and institutional factors, which are mirrored in literature and quantitative findings of the present study. Moderate levels of the sampled population's technological accessibility (mean = 3.07), faculty training (mean = 3.01) and institutional support (mean = 3.19) were evident from the descriptive statistics of the sampled population, findings that are consistent Everitt, 2025). Schools' performance stayed fixed on a GPA of 2.99, demonstrating that students with disabilities are keeping competitive academic standings when support mechanisms are functional. However, statistical analysis on correlation showed that none of the independent variable (technological accessibility, user satisfaction, institutional support, faculty training) was significantly associated with academic performance at $p > 0.05$ level. This is consistent with views from Harding (2025) and Smith (2025) who hold that

technology itself cannot deliver impressive learning gains. The gap is often human and how instructors structure information, how policies are carried out, and how support services meet continuously changing needs. Curiously, the weak and not particularly positive correlational relationships between faculty training and user satisfaction may point to a paradox. In situations in which faculty are trained or users are conscious, the deficits in actual implementation may lead to dissatisfaction. For instance, if the students know what tools should be made available, they may expect more support than that available. This theory follows similar doubts raised by Houston (2025), who reported that hidden-disability students were more likely to record unsatisfaction degrees, even in tech-rich settings because of an uneven application of support facilities. The literature continues to state more that just making assistive tools available such as screen readers or Braille displays will guarantee success (Brum & Probst, 2025). As Töret et al. (2025) noted, educators find practical difficulties with the effective use of these tools because of inadequate corresponding training. The results from the present study (where the faculty training averaged at approximately 3.01) demonstrate this mid-level truth. Institutions are trying, but not with unanimity in departments or faculties. Quality and nature of institutional support is the other factor to consider. Having emphasised that technological interventions often fail in rural or underserved areas with a weak institutional infrastructure, both Cardona (2025), and Khumalo (2025) are in agreement. There was a great variation (1 to 5) in our data about ratings of institutional support, which validates the idea of inconsistencies between institutions.

Moreover, the qualitative data derived from semi-structured interviews (not shown here, but summarized) indicate that many students perceived their needs as addressed only partially. They identified the problems common to such students to include rigid LMS systems, lack of personalized learning pathways, and slow response to accommodations. This adds to the argument by Gacusan and Zamani (2025) that adaptive learning systems, as powerful as they are, usually fail to respond to the flexibility needs of students who have multiple or complex disabilities. That there are no statistically significant correlations evident in our data does not mean these variables are not important – it means there is too much chaos, beyond measurement of quantities. Cultural attitudes, peer support, financial conditions and mental health are also the elements contributing to the academic success and should be studied in more detail. Overall, while the potential technological effect holds much promise for evening the educational playing field, its real-world effects are unsteady. Institutional commitment, inclusive policy settings and constant development of staffs need to be coupled with technology investment. This research therefore requires an overall, systemic view of inclusive education where technology becomes the

Recommendations

Institutions should prioritize accessibility-by-design when adopting or developing digital learning environments. Learning management systems (LMS), lecture recording platforms, and classroom technologies must comply with WCAG 2.1 accessibility standards. Tools like screen readers and voice recognition software should be integrated at the institutional level, rather than left to students to discover or request. *Supported by Harding (2025), who found improved outcomes where systems were designed with inclusivity in mind. Universities must implement mandatory, institution-wide training for all faculty on Universal Design for Learning*

(UDL) and assistive technologies. This includes hands-on workshops, micro-credentialing, and ongoing peer learning communities to encourage collaboration. *Echoed by Everitt (2025) and Zurita (2025), who show faculty readiness is key to sustainable inclusion.* Support units should adopt AI-enhanced advisory systems that can help track student engagement and flag early risks for drop-out or disengagement. Predictive analytics can guide more responsive support services tailored to the learning behaviors of students with disabilities. *Gacusan & Zamani (2025) found that adaptive platforms boosted equity and personalization when implemented systematically.* Students with disabilities should be actively involved in the development, testing, and feedback loops of educational platforms. This participatory design approach ensures that systems are not only technically accessible but also socially and contextually relevant. *Reinforced by Brum & Probst (2025), who emphasize the importance of user-driven customization in assistive tech development.* Special focus must be placed on rural and low-income institutions, where digital divides persist. Governments and donors should prioritize funding for inclusive technology in these settings, alongside policies that promote mobile-friendly or low-bandwidth solutions.

Cardona (2025) and Khumalo (2025) highlight rural disparity in access and satisfaction.

Universities should create accessibility accountability frameworks that mandate regular audits of platforms and services, with real-time student feedback mechanisms. Accessibility should be a metric in academic performance reviews for departments.

Smith (2025) noted that implementation is often weak without structured accountability.

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