RESEARCH PAPER

The Role of Accessibility and Inclusivity in Instructional Materials in Enhancing Learning for Higher Education Students

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ABSTRACT

This study explores the role of accessibility and inclusivity in instructional materials in enhancing learning experiences in higher education. It investigates how instructional materials supports accessible and inclusive environments and identifies barriers hindering these efforts. A descriptive survey design was adopted, using a mixed-method (QUAN-qual) approach with an explanatory sequential design. The sample included 16 department heads, 80 teachers, and 320 students, selected through convenient and random sampling. Data collection tools, including questionnaires and interviews, were validated using expert reviews and tested for reliability with Cronbach's Alpha. Data were analyzed in SPSS-24 using descriptive statistics and correlation techniques. Most respondents found the university website accessible (mean score = 3.36, SD = 1.36). They also recognized support for students requiring accessible content (mean = 3.37, SD = 1.22). The study recommends that the universities should prioritize the development of accessible instructional and digital materials while providing assistive technologies to address diverse student needs.

| **KEYWORDS** | Accessibility in Education, Assistive Technologies, Higher Education Learning, Inclusive Instructional Materials, Student-Centered Learning |

Introduction

Accessibility and Inclusivity in Education are two important concepts that promote equitable learning opportunities for all individuals, regardless of their abilities, backgrounds, or differences. These concepts aim to create an educational environment that fosters diversity, empowers learners, and ensures that every student has the chance to reach their full potential. According to the United States Department of Education, Structural barriers are key issues affecting educational equity, including unequal funding system between high and low socioeconomic areas (U.S. Department of Education 2016).

Accessibility and inclusivity are there to ensure that student s are provided with all the facilities to meet their needs without considering their "social status, race, gender, cultural and language disparities" (Deppeler, Loreman, & Smith, 2015). There already an extensive amount of literature available to establish the need of accessible learning content and accessibility infrastructure. For example, Goddard and Kim in their study on higher education learners also emphasize that need for "equitable classroom practices". They encourage university teachers to "focus on strengths and needs of students with disabilities". However, most of these academic studies are in the context of western institutions. However, the same is lacking in case of Pakistani academic institutions. Questions such as what support is available to students with academic needs or the type of facilities available for the academic staff and learners are missing from the broader academic literature on the subject (Shakir et al., 2011; Shafqat et al., 2024).That is a vast

area and requires extensive investigation in various elements of the learning process. This paper is part of series of research studies that aim to bridge this gap. In the first part, we are aiming to explore the role of accessibility and inclusivity on instruction material that will be followed by a series of other areas in near future.

Literature Review

"A Literature review summarizes and assesses the text of writing of the definite theme and provides a basis to think about the possible importance of innovative study. It also divulges what has previously been done by giving advanced concepts for new research" (Sadaf et al., 2024, p.658). Higher education is facing a critical moment of transformation. Achieving complete educational equality across all individuals is challenging, as learning outcomes are influenced by multiple interconnected factors (Pekrun et al., 2017). These disparities stem from individual differences in cognitive abilities and personal motivation, varied socioeconomic and cultural backgrounds, and unequal access to educational resources. To address these challenges, educators can implement several key strategies (Smith & Williams, 2017; Yousaf et al., 2021).

Before we dive further into our discussion on accessibility, we would like to first define what we mean by accessibility. For that, we have borrowed the definition from the World Wide Web Consortium (W3C) that is one of the worlds' most reputable organizations on accessibility. W3C defines accessibility as "the quality of an object or environment to be easily used by persons with disabilities with or without assistive technologies" (World Wide Web Consortium, 2016). Compared to accessibility, inclusivity is more dependent on the context but has an underlying principle of creating supportive learning environment that recognize the diverse needs of students. Below, we have provided some of the basic principles that can help institutions create more equitable and supportive learning environments:

Diversity: As mentioned above, inclusivity is about incorporating and embracing diversity. This involves, making sure that people of different backgrounds, abilities, identities, and characteristics are have equal participation in various segments of society, such as education, employment, and decision-making processes.

Equality: Inclusivity also means ensuring that all individuals, regardless of their differences or circumstances are provided with equal opportunities. This means, everyone has access to the same resources, benefits, and experiences without any discrimination. Jone and Knight argue that "this principle extends beyond students with disabilities and encompasses a broader range of diversity" in academic institutions (Knight et al., 2018; Hina et al., 2023).

Access for All: This refers to taking steps to make changes in physical and electronic infrastructure so that every individual has access to all the resources needed for them to grow and excel within their area of interest. This process may also require making necessary accommodations for individuals with disabilities. For example, making physical spaces, digital content, products, and services accessible. According to the UK Quality Code for Higher Education (2018), "clear, accessible, and inclusive policies and procedures enable students and staff to identify when support mechanisms are necessary for academic and personal progression" (Quality Assurance Agency for Higher Education, 2018).

A Sense of Belonging: Inclusivity fosters a sense of belonging and community. It means creating an environment where individuals feel accepted, valued, and respected for who they are, and where they feel they have a place within a group or society.

Anti-Discrimination: Inclusivity is often associated with opposing discrimination and bias. This approach involves challenging and combating practices, policies, and behaviours that marginalize groups based on race, gender, age, religion, sexual orientation, or disability. Draffan et al. (2017) warn against overlooking students' specific requirements. Inclusive education is fundamentally recognized as a basic human right and the foundation for a fair and equitable society (European Agency for Development in Special Needs Education, 2012; Forlin, 2013).

Cultural and Social Integration: In some contexts, inclusivity may refer to the integration of various cultural, social, or demographic groups into a broader society or community. It implies creating a harmonious and cohesive society that welcomes and respects all its members). Barriers to inclusion exist in both physical and social environments. Physical barriers might include architectural challenges like building stairs (Myers et al., 2014), while social barriers encompass institutional administrative arrangements that prevent students from receiving timely and appropriate accommodations (Baker, 2019).

Inclusive Language: In the realm of language and communication, inclusivity means using language that is neutral and inclusive of all genders, identities, and backgrounds. It avoids reinforcing stereotypes or excluding specific groups. Thomas (2016) observed that university participation has broadened through the progressive incorporation of traditionally marginalized collectives, including students of different nationalities, ages, cultures, socio-economic backgrounds, and capabilities. In this context, access involves students' ability to "get there," while inclusion encompasses their capacity to remain, participate fully, and have their contributions valued (Negrón-Gonzales, 2017; Louise & Swartz, 2022).

Universities represent complex environments where access and inclusion are critically important. Undergraduate and postgraduate students may have diverse needs that vary across different course stages. The Universal Design for Learning (UDL) umbrella encompasses various educational experiences, including placements, laboratory work, research degrees, distance learning, and international student experiences. When planning, educators define objective aims considering general educational goals, students' strengths, available time, educational environment, and existing infrastructure (Test et al., 2016).

The Accessible Materials for students

Teaching at the university level is inherently challenging due to the vast diversity of students. The presence of students with different disabilities has further complicated this task. Effective teaching is not merely knowledge transfer but transforming knowledge to meet the needs of diverse student populations (Mulnix et al., 2016; Hassan et al., 2024). University-level educators must focus on understanding and addressing the strengths and needs of students with disabilities to ensure equitable classroom practices (Goddard & Kim, 2015; Akram et al., 2022; Mumtaz et al., 2024).

Achieving complete equality in educational outcomes for every individual within a society may be an elusive goal, as variations in learning achievements often stem from disparities in abilities, motivations, background contexts, and available resources (Pekrun et al., 2017; Arshad et al., 2024). However, societies can optimize the potential of their students by embracing the concept of equitable classroom practices.

Another important aspect of accessibility and inclusivity is the adoption of Universal Design for Learning (UDL). UDL constitutes a framework which is designed to accommodate a different learning styles and requirements. UDL provides multiple methods to present information, express knowledge, and foster engagement. It also

provides guidance on the practical approaches to inclusive education such as offering learning materials in multiple formats, such as text, audio, and video, and providing students with varied options to demonstrate their understanding. These might include written assignments, oral presentations, or visual projects. There are various practical steps that can be taken for the purpose. For example, Material for STEM subjects can include large Braile prints, or the use of machines that create swelled format for any charts and graphs. Similarly, making sure that any PDF documents are created using a fully tagged structure so that users with any visual impairments; are able to read those documents using assistive technologies. Offering these "alternative communication techniques, and differentiated instruction are crucial strategies to promote equity in the classroom" (Lone et al., 2011; Leadley & Goodwin,, 2019).

Hypotheses

HA1: Accessibility and inclusivity in instructional materials have a significant role in enhancing learning for higher education students.

H01: Accessibility and inclusivity in instructional materials do not have a significant role in enhancing learning for higher education students.

HA2: Technology support significantly enhances the accessibility and inclusivity of instructional materials in learning for higher education students.

H02: Technology support does not significantly enhance the accessibility and inclusivity of instructional materials in learning for higher education students.

Material and Methods

The methodical study of the procedure is called the research methodology; it is the procedure that is used by the researcher for assembling data to resolve stated problem, while research design comprises of the whole procedure that is used to conduct research (Ahmad et al., 2023; Rao et al., 2023). Based on the study requirements, and its descriptive nature, the researchers decided choose Quan-qual method. However, it was also decided that the study will benefit from explanatory sequential technique too.

Population

"The population is defined as a set of individuals, data, or items from which a statistical sample is taken" (Younus et al., 2023). Due to the nature of the study, we included all stakeholders as our population, such as faculty members, Heads of department, as well as students at Khwaja Fareed University of Engineering & Information Technology (KFUEIT), Rahim Yar Khan.

Targeted Population

All the HODs, Teachers and Students of various departments of KFUEIT, Rahim Yar Khan.

Accessible Population

25 HODs, 125 Teachers and 375 students of various departments of District Rahim Yar Khan.

Sampling

As the name indicates, and due to the size of our population, we used sampling techniques so that to select a part of our population to collect data that can be a good representation of our study (Zafar et al., 2023; Rasheed et al., 2024). We included 25 Heads of Departments, 125 faculty members and 375 students from various disciplines. These respondents were selected using convenient and simple random sampling techniques.

Research Tools

Research tools perform significant part and help to assemble accurate information from the research participants (Ullah et al., 2020; Zafar & Akhtar, 2023). Our study included survey as well as interviews. For survey, we designed a survey questionnaire, whereas for interviews, we adopted relevant protocols for interviews of those stakeholders who were involved in decision making process. The questionnaires were tailored for gathering data from Heads of Departments, university teachers, and students. The validity and reliability of the questionnaire was testing using pilot testing and expert reviews. Based on the pilot testing, the questionnaire was revised accordingly. The interview protocol was specifically designed for data collection from head teachers. We also ensured ethical consideration by anonymizing the responses and securing all personal information using encryption.

Data Analysis

The collected data was quite extensive and required a systematic tool to analyze. Therefore, we used one of the most common and reliable application, SPSS version 24. This application helped us to use relevant statistical methods and provide results without manual intervention. The application also provided us with the frequency, percentage, mean score and standard deviation which are provided in the below tables.

Results and Discussion

Table 1
Indicator.1 Instructional material

Items	Stat.	Responses						SD	Mean
		SDA	DA	UD	A	SA	Total		
Item.1	F	92	53	104	187	98	534	1.308	3.30
	%	14%	10%	21%	34%	21%	100%		
Item. 2	F	76	52	97	187	122	534	1.318	3.41
	%	13%	10%	16%	37%	24%	100%		
Item.3	F	80	79	80	178	120	537	1.363	3.28
	%	15%	15%	14%	32%	24%	100%		
Item.4	F	77	83	65	173	136	534	1.378	3.41
	%	13%	14%	12%	12%	33%	28%		
Item.5	F	87	57	74	204	122	544	1.353	3.41
	%	15%	10%	11%	41%	23%	100%		
Item.6	F	81	45	74	207	124	531	1.342	3.49
	%	14%	7%	15%	38%	26%	100%		
Item.7	F	87	61	97	160	129	534	1.36	3.36
	%	15%	10%	16%	34%	25%	100%		
Total	F	580	430	591	1296	863	3760	1.346	3.38
	%	14%	10%	15%	32%	29%	100%		

This table summarises responses regarding the accessibility and inclusivity of instructional materials. It evaluates how participants perceived various aspects, from strong disagreement (SDA) to strong agreement (SA). The mean scores for each item indicate the general sentiment:

Item 1 (Mean = 3.30): Indicates moderate agreement with the inclusivity or accessibility of instructional materials, with a notable percentage (34%) agreeing that the materials met their needs.

Item 2 (Mean = 3.41): Shows slightly stronger agreement than Item 1, with 37% agreeing and 24% strongly agreeing that materials support accessibility and inclusivity. This suggests an improvement in certain areas.

Item 3 (Mean = 3.28): Reflects a dip compared to Item 2, with less positive responses. Although 32% agree, a significant proportion remains neutral (14%), suggesting inconsistent accessibility measures.

Item 4 (Mean = 3.41): Reiterates moderate satisfaction, with the highest percentage (33%) strongly agreeing. This suggests better practices were adopted for specific instructional materials.

Item 5 (Mean = 3.41): Maintains the trend of moderate satisfaction. A higher proportion of students (41%) agreed, indicating some improvement in inclusivity.

Item 6 (Mean = 3.49): Achieves the highest mean score, indicating the strongest agreement on accessibility-related measures, with a considerable percentage (38%) agreeing and 26% strongly agreeing.

Item 7 (Mean = 3.36): Slightly lower than Item 6, suggesting room for improvement in consistency. While 34% agreed, a notable minority (15%) strongly disagreed.

Overall, these statistics highlight that while efforts towards accessibility and inclusivity are evident, disparities exist in students' perceptions, suggesting the need for a more uniform approach across instructional materials.

Table 2
T-Test Data Analysis-Gender Analysis of Factor Instructional material

Items	Gender	N	Statistics				
			Mean	SD	T -value	Df	Sig.
Item.1	Male	268	3.294	1.259	-1.201	523	.981
	Female	257	3.377	1.329	-1.201	522	
Item.2	Male	268	3.175	1.333	.021	523	.276
	Female	257	3.315	1.333	.021	521	
Item.3	Male	268	3.399	1.318	-.265	523	.945
	Female	257	3.396	1.322	-.265	520	
Item.4	Male	268	3.279	1.340	.064	523	.989
	Female	257	3.311	1.373	.064	519	
Item.5	Male	268	3.365	1.360	-.037	523	.602
	Female	257	3.358	1.410	-.037	522	
Item.6	Male	268	3.376	1.375	.555	523	.310
	Female	257	3.381	1.370	.554	519	
Item.7	Male	268	3.481	1.313	-.647	523	.920
	Female	257	3.416	1.369	-.647	521	
Total	Male	268	3.338	1.131	-.412	523	.720
	Female	257	3.364	1.162	-.398	520	

This table compares male and female students' responses regarding instructional materials using t-tests. The key insights include:

1. **No Significant Gender Differences:** Across all items, the t-values and significance levels indicate that there is no statistically significant difference between male and female perceptions. For example, in Item 1, the t-value is -1.201 with a significance level of 0.981, well above the threshold for significance ($p < 0.05$).

2. **Overall Mean Scores:** Male respondents (mean = 3.338) and female respondents (mean = 3.364) have nearly identical perceptions, reinforcing the finding that gender does not influence the overall perception of accessibility and inclusivity in instructional materials.

3. **Item-Level Observations:** While the means for individual items fluctuate slightly between genders (e.g., 3.294 for males vs. 3.377 for females in Item 1), these differences remain statistically insignificant.

This analysis underscores that accessibility and inclusivity initiatives in higher education benefit all students equally, regardless of gender. It also highlights that efforts should focus on enhancing overall quality rather than addressing perceived gender disparities.

Results

The findings of the study reveal that:

- Majority (over 50%) of participants (Heads of Departments, Teachers, and Students) agreed that accessible digital materials (textbooks, research papers with glossaries, multimedia resources, assessments, and supplementary materials) are available.
- There was strong agreement (over 30%) on the availability of properly tagged PDFs and audio/video materials with captions and descriptions.
- The significant portion (around 30%) agreed that alternative text for figures and graphs is provided.
- There was a positive response (over 60%) regarding captions for all figures and tables in the materials.
- Most of the participants (over 60%) agreed that students have equal access to the library resources.
- There were mixed opinions on the university website's accessibility features (alt text, captions etc.) with a slight majority (around 59%) agreeing it follows accessibility guidelines.

These findings highlight both progress and areas for improvement in the accessibility and inclusivity of instructional materials in higher education. The consistently moderate-to-high mean scores suggest that universities are making significant strides in ensuring that instructional materials are accessible and inclusive for students. However, the presence of neutral and negative responses, particularly in some items, points to gaps in execution. These gaps indicate a need for more uniform standards and consistent application of accessibility measures across all instructional materials. Furthermore, the gender-based analysis reveals no significant differences between male and female students' perceptions of accessibility and inclusivity, which demonstrates that current efforts are broadly effective across genders. This neutrality allows institutions to shift their focus to addressing other critical diversity factors, such as disability accommodations, language barriers, and socio-economic disparities, to ensure an even more inclusive learning environment. By addressing these gaps and refining existing practices, universities can enhance their commitment to creating an equitable educational experience for all students.

Discussion

This study investigated the availability of instructional materials and technology support for students with disabilities. Findings revealed a generally positive outlook on the availability of accessible instructional materials. Over half of the participants (including Heads of Departments, teachers, and students) agreed that accessible digital

materials, properly tagged PDFs, captioned/described audio/video materials, figures/tables with captions, and equal library access were available. This aligns with the need for accessible materials identified by Zorzi (2020) to promote equitable practices and inclusion.

However, there seems to be room for improvement in providing alternative text for figures and graphs, with only around 30% of participants fully agreeing on its availability. This is not surprising. Even the largest study conducted in the US identified similar results that "they identify both the barriers and the supports in their university experiences" (Shevlin, Kenny, and Mcneela 2004; Jacklin et al. 2007; Claiborne et al. 2010; Hopkins 2011; Mullins and Preyde 2013; Morina, López, and Molina 2015).

The website's accessibility features also received mixed opinions, with a slight majority suggesting it adheres to accessibility guidelines. Further investigation into specific accessibility issues on the website might be beneficial. Although these results are encouraging and portray a fancy picture. However, it is also important to explore what is the understanding of accessibility of those involved in policy making. Do they consider that as an 'exception' when someone approaches them for help, or is it a norm to provide accessible content and alternative formats to all without considering that as an extra favor to anyone? Similarly, there seems to be a lack of training opportunities for academic and support staff about developing their skills in accessibility for example, a basic us of heading styles in Word, or tagging of a PDF document. Currently everything is offered as 'guide' and not as a compulsion where accessibility is enforced at all levels of learning process. Pliner and Johson argue that, "Faculty members should be sensitized, informed and trained in how to carry out inclusive pedagogy and universal designs for learning" (Pliner and Johnson 2004; Spratt and Florian 2015).

The availability of accessibility officers received a moderate response (around 50% agreement), suggesting a potential need for increased awareness or resources in this area. Fortunately, most participants (over 57%) agreed that students receive support to convert content into accessible formats. This aligns with Zorzi's (2020) point about the importance of adapting content for students with disabilities.

Overall, the study suggests a partial fulfillment of accessibility needs for students with disabilities. While there are positive aspects regarding instructional materials and support for content conversion, significant improvements are needed in providing assistive technologies, website accessibility, and ensuring readily available accessibility officers.

Conclusion

In this research, we aimed to explore how accessibility and inclusivity in instructional materials improve the learning experience for all students, and not particularly disabled students. The findings showed that there are positive steps being taken to make instructional materials accessible. Also, a majority of them believed to have access to accessible resources, such as tagged PDFs, or accessible learning material. However, the findings also indicated that not all instructors provide alternative formats. This seems higher in the STEM subject compared to humanities or social science disciplines. For example, use of Blackboard in a classroom for mathematics can put some students at disadvantage because they are unable to see the information. This could be addressed by providing accessible material to those students before the class so that have a clearer idea of the concepts being discussed in the class. Similarly, the application forms, or some of the academic resources on the university website are not provided with alternative text, or closed captioning.

Although, the findings are reassuring, there are a lot of steps that need to be taken. It is a long time process of setting accessibility and inclusivity as a norm. We also want to emphasize that providing accessible material should not be optional and hence made compulsory. Similarly, the research papers, or even PhD theses at the university are not fully accessible. These few examples highlight a bigger problem at institutional levels. Once improved, these steps are going to benefit every individual, including those with temporary disabilities.

We strongly believe that accessibility and inclusivity benefit everyone, not just those with disabilities. By adopting the above practices, institutions can create an environment that is fair, supportive, and welcoming to everyone. Therefore, we need a proactive approach to accessibility and inclusivity. For that purpose, we present a list of recommendations that policy makers can benefit from for their quest towards offering an inclusive learning experience.

Recommendations

Based on the results of this study, we have the following recommendations:

Accessible Learning Materials

Universities should take all the necessary steps to provide accessible learning materials. This includes but not limited to textbooks, research articles, e-resources, assessments, and even any supplementary content such as offering videos with closed captions, text documents compatible with screen readers, and materials designed to support assistive technologies.

Accessible Library Resources

The libraries also need to take proactive steps meet the needs of all students. This involves ensuring digital materials as accessible, physical spaces with ramp or lift access, and staff well trained to assist students in locating and using recommended resources.

Assistive Technologies

Another action that university can take is to allocate resources to provide assistive technologies, such as screen readers, adaptive keyboards, and any devices that a learner needs to fully access the learning material. These tools are vital for enabling students with specific needs to fully engage in their academic activities.

Accessibility of University Websites

Institution website is usually the primary source to navigate all students towards university resources. Therefore, it is of utmost importance to make sure that the official website followed WCAG principles to a minimum of AA standards.

Dedicated Accessibility Officers

This study also revealed non availability of dedicated accessibility officers. Therefore, we recommend appointment of designate accessibility officers who can provide targeted support to students and address any issues related to inclusivity.

Train Staff and Faculty on Inclusive Practices

Another important area that is often ignored is to quip key stake holders with accessibility skills. These include academic and support staff. They should have access to regular training to develop inclusive teaching practices and better support students with

diverse needs. Training should focus on implementing universal design principles and adapting teaching approaches to ensure everyone can participate effectively.

Feedback from Students

Another important but on going aspect could be to regularly seek feedback from students, particularly those with disabilities. Offering them opportunity to share their experience will have a significant impact on making decisions for accessibility.

Collaboration across Institutions

Finally, Higher education institutions should work together to exchange ideas, share resources, and adopt successful strategies for accessibility. Collaborative efforts can lead to innovative solutions that address shared challenges.

By following these steps, universities can create an environment that embraces diversity, supports students with disabilities, and ensures equal opportunities for academic success.

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