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## Alleviation of Educational Stress of Visually Impaired Students through Intelligent Virtual Assistant at College Level

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**Abstract:** *Students with visual impairment find it difficult to explore their environment due to their visual limitations and face challenges. The inaccessible physical environment of academic institutes, inflexible assessment techniques, and dependence on others to accomplish tasks are causes of stress for visually impaired people they face in their studies. The current study was conducted to explore the lived experiences of visually impaired students using Intelligent Virtual Assistants studying at a secondary level of education. A phenomenological interpretive approach was implied for data collection. For this purpose, 15 participants were selected for in-depth interviews through a semi-structured guide. All the interviews were recorded and transcribed. Coding was made, and themes were derived. Analysis of data in the form of Findings indicated that Visually impaired students use various features of IVAs in their education and daily living. The use of IVAs has improved their accessibility, mobility, independence, motivation, confidence, autonomy, and social integration, which have played a positive role in their studies and daily lives. It is recommended that the use of technology should be encouraged in educational institutions for people having special needs. Educational institutes may take full advantage of technology to impart education to people who have special needs.*

**Key Words:** Intelligent Virtual Assistant, Higher Secondary Level, Education, College Level, Students

### Background

In today's era, artificial intelligence technology has revolutionized all spheres of life (Namatherdhala et al., 2022). IVA is a type of artificial intelligence, and it is called by different names (Forbe, 2019), such as Google Assistant, Siri, and Alexa. This software is available in mobiles, smart speakers, computers, tablets, smartwatches, and smart TVs (Hoy, 2018). This technology is controlled through voice commands. Educational purposes were not in mind while creating this modern technology. Its main purpose was to control the mobile and its various functions (Terzopoulos & Satratzemi, 2019). This technology uses voice recognition, speech synthesis, and natural language processes to provide services to its users. Internet facility is essential to operate this technology (Terzopoulos & Satratzemi, 2019).

In today's era, education is considered the basic right of every individual, and the national development of any country depends on the literacy rate of its citizens (Cologon, 2022). Persons with disabilities cannot be deprived of this right. Among these people with disabilities are the visually impaired, whose enrollment in higher education institutions has increased over the past few decades (Stambekova et al., 2022). Research literature also indicates that these students face immense problems during education, due to which the academic performance of these students lags behind their other sighted peers (Hanif et al., 2022). Possible major causes of these students' problems are the availability of facilities, negative social attitudes, and inability to manage disability-related curricular accommodations by the college staff (Kumar & Saeed, 2015). In this situation, these visually impaired students feel enormous mental stress, and this stress has negative effects on their academic performance. The degree completion rate of visually impaired students is lower than that of sighted students, or it usually results in failure and dropping out of educational institutions, leaving the degree incomplete (Fuller et al., 2004). Additionally, since technology like IVAs can be operated by voice commands, it is thought that if these students are given

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enough opportunity to use the technology, their academic issues may be greatly reduced, and with its assistance, visually impaired students' academic difficulties may be lessened (Arslantas & Gul, 2022).

Students' transition from high school to college life poses higher academic expectations on them (Lal, 2014). Visually impaired students experience more stress at the college level than their peers with other disabilities and non-disabled students. At the college level, there are additional stressors that can impair academic success. According to Yusof, Chan, Hillaluddin, Ahmad Ramli, and Saad (2020), the biggest issue of accessibility is that buildings are not designed to meet the needs of students with special needs. As a result, visually impaired students find it difficult to access college campuses. The accessibility issue is one of the causes of stress for visually impaired students within the institutional premises. Taking notes during lectures in class is another stressor for them. Research-based studies show that lecturers do not verbally explain the written material on the board, the slides, or the video transcription of the content is required for such students (Karellou, 2020). Google Assistant significantly improved communication confidence and reduced speaking hesitation for 8th-grade EFL learners. Qualitative responses showed that students enjoyed playing games with Google Assistant and talking to Chatbots. IPA interaction promotes an encouraging environment. Voice interfaces provide an opportunity for children to independently search internet resources using Google Assistant, Amazon Alexa, and Apple Siri. According to Lovato et al. (2019), Google Assistant is a valuable tool for improving language capabilities, especially for reading comprehension. Students enjoy doing activities with Google Assistant due to the availability of information.

The current study was conducted to find out the experiences of visually impaired students using IVAs and how it helps to mitigate the stress related to their education.

## Methodology

This study was conducted to examine the lived experiences of visually impaired students studying at a higher secondary level using intelligent virtual assistants for the alleviation of stress. It was a qualitative study using phenomenological design. Phenomenology describes the meanings of lived experiences of a concept or phenomenon as experienced by a person or group of people. It focuses on the description of the perspective of a common phenomenon experienced by several individuals (Creswell & Path, 2016). To carry out this phenomenological study, the Interpretive approach was used. This approach describes that everybody interacts differently with his/her environment and gives unique meaning to every reality according to their interaction (Lapin et al., 2012; Schensul, 2012). The interview method was used to get the responses.

The inclusion criteria for this study for respondents were as follows:

- Totally blind and partially sighted students,
- Students studying at higher secondary level,
- Participants who have been using IVA for at least one year.

Purposive sampling was employed for the identification of primary participants who have had experience using IVA at a higher secondary level. In-depth interviews were conducted to get a deep understanding of participant perspectives regarding their experiences of IVA with specific reference to the stress they generally go through while reaching their school/college, following the lectures, notes taking, surfing the material, doing their academic assignments, movement from one place to another, carrying out daily living tasks, etc.

Upon the submission of the demographic questionnaire, participants who met the criteria for inclusion became active members of the research. Fifteen students were selected for in-depth interviews.

Through a Demographic questionnaire, the eligibility of the respondents was determined. This was not used as a data collection tool. Students having experience of using IVA for a minimum of one year were eligible for the present study. The demographic questionnaire consisted of name, age, gender, phone number, level of visual impairment, year of enrollment in higher secondary level, and type of IVA being used by the client. This data sometimes offered insight into the contextual information about the individual as well. However, the primary purpose of the demographic data was to collect information on the individual for eligibility to be included in the study. After the selection of participants, an identification number was



allotted to each of them. The interview protocol allowed participants to express experiences with their own perspectives about the use of Intelligent Virtual Assistants.

Stress is an integral part of a visually impaired person's life. They are dependent on others to carry out their academic assignments, though in general, daily living tasks make them dependent on others, too. For the current study, the academic-related stress and stress they face in carrying out everyday tasks were focused. This included the use of a dictionary, information about synonyms and antonyms, improving spelling and pronunciation, making words and sentences, grammar, and improving Everyday Conversation. Participants were asked to share their experiences of how they use IVA to get help in these areas. Students were asked to explain the use of IVA in knowledge acquisition, internet searches, and access to the learning material of their course. Telephonic contact was made for scheduling interviews. All the Interviews were recorded with the prior permission of the participant. The interview setting was made free of background noise and interruption at the most possible level.

The interview started with the introduction of the participant. The discussion was then followed by an exchange of information about the disabled person in the participant's family, after which the participants were asked to describe their educational experiences, challenges, and facilities provided there. After that, questions were asked about the participant's disability-related stress, how things were before they were using IVA, and how it is now. The initial part of the interview was to build rapport with the participants so that the participants could express their feelings well. The participants described in detail the use of various features of IVAs in their education for the mitigation of stress. In addition, participants were asked to what extent the use of IVAs has reduced their disability-related stress, especially in education. The participants highlighted various aspects of the use of IVAs and shared their different experiences in this context. Finally, the psychological impacts of IVA use were also taken into account, and the difficulties encountered as a result of the use of IVAs were discussed, too. Interview questions were prepared in both Urdu and English languages, but the interviews were conducted in Urdu language. After that, all the conversations of the participants were translated into English language for analysis. Translation validity was ensured. Interviews were conducted face-to-face and by telephone at per participants' convenience. Simple language was used during the interview. The interview was conducted in one sitting without any interval. Open-ended questions were asked of participants so as not to influence the responses given by participants. After the completion of each interview, field notes were written about the location of the participants. Field notes were used in interpreting the transcripts during data analysis in an effort to maintain trustworthiness and authenticity. Each participant was assigned a chronological number to protect anonymity. At the end of each interview, each participant was asked to express any other concern that they wanted to and had not discussed before.

Upon completion of each interview, a participant was requested to complete a semi-structured journal to share their experiences regarding the use of IVA. This tool was e-mailed to all participants of the research. Participants were asked to fill up these entries. Upon filling this up, they sent this tool back to the researcher via email. This supported and validated the findings and information gained through interviews.

## Data Collection

Data was collected with the help of semi-structured in-depth interviews and semi-structured journals. Many approaches were executed to base the belief ableness inside the current study. In the beginning, this was settled through Bracketing by cultivating a rapport with the respondents and auditing the trail of responses. Bracketing helped in these efforts by minimizing the impacts of the researcher's biases on the responses received, building rapport, and increasing the level of comfort required to facilitate open and honest sharing. So, the data received could be believable for being accurate and relevant.

Telephonic contact was made for scheduling interviews. All the Interviews were recorded with the prior permission of the participant. The interview setting was made free of background noise and interruption at the most possible level. Each interview was assigned a code. All the interviews were recorded with the help of mobile devices. All the recorded interviews were saved in the researcher's protected folder on mobile, laptop, and Google Drive. All the interviews were labeled with the unique assigned code in a protected folder. As earlier as possible, the recording of interviews was listened and

notes were made. Keywords, phrases, and statements were transcribed. The duration of these interviews was approximately 40 to 60 minutes.

Semi-structured journals were emailed to the addresses of participants. They were requested to complete journal entries. If they felt any inconvenience in writing their responses via email, they had the option to dictate their responses to a researcher by telephone. However, very few participants filled in the journal via email. Rather, more participants asked the researcher if they would like to give their answers with the help of the researcher over the telephone. Filling up journal entries took about 15 to 20 minutes each. Participants were allowed to contact the researcher at any time via telephone, text, WhatsApp text, and email. Participants were ensured that their information would be kept confidential and would only be used for research purposes. Participants were informed that their recordings would be kept in the save-protected laptop of the researcher. The Journal Entry complemented the process of examining the phenomenon of Interpretivism for the experiences each respondent narrated in his/her own way. This helped in being open to the listening experiences in a new way and examining the phenomenon with its contextualization towards the lived experiences of the respondents. These helped with the emergence of concrete categories from the descriptions and narratives. The journal entries were actually a dialogue with themselves.

## Analysis of the Data

There are many methods used in qualitative research for the analysis of data. Therefore, the researcher should mark all the steps taken in his study, which make any research replicable and truthful. For the present study, it was important to choose an approach that was both qualitative and interpretive. Thus, an inductive, data-driven thematic analysis was conducted (Braun and Clarke, 2006). Six steps of Braun and Clarke guided data analysis in this phase of the research. As intended by the researcher, the use of this method played an important role in maximizing the meaning and usefulness of the study results (Attride-Stirling, 2001).

### Phase 1: Familiarizing Yourself with Your Data

Data collection and analysis were carried out simultaneously in this study, as is typical for qualitative research, and iterative revisions were made throughout this research (Braun & Clarke, 2006; Cresswell, 2014). Braun and Clarke's (2006) first-stage analysis attempts to give the level of familiarity required to carry out an efficient analysis, despite the fact that the researcher had some background knowledge of the data obtained due to his active participation in the data collection phase to reach a certain level. The data collection began by recording all the interviews. The duration of these recordings was about 12 to 15 hours. These interviews were recorded in Urdu language, then the process of transcribing these interviews began. Before analyzing the data, pre-data analysis measures were taken. All the audio-recorded interviews were transcribed through the verbatim method. Each participant was given a pseudonym to protect his/her identity. The researcher wrote down the important points of all these interview recordings. The researcher transcribed all these interviews in the Urdu language in NVDA screen reader software using option E speak NG. This text-to-speech engine has the ability to easily read Urdu script. All interviews were transcribed with its help. In addition, the interviews, conducted in the English language, were completed by voice typing through Google board and traditional typing on MS Word. To make sure that all of the participant's comments were recorded, all of the interviews' transcripts were checked against the original recordings once they had been completely transcribed. Following that, all data was actively examined in its entirety. Short notes were made of any important details or areas of interest that might be useful for future coding and theme identification (Braun & Clarke, 2006). The organization of collected information resulted in raw data for presentation. It was possible to use descriptive statistics relevant to the research questions.

### Phase 2: Generating Initial Codes

After a thorough familiarization with the data, each segment of the data was examined for initial labeling or coding. Key information and areas of interest obtained in the first phase initiated the second phase. These ideas were then expanded through a systematic examination of the data, looking for revised possible patterns. As suggested by (Braun & Clarke, 2006), data extracts were comprehensively recorded during the





coding process. So that the context can be properly understood, often coded multiple times. If the latter occurred, the use of an asterisk was noted for reference in later stages. So, re-grouping of coded data for easy identification and location was possible after a considerable reduction of initial codification. By the time the coding process was completed, grouping the data had greatly helped to streamline it. This is followed by the identification and presentation of broad themes that represent important aspects of the study. The researcher concentrated on overarching grouping patterns, or themes, in the following three phases, as described by (Braun & Clarke, 2006).

### Phase 3: Searching for Themes

The third step involves assessing the current codes and analyzing their relationships to find potential themes, including a "miscellaneous" theme for uncategorized codes (Braun & Clarke, 2006). Coded data was reorganized into themes, much like it did with data extracts during coding, bringing together related codes into broad concepts (Braun & Clarke, 2006). At this step, an inductive methodology was used, enabling the data to drive the development of themes (Braun & Clarke, 2006). Explication is a process that infers a phenomenon through its components while keeping the context intact.

### Phase 4: Reviewing Themes

Fourth stage, the main objectives of this revision phase were to establish coherence across data extracts inside themes, define cohesion between themes, and ensure accurate data representation within themes (Braun & Clarke, 2006). The examination of the data extracts categorized under the "miscellaneous" category for reclassification was now finished by the researcher.

### Phase 5: Defining and Naming Themes

The identifying, defining, and further refining of themes were the focus of the fifth stage of this procedure (Braun & Clarke, 2006). Each topic was given a name that was descriptive, succinct, and clear before being discussed in terms of its specific significance to the study as a whole. The choice of the representational pieces utilized to bolster the correctness and plausibility of each topic was aided by the analysis of data extraction.

### Phase 6: Producing the Report

The final analysis and preparation of a thorough report, as specified by the last step of Braun and Clarke's (2006) method, commenced following the solidification of patterns and themes. In this report, descriptive accounts of what they communicated individually and collectively are offered in an effort to pique the reader's interest, gain their confidence, and gain their trust.

## Finding of the Study

This study aimed to investigate the lived experiences of students with visual impairments who utilized various features of an intelligent virtual assistant in their educational pursuits to reduce stress. Participants in this study shared their experiences concerning the use of various features of the intelligent virtual assistant in their education. These experiences can be categorized into three main areas: language, subjects, and independent studies.

### Language and Vocabulary Enhancement

Participants commonly reported utilizing a majority of the intelligent virtual assistant's features within the language category. The most commonly utilized feature within the Language category, as reported by study participants, was translation. Visually impaired students in this study mentioned that they freely employed the translation feature of the IVA in their studies, significantly reducing their reliance on others and thereby leading to a substantial reduction in stress. The majority of participants reported that by utilizing this translation feature, they can now effortlessly translate passages from English books into Urdu. As a result, their proficiency in the English language has improved, and they no longer need to rely on or seek assistance from others to translate different paragraphs into Urdu.

Additionally, most participants highlighted that the primary reason for using this particular feature of the intelligent virtual assistant is the unavailability of Braille books for translation, and they lack access to such resources. These participants also mentioned their ease in using this feature when working on English homework at home, especially when they have no one else to turn to for translations. Consequently, the use of this feature has significantly boosted their self-confidence, reduced their dependency, and consequently alleviated a substantial amount of stress from their lives.

### **Vocabulary and Synonyms**

A robust vocabulary is paramount for comprehending any language. Recognizing this significance, participants in the study attested to their ability to easily acquire the meanings of diverse words through the use of an intelligent virtual assistant. Interestingly, among the 15 participants, seven disclosed that consulting a Braille dictionary to decipher word meanings proved to be a challenging and cumbersome process. However, they found a seamless solution through the assistance of Google Assistant and Siri, particularly when bridging the gap between English and Urdu, and occasionally, even for Arabic word meanings in Urdu.

The majority of participants concurred that their independence surged after embracing the intelligent virtual assistant. They articulated that before incorporating this technology into their lives, they relied on others to look up word meanings. With the intelligent virtual assistant at their disposal, they could effortlessly search for word meanings using just their voice commands. This newfound autonomy streamlined the process, completing tasks within seconds and eliminating the need for external assistance. This newfound independence not only serves as a potent means to alleviate their stress but also bolsters their self-confidence significantly.

### **Subjects and Learning Enhancement**

Lack of access to Braille books means that individuals with visual impairments often rely on audio formats for reading. Listening to books in audio format can lead to weak spelling skills among these learners, resulting in difficulties when they need to write. This spelling deficiency poses significant obstacles and challenges, causing heightened stress levels. In response to this issue, many individuals participating in studies have reported enhancing their spelling abilities with the assistance of intelligent virtual assistants, especially when they consult Siri and Google Assistant for spelling help while writing. 8 out of the 15 participants in the study revealed that they turn to Google Assistant and Siri for spelling assistance when confronted with challenging words. This approach significantly streamlines their writing process, liberating them from the need to rely on external support. As a result, it not only fosters their independence and self-assuredness but also contributes to a noticeable reduction in their stress levels.

### **Enhanced English Proficiency**

In the realm of non-native English speakers, many grapple with hesitancy when engaging in English conversations. However, a remarkable avenue for enhancing English proficiency lies in harnessing the capabilities of Google Assistant and Siri. Remarkably, 9 out of 15 participants in the study attested to experiencing remarkable progress in their English conversational skills, attributing this growth to their seamless interactions with these virtual assistants. A key contributing factor is that when conversing with Siri and Google Assistant, these individuals enjoy a judgment-free environment where their language slip-ups go unnoticed. This absence of critique fosters a sense of ease and eliminates the fear of hesitation. Moreover, as these software interfaces consistently engage in standard English discourse, the participants reported noteworthy improvements in their pronunciation, reinforcing their trust in the software.

Engaging with these intelligent virtual assistants grants individuals the sensation of interacting with native English speakers, thereby significantly elevating their day-to-day English communication prowess. Consequently, their self-confidence experiences a substantial boost, their reliance on external support wanes, and their independence flourishes. This transformative journey also brings about a substantial reduction in stress levels.



## Diverse Subjects and Academic Success

The majority of participants in the study highlighted their utilization of Intelligent Virtual Assistants (IVAs) as invaluable resources in their pursuit of knowledge across diverse subjects, spanning the realms of science, Islamic studies, mathematics, and history. Notably, half of the participants went on to express that their academic journey had been significantly simplified, courtesy of their newfound ability to independently navigate these subjects without relying on external assistance. Furthermore, a significant portion of these individuals underscored the profound educational benefits reaped through IVAs. They elucidated that the world of science, for instance, had become an accessible treasure trove, granting them insights into the intricate workings of the solar system and the human body. The ease of acquiring such vital information through simple voice commands has undoubtedly broadened their horizons, further accentuating the transformative power of these technological marvels.

## Mathematical Proficiency

Similarly, people in the study found it easy to do basic math like addition, subtraction, multiplication, and division by simply talking to their Intelligent Virtual Assistants (IVAs). This saves them from the hassle of opening calendar apps or typing numbers manually. Users believe this approach not only makes math tasks smoother but also frees them from the tedium of entering data by hand, making their experience much better.

## History and Islamic Studies

In a similar vein, the majority of participants expressed that they derive substantial assistance in the field of history through their use of IVAs. These digital companions provide them with comprehensive insights into historical figures, locations, and events, all at their fingertips with a simple voice command. This not only ensures easy access to information but also grants them independence, significantly diminishing their stress levels. Furthermore, half of the study participants shared that they can effortlessly translate crucial Quranic verses into Urdu using voice commands, courtesy of their intelligent virtual assistants when engaging with Islamic studies.

## Boosted Confidence and Independence

Ten out of fifteen study participants spoke highly of how intelligent virtual assistants (IVAs) have positively impacted their pursuit of knowledge. These IVAs have made it easy for them to find answers to a wide range of questions, boosting their confidence and sense of empowerment. They appreciate the convenience of getting answers through voice commands, which has made their academic endeavors more effective. Similarly, three of the fifteen participants praised the capabilities of IVAs like Google Assistant, noting that they have even won college competitions with their assistance. This success has not only boosted their confidence but also increased their independence, all while reducing stress significantly.

## Effortless Internet Searches

Virtually all participants in the study hailed the Intelligent Virtual Assistant for its transformative impact on Internet searches. Gone were the days of typing out queries; now, they could effortlessly execute searches using just their voice commands. They emphasized that this innovative tool not only spared them the need to manually enter queries into Google's search bar but also streamlined the entire process, making information retrieval a breeze.

In fact, relying on an Intelligent Virtual Assistant for voice-activated information retrieval emerged as the swiftest and most efficient method. Importantly, this advancement holds particular significance for visually impaired individuals, significantly alleviating their stress levels while bestowing upon them a newfound sense of freedom.

## Conclusion

The incorporation of Intelligent Virtual Assistants (IVAs) into education has yielded a multifaceted enhancement for visually impaired participants. It not only bolsters their independence but also amplifies

their accessibility, fosters unwavering confidence, and curtails dependency. The educational journey has been markedly streamlined with the integration of IVAs, empowering visually impaired individuals who access information through voice commands and bolstering their self-assurance.

Indeed, there exists a compelling call to harness the full potential of Intelligent Virtual Assistants within the realm of education, a move that promises to mitigate feelings of inferiority and stress often associated with visual impairment. Furthermore, this strategic utilization of IVAs can play a pivotal role in promoting a positive image within society, enabling these individuals to stride confidently alongside their peers as productive and valued members of our community.

### Researcher Perspective

Often, it is useful to know the perspective of the researcher in qualitative research. Therefore, it becomes important to recognize that the beliefs, assumptions, and experiences of the researcher greatly influence the interpretation of the data collected. So that the readers and experts understand the data well, the researcher's critical identity creates clarity in the research process. Considering the qualitative nature of the current study, personal sensitivity was necessary. As the researcher was deeply connected to the population that this research was about, full disclosure of the researcher's background, personal beliefs, and experiences was essential. To better understand the role of the researcher in collecting, interpreting, and giving meaning to his data. The researcher himself is a visually impaired person. And he faced various difficulties during his educational journey, because of which he needed the help of others to complete the educational tasks. Even while taking the exam, he faced a lot of difficulty in getting the writer. Apart from this, he had to face mobility problems, due to which he had to depend on others, which was a major cause of his stress.

In addition to this, negative attitudes of the society were disheartening for him. He believes that people with disabilities are not given the place they deserve in our society. The main reason for this is that people with disabilities use technology much less in their education and their daily lives as compared to sighted people. If people with disabilities use technology more in their education and daily life, they can have equal opportunities. Among the same modern technology, there is an AI-based technology intelligent virtual assistant. With its help, the work can be done very quickly. It is possible to get immense academic and daily benefits. The use of this technology brought about a revolution in the researcher's life now, he was able to do many educational and daily living tasks himself with its help. The researcher is highly inclined towards this technology as he uses it often in his education and daily life. Because of this bias, researchers may have different experiences with the use of this technology, and other people may have different perceptions about this IVA.

### References

- Arslantas, T. K., & Gul, A. (2022). Digital literacy skills of university students with visual impairment: A mixed-methods analysis. *Education and Information Technologies*, 27(4), 5605–5625. <https://doi.org/10.1007/s10639-021-10860-1>
- Attride-Stirling, J. (2001). Thematic networks: An analytic tool for qualitative research. *Qualitative Research*, 1(3), 385–405. <https://doi.org/10.1177/146879410100100307>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qpo630a>
- Cologon, K. (2020). Is inclusive education really for everyone? Family stories of children and young people labelled with 'severe and multiple' or 'profound' 'disabilities'. *Research Papers in Education*, 37(3), 395–417. <https://doi.org/10.1080/02671522.2020.1849372>
- Creswell, J. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches (4th ed.)*. Thousand Oaks, CA: SAGE.
- Fuller, M., Bradley, A., & Healey, M. (2004). Incorporating disabled students within an inclusive higher education environment. *Disability & Society*, 19(5), 455–468. <https://doi.org/10.1080/0968759042000235307>





- Hanif, T., Naz, S., Ahmad, A., & Azmat, M. (2022). A pragmatic approach to academic challenges of students with visual impairment during COVID-19: Teacher's experiences. *Pakistan Journal of Humanities and Social Sciences*, 10(4). <https://doi.org/10.52131/pjhss.2022.1004.0315>
- Hoy, M. B. (2018). Alexa, Siri, Cortana, and more: An introduction to voice assistants. *Medical Reference Services Quarterly*, 37(1), 81-88. <https://doi.org/10.1080/02763869.2018.1404391>
- Karellou, J. (2020). Filling the gap: Students with disabilities and their perceptions about higher education accommodations in Greece. *Journal of Disability Studies*, 6(1), 3-12.
- Kumar, R. S., & Side, A. S. (2015). Academic stress and coping strategies among students with disabilities in Addis Ababa University. *Eastern Africa Social Science Research Review*, 31(2), 83-100. <https://doi.org/10.1353/eas.2015.0008>
- Lal, K. (2014). Academic stress among adolescent in relation to intelligence and demographic factors. *American International Journal of Research in Humanities, Arts and Social Sciences*, 123-129.
- Namatherdhala, B., Mazher, N., & Sriram, G. K. (2022). A comprehensive overview of artificial intelligence trends in education. *International Research Journal of Modernization in Engineering Technology and Science*, 4(7)
- Smith, D. C., Karahan, H., Wijeratne, H. R., Al-Amin, M., McCord, B., Moon, Y., & Kim, J. (2022). Deletion of the Alzheimer's disease risk gene *Abi3* locus results in obesity and systemic metabolic disruption in mice. *Frontiers in Aging Neuroscience*, 14. <https://doi.org/10.3389/fnagi.2022.1035572>
- Stambekova, A., Zhakipbekova, S., Tussubekova, K., Mazhinov, B., Shmidt, M., & Rymhanova, A. (2022). Education for the disabled in accordance with the quality of inclusive education in the distance education process. *World Journal on Educational Technology: Current Issues*, 14(1), 316-328. <https://doi.org/10.18844/wjet.v14i1.6760>
- Tai, T. (2022). Effects of intelligent personal assistants on EFL learners' oral proficiency outside the classroom. *Computer Assisted Language Learning*, 1-30. <https://doi.org/10.1080/09588221.2022.2075013>
- Terzopoulos, G., & Satratzemi, M. (2019). Voice assistants and artificial intelligence in education. *Proceedings of the 9th Balkan Conference on Informatics*. <https://doi.org/10.1145/3351556.3351588>
- Wijeratne, D., Dennehy, D., Quinlivan, S., Buckley, L. A., Keighron, C., & Flynn, S. (2022). Learning Without Limits: Identifying the Barriers and Enablers to Equality, Diversity, and Inclusion in IS Education. *Journal of Information Systems Education*, 33(1), 61-74.
- Yusof, Y., Chan, C. C., Hillaluddin, A. H., Ahmad Ramli, F. Z., & Mat Saad, Z. (2019). Improving inclusion of students with disabilities in Malaysian higher education. *Disability & Society*, 35(7), 1145-1170. <https://doi.org/10.1080/09687599.2019.1667304>