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Bridging The Digital Divide: An Exploratory Study On Ict's Role In Inclusive Education For Students With Disabilities

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Abstract

This study explores role of Information and Communication Technology (ICT) that are promoting inclusive education for students with disabilities. It is aiming to bridge the digital divide in educational access.

Literature Review: Existing research highlights the potential of ICT tools to enhance learning outcomes for "students with disabilities". These are included though challenges like accessibility, affordability, and training persist.

Methodology: Primary quantitative data collection method uses with a sample of 70 participants. Data was analysed for using IBM SPSS software to assess the effectiveness of ICT in inclusive education.

Findings and analysis: Results show that ICT tools impact on accessibility and learning engagement. It has significant barriers remain, such as the high cost of assistive technologies, insufficient teacher training, and technical issues. Correlation analysis states as a weak relation between dependent and independent variables.

Conclusion and recommendation: The study summarizes that ICT is important for comprehensive schooling that requires better foundation, moderateness, and educator support. Suggestions incorporate for putting resources into ICT framework that are improving instructor preparing, and advancing mindfulness for lessening social shame.

Introduction

Spanning the Advanced Gap is an "Exploratory Concentrate" on ICT's Part in "Comprehensive Training for Handicaps". It inspects the capability of Data and Correspondence Innovation for making instruction more available and impartial. The computerized partition is a huge obstruction for understudies with handicaps that can prevent their admittance to fundamental learning instruments.

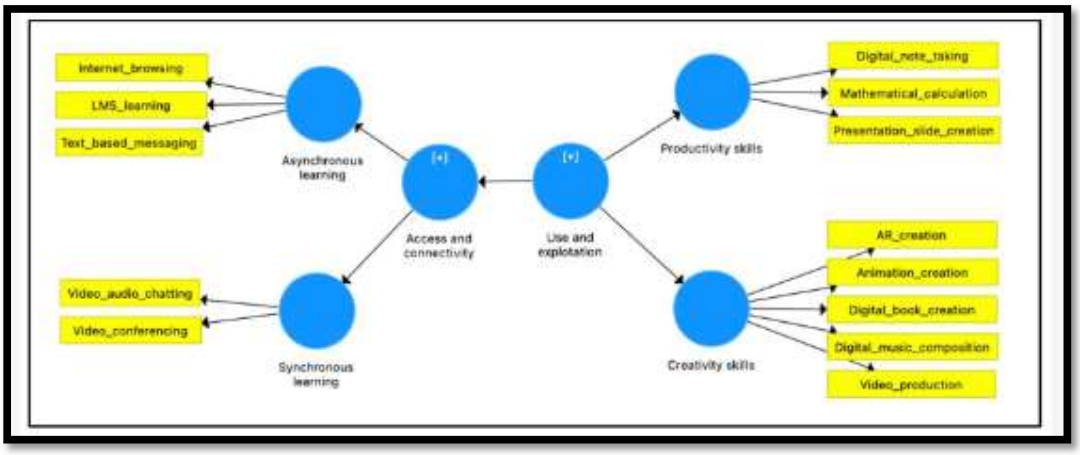

Figure 1: Educational Digital Divide for Vulnerable students

(Source: Inspired by AlSadrani et al. 2020)

This study investigates as an ICT that can overcome this issue for giving assistive innovations, versatile learning stages, and comprehensive advanced content. According to the perspectives on AlSadrani et al. (2020), advanced partition explores both the amazing open doors and difficulties in carrying out ICT arrangements in instructive settings through an examination of contextual analyses and existing exploration. The review features how ICT encourages a more comprehensive climate to upgrade learning results that can engage understudies with handicaps to conquer customary instructive obstructions. These findings inform educators, policymakers, and technologists for creating a more inclusive and accessible education system for all learners.

Aim

Aim of this study is to explore inclusive criteria of ICT that can enhance inclusive education for students with disabilities and bridging the digital divide accessibility.

Research Objectives

- To examine the role of ICT for enhancing accessibility for students with disabilities in educational environments.
- To identify key challenges students with disabilities for utilizing ICT tools for learning face that.
- To evaluate the effectiveness of ICT-based inclusive education strategies that are improving learning outcomes among students with disabilities.

Research Questions

- How is to examine the role of ICT for enhancing accessibility for students with disabilities in educational environments?
- What are the identified key challenges that are faced by students with disabilities for utilizing ICT tools for learning?
- How is to evaluate the effectiveness of ICT-based inclusive education strategies that are improving learning outcomes among students with disabilities?

Research Hypothesis

H0: There is no relationship between educational resources and traditional methods

H1: There is a positive relationship between ICT tools that demonstrate higher engagement and participation in learning activities.

H2: There is a correlation between ICT integration and educational disparities.

Literature Review

Role of ICT for enhancing accessibility for "students with disabilities in educational environments".

Role of "Information and Communication Technology (ICT)" enhances its accessibility for "students with disabilities in educational environments". It is transformative. ICT tools that can provide diverse ways to overcome traditional barriers. These are allowing students with various disabilities to access learning materials to achieve educational success. According to Lebeničnik & Istenič Starčič (2020), ICT offers adaptive hardware like screen reader and ergonomic keyboards for enabling them to navigate digital platforms independently for students with physical disabilities. These tools reduce all reliance on physical mobility that are provided as a seamless access to educational resources. Students, screen magnification, braille displays, and text-to-speech software ensure to interact with content effectively. Students hear as an impairments benefit for captioning software to get as a sign language that can interpret tools. These technologies have provided equal opportunities for engagement in classroom activities in their learning environments.

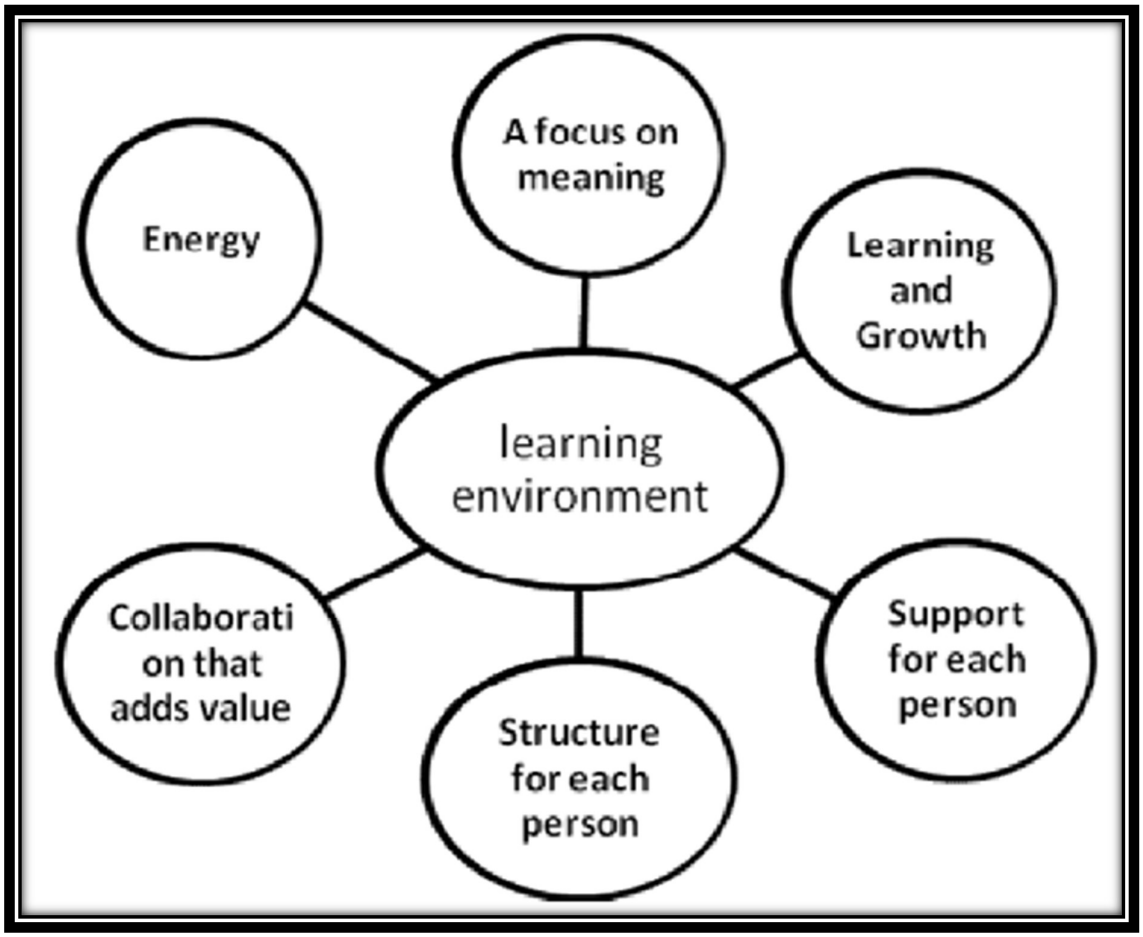

Figure 2: Six Dimension of learning environment

(Source: Anagnostopoulou, Lorentzou & Drigas, 2021)

ICT enhances its learning for students with cognitive disabilities through personalized learning platforms. It has needed interactive multimedia and educational apps that can adapt to individual learning styles. These tools enable their differentiated instruction for offering flexibility and supporting students as a unique need. Moreover, ICT facilitates the development of communication between educators and students through online platforms. Anagnostopoulou, Lorentzou & Drigas (2021) noted that ICT in inclusive education is ensuring that students with disabilities collaborate in inclusive learning communities. ICT promotes inclusion that fosters independence and self-confidence for empowering "students with disabilities" to succeed in education and beyond. Thus, ICT plays a crucial role for creating equitable and "accessible learning environments".

Students with disabilities for utilizing ICT tools for learning face key challenges

Students with disabilities face different key challenges for utilizing ICT tools for learning. It can hinder their full access to education and one major issue is facade due to lack of accessible infrastructure. As per the views of Akinlar et al. (2023), all educational institutions have needed to develop adaptive technologies, such as screen readers, specialized keyboards and captioning services. These are essential for students with physical, sensory, or cognitive disabilities. High costs of assistive technologies have posed a barrier for students from low-income backgrounds. ICT tools are expensive without sufficient funding that students may struggle to access these essential resources.

Lack of teacher training is another challenge to integrate ICT tools for students with disabilities. The effective use of available technology is leading to underutilization applications so that students face technical difficulties and issues between their assistive devices and educational platforms. As per the views of Ajrun (2023), educational software is designed with accessibility for making it difficult for students to engage with digital learning resources. Thus, students are getting their experience of social isolation by relying on ICT tools. Another challenge is needed due to the high cost of specialized ICT tools that can be prohibitive for students from low-income backgrounds (Malik, Elbatal & Khan, 2024). Access to these technologies remains a barrier among educators. Teacher training gaps pose a problem and many educators are trained to integrate ICT tools effectively. ICT tools practices that limit as a usefulness for students with disabilities. Furthermore, technical compatibility issues often arise that software is designed to accommodate as an assistive device. Hence, students can experience social stigma for using specialized tools that are needed to discourage them from fully engaging in their learning activities.

Effectiveness of ICT-based inclusive education strategies that are improving learning outcomes among students with disabilities

ICT-based have proven to be highly effective for improving learning outcomes for “students with disabilities” to develop its inclusive education strategies. It is catering to individual needs and abilities by leveraging technology, these strategies offer personalized and adaptive learning experiences. For example, assistive technologies like text-to-speech and speech recognition software empower students with physical or sensory impairments to engage with learning materials that would be inaccessible. As per the views of Afzal et al. (2023), one of the most impactful aspects of ICT in inclusive education is personalized learning. Adaptive learning platforms can adjust the pace and complexity of lessons based on a student’s abilities. Understudies are offered constant criticism and backing that assists understudies with mental handicaps to actually foster ideas more. It is encouraging a more profound comprehension of material at their own speed.

ICT upgrades their joint effort and cooperation devices like web-based conversation discussions, intelligent whiteboards, and continuous correspondence programming. It can permit understudies with incapacities to actually draw in with their companions and educators more. These are separating social obstructions to advance as an inclusivity for creating as a learning climate. In addition, ICT techniques improve for following teachers to screen understudies' advancement (Buthelezi et al., 2024). It considers convenient mediations that are empowering educators to address difficulties as they tweak backing to individual necessities. Hence, ICT-based strategies improve academic performance that helps to boost self-confidence among students both their educational experience and long-term learning outcomes.

Theoretical Interpretation

Vygotsky's Sociocultural Theory

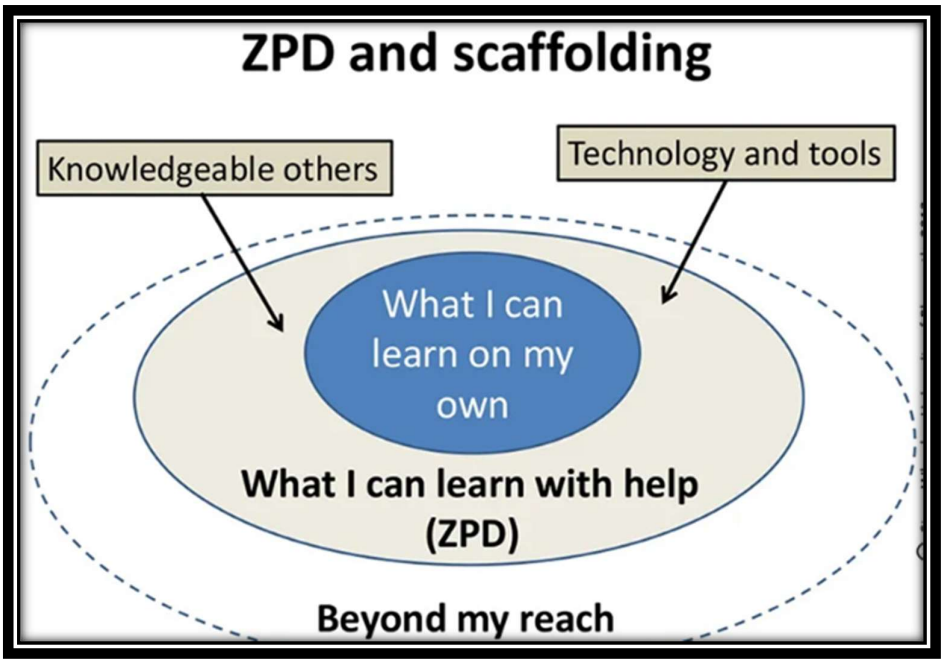

Figure 3: Vygotsky's Sociocultural Theory

(Source: Norman et al. 2022)

This study is Vygotsky's Sociocultural Hypothesis accentuates the job of social connection and social apparatuses in mental turn of events. This hypothesis features the significance of utilizing apparatuses like “Data and Correspondence Innovation” to upgrade growth opportunities formative holes about comprehensive instruction for understudies with inabilities. Learning is a social cycle through communication with companions, educators, and instruments inside one's current circumstance. According to the perspectives on Norman et al. (2022), ICT fills in as a present day "social device" that can be utilized to intervene learning for understudies with handicaps. Assistive innovations like screen peruses and versatile learning stages that can to beat obstructions that hinder their mental and scholarly advancement. The hypothesis highlights "the Zone of Proximal Turn of events (ZPD)" and the distinction between autonomously to accomplish with help. ICT tools can provide for enabling students to perform tasks that struggle for extending their learning potential (Raihan et al., 2024). Hence, Vygotsky’s theory supports the idea that ICT can enable inclusive education that is fostering collaboration, scaffolding learning, and promoting cognitive development for students.

Methodology

Data was collected for using a Primary Quantitative Data Collection method for this study. It is ensuring that the findings are based on first-hand information directly from the participants. A sample of 70 participants was selected to represent a diverse group of students with disabilities. It ensures that different perspectives and experiences are captured. This method allows for the systematic collection of numerical data. It is crucial for identifying trends, relationships, and measurable outcomes that are related to ICT in inclusive education (Choudrie, Zamani & Obuekwe, 2022). The data collected was analyzed using “IBM SPSS software”. It is a powerful tool for statistical analysis and SPSS enabled the researchers to conduct detailed data analysis. These include descriptive statistics, correlation analysis, and hypothesis testing by utilizing SPSS. The study ensures that the results are reliable, objective, and grounded in statistical evidence that allows for the clear identification of the effectiveness of ICT tools.

Findings and Analysis

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Gender	70	1	3	2.04	.875
Age	70	1	3	2.14	.767
Valid N (listwise)	70				

Table 1: Demographic Statistics

(Source: IBM SPSS)

The provided table presents descriptive statistics for two variables are Gender and Age. It is based on a sample of 70 participants and the table includes key metrics such as the minimum, maximum, mean, and standard deviation. The data suggests that participants were grouped into three categories with 1 likely representing "Male," 2 representing "Female," and 3 representing another category. The mean value of 2.04 indicates that the majority of participants identified as gender category 2, likely "Female." “The standard deviation” of 0.875 shows “moderate variability” in the gender distribution with all three categories. Participants were categorized into three age groups for representing different age ranges that fell into the second category (Berg, Guddingsmo & Solum Myren, 2024). “The standard deviation” of 0.767 indicates lower variability in age compared to gender. Both variables show that there is some diversity among the participants in terms of gender and age are likely clustered around specific categories that gender has slightly more variability than age.

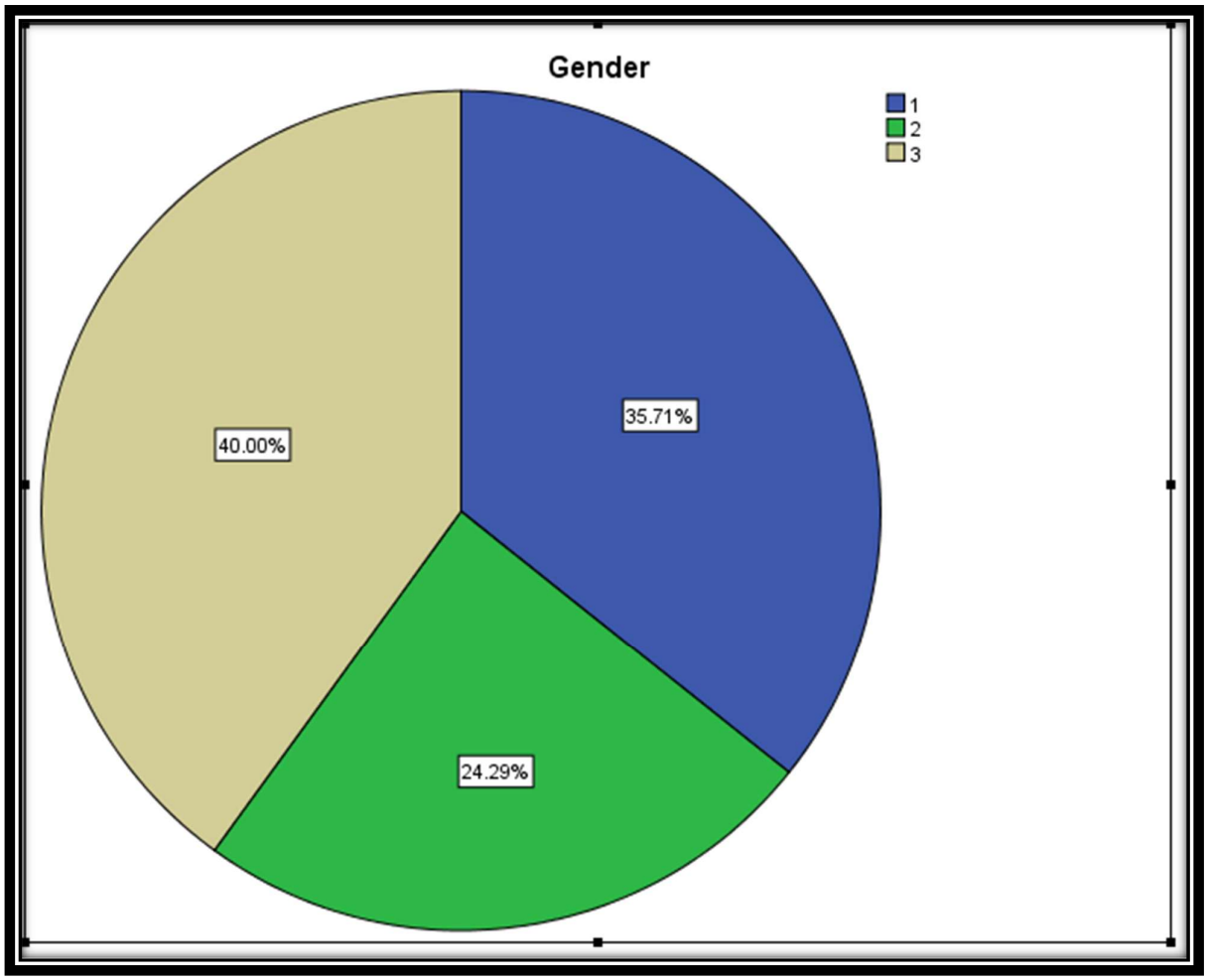

Figure 4: Gender

(Source: IBM SPSS)

The figure demonstrates that among the members, 40% are male, addressing the biggest gathering, while 36% are female, making up a marginally more modest extent. Furthermore, 25% distinguish as "others", including non-parallel, orientation non-adjusting or vague classes. This conveyance mirrors a different example concerning orientation personality.

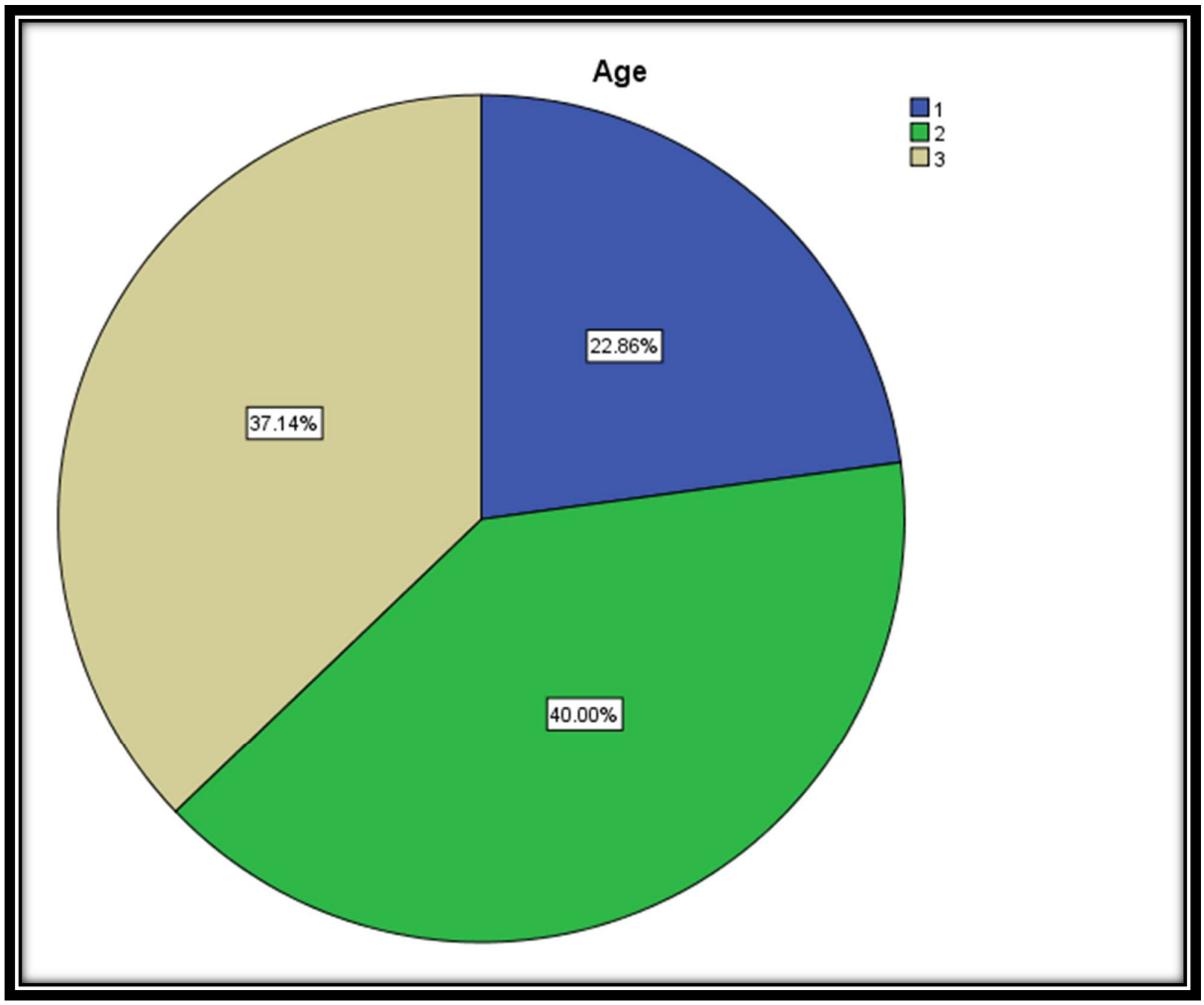

Figure 5: Age

(Source: IBM SPSS)

The information shows that 40% of the members are matured 20-40 years, framing the biggest age bunch. In the interim, 37% are between 40-60 years, showing a critical moderately aged portrayal. In conclusion, 23% are over 60 years, mirroring a more modest extent of more seasoned members in the review. This features a different age circulation.

Correlations

		DV	IV1	IV2	IV3
DV	Pearson Correlation	1	.058	-.111	.158
	Sig. (2-tailed)		.631	.358	.192
	N	70	70	70	70
IV1	Pearson Correlation	.058	1	.090	.014
	Sig. (2-tailed)	.631		.458	.905
	N	70	70	70	70
IV2	Pearson Correlation	-.111	.090	1	.011
	Sig. (2-tailed)	.358	.458		.929
	N	70	70	70	70
IV3	Pearson Correlation	.158	.014	.011	1
	Sig. (2-tailed)	.192	.905	.929	
	N	70	70	70	70

Table 2: Correlation Analysis

(Source: IBM SPSS)

The above table shows the connection lattice between a reliant "variable (DV) and three free factors (IV1, IV2, IV3)" in light of Pearson connection coefficients and their importance levels The connection among DV and IV1 is 0.058, demonstrating a frail positive relationship. Nonetheless, the importance esteem (p = 0.631) is a lot more prominent than 0.05, it is not measurably vital to mean this connection. The connection between DV and IV2 is - 0.111, showing a powerless negative relationship. The importance esteem (p = 0.358) likewise recommends that this relationship is not huge. The connection between DV and IV3 is 0.158, showing a feeble positive relationship. Nonetheless, the importance of esteem (p = 0.192) demonstrates that this relationship is not genuinely huge similarly. None of the factors areas of strength show measurably critical relationships. The powerless connections propose practically no straight relationship between the DV and the free factors, or among the autonomous factors themselves (Vassilakopoulou & Hustad, 2023). Subsequently, the connections in this dataset are not significant according to a factual point of view.

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	IV3, IV2, IV1[b]	.	Enter

a. Dependent Variable: DV

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.205[a]	.042	-.001	2.34177

a. Predictors: (Constant), IV3, IV2, IV1

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15.908	3	5.303	.967	.414[b]
	Residual	361.935	66	5.484		
	Total	377.843	69			

a. Dependent Variable: DV

b. Predictors: (Constant), IV3, IV2, IV1

Table 3: Regression Analysis

(Source: Created by IBM SPSS)

The Model Rundown table gives key insights to a relapse investigation with the reliant variable (DV) and three free factors (IV1, IV2, IV3). R = 0.205 shows a powerless positive connection between the indicators (IV1, IV2, IV3) and the reliant variable. This proposes that the free factors have little relationship with the DV. R Square (0.042) addresses the extent of change in the reliant variable made sense of by the free factors. For this situation, just 4.2% of the variety in the DV is made sense of by IV1, IV2, and IV3, which is extremely low. Changed R Square (- 0.001) adapts to the quantity of indicators in the model and proposes that, subsequent to adapting to the indicators, the model does not work on the forecast of the DV. The negative worth infers the indicators might add clamour instead of working on the model's exactness (Sripathi et al., 2024). The Standard deviation (2.34177) measures the typical distance that the noticed qualities tumble from the relapse line, showing some changeability in the expectations made by the model. Hence, the model has frail informative power.

The ANOVA table represents an overall fit of the regression model with “the dependent variable (DV) and independent variables (IV1, IV2, IV3)”. Sum of Squares (Regression = 15.908) represents variation criteria in the DV explained by the independent variables. The Residual Sum of Squares (361.935) shows, as an unexplained variation that are indicating different remains unaccounted for by the model.

Discussion

. Students with disabilities face challenges for utilizing ICT tools for learning. One significant issue is inadequate access to assistive technologies and many educational institutions due to lack the necessary infrastructure. These are screen readers, speech-to-text software, and adaptive keyboards that are essential for students with physical, sensory, or cognitive impairments The regression model has 3 predictors (IV1, IV2, IV3), so the regression df is 3, and the residual df is 66 and their size minus the number of predictors). Mean Square (5.303 for regression and 5.484 for residuals) represents an

average variance explained by the predictors versus the unexplained variance. “The p-value” (Sig. = 0.414) is greater than 0.05 and this meaning the regression model is not statistically significant that it does not significantly predict the DV. The Coefficients table shows that none of the autonomous factors (IV1, IV2, IV3) and their p-values (Sig.) are more noteworthy than 0.05. The Unstandardized Coefficients show that IV1 and IV3 make positive impacts, while IV2 makes a negative difference. Thus, it can create psychological barriers to their full participation. These challenges highlight systemic improvements in infrastructure, affordability, and training to make ICT-based education more inclusive.

Conclusion and Recommendation

This study concluded that the transformative potential of “Information and Communication Technology (ICT)” is fostering an inclusive education for students with disabilities. ICT helps span the advanced gap and upgrades instructive open doors for these understudies by giving available and versatile devices. In this manner, challenges are required like deficient framework, significant expenses, and absence of educator preparing can prevent full use of these advances. ICT has demonstrated compelling for further developing learning results, expanding commitment, and cultivating a more comprehensive climate in spite of these hindrances. In this manner, ICT in schooling is fundamental for advancing as a value that understudies with handicaps can flourish socially.

Recommendation

A few stages are prescribed to boost the advantages of ICT in comprehensive schooling. In the first place, interest in framework and reasonable assistive advances is pivotal to guarantee that all understudies approach the fundamental apparatuses. Exhaustive educator preparing projects to outfit teachers with the abilities to coordinate ICT apparatuses in the study hall. Finally, endeavours to bring issues to light and diminish social shame around utilizing assistive innovations are indispensable to cultivating a steady and comprehensive learning climate for understudies with incapacities.

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