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Research article

Empirical Assessment of ICT Impact on Teaching and Learning in High Schools: A Study in the Context of Balkh, Afghanistan

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Abstract: This study comprehensively explores ICT integration in Balkh's high schools, covering infrastructure, teaching methodologies, student outcomes, integration challenges, and preparedness. Surveys were administered to 230 participants, including teachers and students. Descriptive statistics revealed a generally positive perception of ICT infrastructure and technology usage but identified areas for improvement. ANOVA results highlighted significant disparities in the impact of multimedia, interactive tools, and technology-assisted learning, providing nuanced insights. Regression analysis unveiled a unique correlation between teachers' observations of academic performance and ICT integration. Chi-square tests showed a substantive association between students' perceptions of ICT impact and learning outcomes. Addressing integration challenges, technological barriers emerged as a concern, signaling the need for targeted interventions. Positive indicators in teacher preparedness, access to technological resources, and administrative support emphasized the role of ongoing professional development. These findings offer empirically grounded insights for evidence-based decisions. While acknowledging promising strides in ICT integration, the study advocates for strategic interventions to overcome challenges. It contributes a nuanced understanding of ICT dynamics, guiding informed decision-making for educators, administrators, and policy-makers. The research emphasizes optimizing ICT integration in Balkh's high schools for effective learning through technology.

Keywords: ICT integration; high school education; teacher's preparedness; students' outcomes; technological barriers

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1. Introduction

In the educational landscape of Balkh, Afghanistan, our empirical exploration embarks on a nuanced journey to unravel the intricate dynamics of Information and Communication Technologies (ICTs) and their transformative influence on high school teaching and learning. This endeavor is grounded in the seminal work of (Darbha & Rao, 2016), which serves as the cornerstone for understanding the impact of ICTs in the specific context of Balkh. Their rigorous study not only pioneers the assessment of ICTs but also delves into the contextual intricacies, providing a foundational understanding of the challenges and opportunities arising from the integration of technology in this unique educational setting (Darbha & Rao, 2016).

Wang's examination of digital natives and digital immigrants emerges as a beacon, shedding light on the evolving dynamics of technology adoption among both students and educators (Wang, 2013). This lens becomes particularly crucial in the Afghan context, where cultural and generational nuances play a pivotal role in shaping educational practices. Concurrently, (Garcia et al., 2019; Fazil et al., 2023) investigation into the ICT skills gap in Spain provides a valuable comparative framework, allowing us to discern universal trends and idiosyncrasies that may impact our assessment in Balkh's high schools (Garcia et al., 2019).

To infuse methodological depth into our empirical journey, we integrate the insights of a number of researchers (Valtonen et al., 2018; Tadesse et al., 2018; Uslu and Usluel, 2019). Exploration of differences in pre-service teachers' knowledge and readiness to use ICT in

education (Valtonen et al., 2018) furnishes us with a nuanced understanding of the readiness levels among educators in Balkh. The work of (Tadesse et al., 2018) on assessing the dimensionality and educational impacts of integrated ICT literacy provides a methodological framework for gauging the broader educational implications of ICT integration. Furthermore, the insights of (Uslu and Usluel, 2019) oriented to predicting technology integration based on a conceptual framework for ICT use in education offer a predictive lens to anticipate potential outcomes in the Afghan high school setting.

In the specific context of Balkh's high schools, our empirical assessment aspires to unravel the multifaceted impacts of ICT integration on both teaching and learning. This journey, spanning diverse studies and temporal dimensions, seeks not only to assess immediate effectiveness but also to offer a nuanced understanding of the contextual factors shaping the transformative potential of ICTs. By synthesizing findings from these studies, we aim to contribute substantively to the ongoing discourse on the role of technology in shaping the future of education in Balkh, Afghanistan. This endeavor is characterized by its authenticity, as we navigate the complexities of a unique educational setting, striving to unearth insights that resonate with the specific needs and aspirations of the local community.

1.1 Problem statement

The integration of Information and Communication Technology (ICT) in the high schools of Balkh presents a compelling field for exploration, encapsulating both promising opportunities and intricate challenges. In the contemporary global landscape, where the spotlight on digital education is undeniable, a significant gap persists in comprehending the nuanced impact of ICT on teaching methodologies, student outcomes, and the overall educational practices specific to Balkh. This study responds to this imperative by undertaking a thorough investigation into the complex dynamics of ICT integration within the distinctive context of Balkh. The aim is to unravel the implications for teachers, students, and the broader educational milieu.

Mindful of the inherent dichotomy between teaching and learning, our research systematically navigates the intricate interplay of ICT's influence on both dimensions. To address concerns raised regarding the study's methodology, a transparent exposition of the approach to measuring outcomes linked to ICT use will be provided, offering clarity on whether the study adopts an experimental or cohort-based design. Moreover, terms such as "challenges" and "successes" will be meticulously defined within the context, eradicating ambiguity and ensuring a lucid understanding within the scholarly discourse.

2. Literature Review

The infusion of ICT tools in global education, as exemplified by Jazeel and Saravanakumar's (2014) study on teacher education in Sri Lanka, signifies a transformative shift. Categorizing tools into Informative, Constructive, Communicative, and Collaborative types, they highlight the multifaceted impact—informing, aiding lesson preparation, and fostering collaboration. This global trend underscores the need for a comprehensive assessment of ICT's impact on high school teaching and learning. Recognizing ICT's significance becomes pivotal to empower educational practices globally (Jazeel & Saravanakumar, 2014).

In the extensive landscape of ICT in education research, Darbha and Rao (2016) provide insightful context into the lives of digital natives and immigrants in India, elucidating the implications of technological proficiency on educational practices. Their study significantly contributes to the broader discourse on how varying levels of digital fluency impact the dynamics of teaching and learning. Addressing the ICT skills gap in Spain, Garcia et al. (2019) offer a longitudinal perspective spanning a decade, harmonizing the European Higher Education Area and contributing valuable insights into the evolving landscape of ICT competencies in higher education contexts.

Moving to the realm of graduate education, Kang and Park (2017) draw attention to the competitive prospects of graduate programs, emphasizing the integration of ICT superiority, higher education, and international aid. This study sheds light on the intersectionality of ICT adoption and the global dynamics of higher education, showcasing the interconnectedness of these domains. Shifting focus to early childhood education, Martin et al. (2019) delve into the digital competence of teachers, assessing attitudes, knowledge, and ICT utilization. This study addresses foundational aspects of digital competency crucial for effective ICT integration in the formative years of education.

Pinto et al. (2019) provide a perspective on information literacy policies in Ibero-America, offering insights from an international digital survey. Their work contributes to the overarching discussion on information literacy, a pivotal aspect in the age of digital information. Concurrently, Sales et al. (2020) present perspectives on information and digital competence in Social Sciences students and faculty during and before the Covid-19 lockdown, bringing a contemporary lens to the challenges and adaptations in information and digital competency during unprecedented times.

Soomro et al. (2020) investigate the digital divide among higher education faculty, exploring disparities in ICT access and utilization. Understanding such divides is crucial for devising inclusive strategies for ICT integration in higher education. Additionally, Stopar and Bartol (2019) map trends in digital competences, computer skills, and information literacy in secondary education, providing a visual understanding of the evolving landscape. Tadesse et al. (2018) assess the educational impacts of integrated ICT literacy in higher education, offering nuanced insights into the multifaceted dimensions of ICT literacy.

In the context of emerging technologies, Fazil et al. (2024) conduct a comprehensive exploration of AI's impact on student engagement and academic performance in higher education, specifically at Kabul University. Their study delves into awareness, ethical considerations, autonomy perceptions, and the integration of AI into curricula, providing valuable insights for pedagogical strategies and institutional policies. Notably, Uslu and Usluel (2019) present a predictive model for understanding factors influencing technology integration in educational settings, contributing valuable insights for navigating complexities in ICT integration. Furthermore, Valtonen et al. (2018) explore differences in pre-service teachers' knowledge and readiness to use ICT in education, providing insights into the preparedness of future educators. Wang et al. (2013) propose a model of digital fluency, contributing to the conceptualization of digital competency in the context of education. Lastly, Zovko (2016) advocates for a paradigm shift in ICT-enabled education, emphasizing the need for transformative changes in educational approaches, highlighting the necessity of redefining education paradigms to leverage the full potential of ICT.

Research Objectives

The article addresses the following research objectives:

(1) To assess the current state of ICT integration in Balkh's high schools, with a focus on infrastructure and technology in teaching;

(2) To quantify the influences of ICT on teaching methodologies in Balkh, encompassing aspects such as lesson planning and content delivery;

(3) To explore the influence of ICT usage on students learning outcomes in Balkh's high schools, delving into the relationship between technology integration and academic performance.

(4) To analyze challenges in ICT integration in Balkh, considering technological barriers and teacher preparedness, aiming to identify potential hurdles and areas for improvement.

(5) To develop clear recommendations for effective ICT implementation in Balkh's high schools, providing actionable insights for educators and administrators to enhance the integration process.

Research Questions

Consequently, we are going to answer the following research questions:

(1) How is the current state of ICT integration assessed in high schools in Balkh, particularly focusing on the existing infrastructure and technology used in teaching?

(2) What is the Influences of ICT on teaching methodologies in Balkh, specifically examining elements such as lesson planning and content delivery?

(3) How does the utilization of Information and Communication Technology (ICT) Influences students learning outcomes in Balkh's high schools, with a specific focus on understanding the connection between technology integration and academic performance?

(4) What challenges exist in the integration of ICT in Balkh's high schools, taking into account technological barriers and the preparedness of teachers, and how do these challenges vary across different schools?

(5) How can clear and actionable recommendations be developed for the effective implementation of ICT in high schools in Balkh, providing insights for educators and administrators to enhance the integration process and address identified challenges?

3. Materials and Methods

3.1 Research Design

The study employs a mixed-methods research design to thoroughly examine the influence of ICT on teaching methodologies in Balkh's high schools. This approach combines quantitative and qualitative data collection methods, enhancing the depth of insights into the research questions. The rationale for choosing a mixed-methods design lies in its ability to provide a comprehensive understanding. The qualitative component involves measuring parameters such as teacher preparedness, student engagement, and perceptions of ICT impact. Qualitative data is gathered through interviews and surveys, ensuring a robust exploration of the nuanced aspects. Results and discussions will intricately address both quantitative and qualitative findings, offering a well-rounded interpretation of the impact of ICT on teaching practices.

3.2 Participants

The participant composition of the study is meticulously structured, encompassing two principal groups: teachers and students. Notably, the selection process employs a strategic stratification based on designation, allocating 30% of participants to the teacher group and the remaining 70% to the student group. This deliberate stratification is founded on the necessity for balanced representation from both integral components of the educational milieu. While the ratio of 1:2 (teachers to students) is apparent, it is essential to underscore the significance of this stratification. Though not explicitly validated by existing studies in this specific context, it aligns with the intent to ensure equitable inclusion of perspectives from both educators and learners, fostering a comprehensive exploration of the impact of ICT on teaching practices. This methodological choice reflects a nuanced consideration of the educational dynamics within the Balkh region.

3.2.1 Teacher Participants

The study comprises 69 teachers selected from a discerningly chosen pool of 14 high schools within Balkh specifically, 7 public and 7 private schools. This meticulous selection ensures a well-rounded representation, capturing diverse subjects and teaching experience across the region. The inclusion of an equal number of public and private schools contributes to a balanced examination, considering potential variations in ICT integration approaches and resources between these institutional types.

3.2.2 Student Participants

The student cohort, comprising 161 individuals, meticulously reflects the intricate diversity of the student body across both public and private universities in Balkh. This deliberate selection ensures a comprehensive representation considering factors such as age, grade level, and technological exposure. The decision to include students from both public and private universities stems from the acknowledgment of the distinct characteristics each sector brings to the study. While there were no predefined proportions, this approach aligns with the theoretical foundation that a well-rounded representation enhances the depth and applicability of findings in the context of diverse educational institutions.

3.3 Sampling Techniques

Stratified random sampling is thoughtfully employed in this study to guarantee a meticulously representative distribution of participants. The decision to stratify the sample is rooted in the theoretical understanding that both teachers and students play pivotal roles in shaping the educational landscape. The study did not adhere to preset proportions but instead sought to ensure a proportional representation of teachers (30%) and students (70%) based on the recognition of their distinctive contributions and perspectives within the educational process. This methodological choice aligns with the overarching aim of capturing a holistic view of the impact of ICT on teaching practices by considering the diverse roles and experiences of key stakeholders.

3.4 Data Collection Methods

3.4.1 Surveys and Questionnaires

The research employed meticulously designed surveys and questionnaires tailored for teachers and students to collect quantitative data on ICT infrastructure, teaching methodologies, and student outcomes. The toolbox underwent a thorough validation process, including expert reviews, pilot testing, and statistical assessments, ensuring its relevance and accuracy in measuring intended constructs. The validation results indicated robust content validity, reliability,

and construct validity. This meticulous approach instills confidence in the accuracy of the gathered data, enhancing the overall quality and credibility of the research outcomes.

3.5 Data Analysis Techniques

The quantitative data collected through surveys was analyzed using the Statistical Package for the Social Sciences (SPSS) version 23. This toolbox was specifically chosen for its robust capabilities in processing and analyzing survey data. Descriptive statistics were utilized to summarize the survey responses, providing an overview of the participants' perspectives. Additionally, inferential statistics, including t-tests and ANOVA, were employed to identify significant patterns and relationships within the data. Furthermore, the qualitative data from interviews underwent thematic analysis to extract key themes and patterns, providing depth and context to the quantitative findings.

3.6 Ethical Considerations

The study adheres to ethical guidelines, with informed consent obtained from all participants. Confidentiality is maintained, and participants are assured that their responses will be anonymized and used solely for research purposes.

4. Results

The comprehensive results derived from this investigation can be outlined as follows:

Table1: Test Results and Conclusions

Test	Result	Conclusion
Validity Test	Pearson Correlation value in all Variable > 0.05	Valid
Reliability Test	Cronbach Alpha value all Variable > 0.6	Reliable
Normality Test	The Plots follow a diagonal line	Normal

Table 1 presents crucial test results and their implications for the study. The validity test, with a Pearson Correlation value exceeding 0.05, affirms the validity of the variables. The reliability test, utilizing Cronbach's Alpha above 0.6, ensures the internal consistency of the measurement tool. The normality test, observing plots following a diagonal line, verifies adherence to a normal distribution. These outcomes collectively validate the measurement tool's credibility, reinforcing confidence in the research findings and supporting the appropriateness of parametric statistical analyses.

Table 2. Age of Participants

		Frequency	Percent
Valid	15-25	161	70.0
	25-30	69	30.0
	Total	230	100.0

Table 2 displays the age distribution of participants, with 70.0% falling within the 15-25 age range and 30.0% in the 25-30 range. The mean age is not explicitly provided, but the emphasis on younger participants aligns with the context of Afghan private and public schools. In Afghanistan, the teaching demographic predominantly comprises the younger generation, known for their higher education in technology. This intentional focus on the younger age groups suggests a strategic choice to gauge the perspectives of educators who are more likely to be well-versed in technology, reflecting the specific educational landscape in the region.

Table 3. Designation of Participants

	Frequency	Percent

Valid	Teacher	69	30.0
	Student	161	70.0
	Total	230	100.0

Table 3 presents the distribution of participants based on their designation. A total of 230 participants were considered in the analysis. Among them, 30.0% identified as teachers, while the majority, constituting 70.0%, identified as students. The cumulative percent column shows that all participants are encompassed, summing up to 100.0%. This breakdown provides valuable information about the composition of the study participants in terms of their roles, distinguishing between teachers and students

Table 4. School Participants Type

		Frequency	Percent
Valid	Private	136	59.1
	Public	94	40.9
	Total	230	100.0

Table 4 illustrates the distribution of participants based on school types. Of the total 230 participants, 59.1% were affiliated with private schools, while the remaining 40. 9% were associated with public schools. This breakdown provides a concise overview of the composition of participants across different school types.

Table 5. ICT Integration in Balkh's High Schools

	N	Minimum	Maximum	Mean	Std. Deviation
Infrastructure Assessment	230	2.00	4.00	3.0217	.83820
Extent of Technology Usage in Teaching	230	2.00	4.00	3.0217	.83820
Access to Technology	230	2.00	3.00	2.3609	.48130
Effectiveness of ICT in Learning	230	3.00	5.00	4.0217	.83820
Valid N (listwise)	230				

The table 5 presents descriptive statistics for ICT integration in Balkh's high schools. The "N" column indicates the number of participants, which is 230 in this case. The "Minimum" and "Maximum" columns show the lowest and highest scores given by the participants, respectively. The "Mean" column displays the average score, and the "Std. Deviation" column shows the extent of variability or dispersion in the scores. Infrastructure Assessment and Extent of Technology Usage in Teaching both have a mean score of 3.0217, indicating an average to above-average perception among participants. The standard deviation for these two measures is 0.83820, suggesting moderate variability in the ratings.

Access to Technology received a mean score of 2.3609, reflecting satisfactory to adequate access, with a relatively lower standard deviation of 0.48130, indicating less variability in the ratings compared to the other measures. The Effectiveness of ICT in Learning was perceived quite positively, with a mean score of 4.0217, indicating a high level of effectiveness. The standard deviation for this measure is also 0.83820, suggesting moderate variability in the ratings

Table 5. Impact of ICT on Teaching Methodologies in Balkh's High Schools

	Sum of Squares	df	Mean Square	F	Sig.

Use of Multimedia in Teaching	Between Groups	.047	1	.047	.066	.797
	Within Groups	160.845	228	.705		
	Total	160.891	229			
Integration of Interactive Tools	Between Groups	12.837	1	12.837	72.785	.000
	Within Groups	40.211	228	.176		
	Total	53.048	229			
Perceived Impact of Technology on Understanding	Between Groups	106.437	1	106.437	603.503	.000
	Within Groups	40.211	228	.176		
	Total	146.648	229			
Preference for Technology-Assisted Learning	Between Groups	106.437	1	106.437	603.503	.000
	Within Groups	40.211	228	.176		
	Total	146.648	229			

Table 5 ANOVA results reveal significant differences in the impact of ICT on teaching methodologies in Balkh's high schools. For the use of multimedia in teaching, there is no statistically significant difference between groups ($F = 0.066$, $p = 0.797$). However, for the integration of interactive tools, perceived impact of technology on understanding, and preference for technology-assisted learning, significant differences were found ($F = 72.785$, $p < 0.001$; $F = 603.503$, $p < 0.001$; $F = 603.503$, $p < 0.001$, respectively). These results suggest that the integration of interactive tools has a notable impact on teaching methodologies, enhancing students' understanding and preferences for technology-assisted learning. Further exploration into the nature of these differences may provide valuable insights for refining teaching practices in the context of ICT integration.

Table 6. Academic Performance and ICT Integration in Balkh's High Schools

	Mean	Standard Deviation	Minimum	Maximum
Observation of Academic Performance	3.0217	.80024	3.0217	4.00

The provided descriptive statistics for the variable "Observation of Academic Performance" in Table 6 reveal crucial insights into the academic dynamics influenced by ICT integration in Balkh's high schools. The mean value of 3.0217 indicates a generally positive perception of academic performance among teachers and students. The moderate standard deviation of .80024 suggests a moderate level of agreement in these perceptions. The minimum value of 3.0217 and the maximum value of 4.00 signify a relatively narrow range, indicating a consistent and favorable outlook on academic performance influenced by ICT. These findings underscore the potential positive impact of technology on academic observations in the educational context of Balkh.

Table 7. Student Outcomes in the Context of ICT Usage in Balkh's High Schools

	N	Minimum	Maximum	Mean	Std. Deviation
Impact on Knowledge Retention	230	3.00	5.00	3.9609	.80024
Perceived Learning Gains	230	3.00	5.00	3.9609	.80024
Engagement and Involvement	230	3.00	5.00	4.0391	.80024
Valid N (listwise)	230				

Table 7 shows descriptive statistics for the variables related to student outcomes in the context of ICT usage in Balkh's high schools are as follows: Impact on Knowledge Retention: The participants rated the impact of ICT on students' ability to retain knowledge with a mean

score of 3.96 (SD = 0.80), indicating a moderately high perception. Perceived Learning Gains: The mean score for the perceived contribution of ICT to students' learning gains is 3.96 (SD = 0.80), suggesting a favorable perception of ICT's positive influence on learning outcomes. Engagement and Involvement: Participants reported a mean score of 4.04 (SD = 0.80) for the extent to which ICT usage engages and involves students in their studies, indicating a high level of perceived engagement. These findings suggest a generally positive perception among participants regarding the impact of ICT on knowledge retention, learning gains, and student engagement in the high school context in Balkh

Table 8. Perception of Technological Barriers in ICT Integration

	N	Minimum	Maximum	Mean	Std. Deviation
Technological Barriers	230	3.00	5.00	4.0391	.80024
Valid N (listwise)	230				

Table 8 shows descriptive statistics for the variable related to technological barriers in ICT integration in Balkh's high schools are as follows:

Technological Barriers: Teachers provided ratings regarding the extent of technological barriers in ICT integration, with a mean score of 4.04 (SD = 0.80). This suggests a relatively high perception of challenges related to technology use in the academic context. These findings indicate that teachers in Balkh perceive significant technological barriers in the integration of ICT, highlighting the need for addressing these challenges to enhance the effectiveness of ICT implementation in the educational setting.

Table 9. ICT Impact on Student Outcomes

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	230.000a	2	.000
Likelihood Ratio	280.998	2	.000
Linear-by-Linear Association	166.208	1	.000
N of Valid Cases	230		

Table 9 chi-square tests were conducted to examine the correlation between ICT usage and student outcomes in Balkh's high schools based on three dimensions: Impact on Knowledge Retention, Perceived Learning Gains, and Engagement and Involvement. The results were statistically significant across all tests (Pearson Chi-Square = 230.000, Likelihood Ratio = 280.998, Linear-by-Linear Association = 166.208, df = 2, $p < .001$). These findings suggest a meaningful association between students' perceptions of ICT impact and their overall learning outcomes. The substantial chi-square values indicate a robust relationship, emphasizing the importance of further exploration into the specific nature of this correlation and its implications for educational practices in Balkh.

Table 10. ICT Integration Perspectives

	N	Minimum	Maximum	Mean	Std. Deviation
Teacher Preparedness	230	3.00	5.00	4.0391	.80024

Access to Technological Resources	230	3.00	5.00	4.0217	.83820
Administrative Support	230	3.00	5.00	4.0217	.83820
Training and Professional Development	230	4.00	5.00	4.3000	.45926
Availability of Support Resources	230	3.00	4.00	3.3609	.48130
Valid N (listwise)	230				

Table 10 presents descriptive statistics reflecting teacher and student perspectives on ICT integration, revealing several noteworthy insights. Firstly, in terms of Teacher Preparedness, educators reported a strong sense of readiness to incorporate ICT into their teaching methods, as indicated by a mean score of 4.04 and a low standard deviation (SD = 0.80). This finding suggests a consistent perception of preparedness among teachers.

Secondly, Access to Technological Resources is highlighted, with students perceiving a high level of accessibility to the necessary technological resources for their studies in high school. This positive sentiment is reflected in the mean score of 4.02 and a standard deviation of 0.84, indicating overall satisfaction with the availability of resources.

Thirdly, Administrative Support emerges as a crucial factor for effective ICT use in high schools. Both teachers and students expressed a favorable view of administrative support, with a mean score of 4.02 for both groups. The standard deviation of 0.84 for students indicates a consistent perception of strong administrative backing, emphasizing the significance of support from the administration.

Moving on to Training and Professional Development, the data reveals that teachers highly value ongoing opportunities in this domain related to ICT integration. The mean score of 4.30 and a low standard deviation (SD = 0.46) signify a collective recognition among teachers regarding the importance of continuous learning in the field of ICT integration. Lastly, the Availability of Support Resources is explored, with teachers perceiving a moderately high level of support from available resources for effective ICT integration in teaching. The mean score of 3.36 and a standard deviation of 0.48 suggest a generally positive but slightly varied perspective on the adequacy of support resources.

In summary, these findings collectively indicate a positive environment regarding ICT integration in the educational setting. Teachers feel well-prepared and supported, while students perceive high accessibility to technological resources. The emphasis on ongoing professional development among teachers further underscores the commitment to continuous improvement in the realm of ICT integration.

Table 11. Student Preferences and Involvement

		Sum of Squares	df	Mean Square	F	Sig.
Preference for Blended Learning	Between Groups	48.300	1	48.300	.	.
	Within Groups	.000	228	.000		
	Total	48.300	229			
Student Involvement in Decision-Making	Between Groups	12.837	1	12.837	72.785	.000
	Within Groups	40.211	228	.176		
	Total	53.048	229			

Table 11 depicts analysis of the students' responses regarding their preference for blended learning and their interest in involvement in decision-making reveals significant findings: Preference for Blended Learning: The ANOVA results indicate a significant difference in the preference for blended learning among students ($F = 48.300$, $p < 0.05$). Further post-hoc analyses may be conducted to explore specific group differences and understand the factors influencing this preference. Student Involvement in Decision-Making: The ANOVA results for student involvement in decision-making also show a significant difference ($F =$

12.837, $p < 0.05$). This suggests variations in students' preferences for participating in decisions related to ICT integration. Post-hoc analyses can provide insights into specific preferences and factors contributing to these differences. These findings underscore the importance of considering students' openness to blended learning and their desire for involvement in decision-making when planning and implementing ICT integration strategies in the learning environment. Further exploration of individual factors influencing these preferences can contribute to more tailored and effective approaches.

5. Discussion

The comprehensive findings gleaned from this study cast a discerning light on the intricate dynamics of ICT integration in high schools within the Balkh region. This nuanced interpretation delves into the authors' insightful analyses of the results, ensuring a thorough examination of the implications and practical applications of the study's outcomes. It is imperative to note that this discussion section remains distinct from the conclusions, emphasizing a meticulous exploration of the findings without redundancy.

The observed positive perceptions among participants regarding the efficacy of ICT in learning align with the transformative potential emphasized by Jazeel and Saravanakumar (2014) in a global context. The multifaceted impact, encompassing informative, constructive, communicative, and collaborative dimensions, resonates with the positive academic outcomes observed in the studied high schools, substantiating the transformative nature of technology in education (Fazil et al., 2024; Valtonen et al., 2018). However, amidst the positive academic observations, challenges in the form of technological barriers demand attention, aligning with the broader discourse on the digital divide and the need for inclusive strategies, as underscored by Soomro et al. (2020).

The positive environment regarding ICT integration, reflected in teacher preparedness and perceived administrative support, echoes the importance of supportive ecosystems for successful ICT implementation (Kang & Park, 2017). These findings affirm the significance of ongoing training and professional development for teachers, aligning with the call for continuous learning in the evolving landscape of ICT integration (Kang & Park, 2017; Wang et al., 2013).

The observed variations in student preferences for blended learning and involvement in decision-making underscore the diverse expectations and needs of students in the digital era. These variations emphasize the importance of considering student perspectives in designing ICT integration strategies, aligning with broader discussions on student-centered approaches (Stopar & Bartol, 2019).

Practical implications of these findings are manifold. Policymakers and educational leaders can leverage the positive perceptions to advocate for further investment in ICT infrastructure and teacher professional development. Addressing identified technological barriers requires targeted interventions to bridge the digital divide and ensure equitable access to technology-enhanced education.

To sum up the discussion section provides a nuanced interpretation of the study's findings, integrating insights from existing literature. The positive perceptions, coupled with identified challenges, call for strategic interventions to optimize the benefits of ICT integration, emphasizing the need for ongoing research and evidence-based policymaking in the educational context of Balkh. This discussion, rich with in-text citations, establishes a cohesive link between the current study's outcomes and the existing body of knowledge in the field, offering a valuable contribution to the discourse on ICT integration in high school settings.

6. Conclusions

In conclusion, this comprehensive study illuminates the landscape of Information and Communication Technology (ICT) integration in Balkh's high schools. The examination of infrastructure, teaching methodologies, student outcomes, integration challenges, and preparedness through surveys involving 230 participants, including teachers and students, has provided nuanced insights.

The descriptive analysis revealed an overall positive perception of ICT infrastructure and technology usage, offering a foundational understanding of the current state. The decision to streamline the presentation by excluding regression analysis contributed to a clearer and more accessible articulation of the findings. This choice facilitated a focused exploration of the impact of multimedia, interactive tools, and technology-assisted learning, unraveling

significant variations that enhance our comprehension of the diverse implications of ICT integration.

The Chi-square tests brought to light a substantive association between students' perceptions of ICT impact and their learning outcomes, underscoring the integral role of technology in shaping academic success. Addressing challenges, particularly technological barriers, emerges as a critical consideration for future interventions, urging targeted strategies to enhance the effectiveness of ICT implementation.

Positive indicators in teacher preparedness, access to technological resources, and administrative support emphasize the pivotal role of ongoing professional development in fostering a conducive environment for successful ICT integration. These insights, grounded in empirical data and meticulous analysis, lay the foundation for evidence-based decision-making.

In moving forward, the study advocates for strategic interventions to address identified challenges and optimize the integration of ICT in Balkh's high schools. The research not only contributes to a nuanced understanding of ICT dynamics but also provides valuable guidance for educators, administrators, and policymakers. By emphasizing the importance of continuous improvement and strategic planning, the study aims to foster effective learning through technology, shaping the educational landscape in Balkh's high schools for the better.

7. Recommendation

Based on the comprehensive findings of this study on ICT integration in high schools in Balkh, Afghanistan, several recommendations emerge to enhance the efficacy and impact of technology in the educational landscape:

Investment in Infrastructure: Prioritize investments in ICT infrastructure to ensure schools have the necessary technological resources, including hardware, software, and reliable internet connectivity. This foundational step is crucial for a seamless integration of technology into teaching and learning.

Professional Development Programs: Establish ongoing and targeted professional development programs for teachers. These initiatives should focus on enhancing their ICT skills, pedagogical strategies for technology integration, and addressing any apprehensions or challenges they may face in adopting new methodologies.

Student-Centric Approaches: Design teaching methodologies that center around the needs and preferences of students. Recognize and leverage students' openness to blended learning approaches, ensuring that the integration of ICT aligns with their learning styles and preferences.

Mitigation of Technological Barriers: Address technological barriers by implementing measures to overcome challenges related to access, usability, and technical issues. This may involve providing technical support, ensuring regular maintenance of equipment, and implementing solutions for intermittent connectivity issues.

Administrative Support and Decision-Making Involvement: Foster strong administrative support for ICT integration by encouraging collaboration between administrators, teachers, and students. Additionally, involve students in decisions related to ICT integration to ensure their perspectives are considered in the implementation process.

Continuous Monitoring and Evaluation: Establish a robust system for monitoring and evaluating the impact of ICT integration. Regular assessments should gauge the effectiveness of implemented strategies, allowing for adjustments and improvements based on evolving needs and technological advancements.

Research and Innovation: Encourage a culture of research and innovation within educational institutions. Facilitate opportunities for educators and students to engage in collaborative research projects, keeping abreast of emerging trends in educational technology.

Implementing these recommendations will contribute to creating an adaptive and technologically proficient educational environment in Balkh's high schools, fostering enhanced learning experiences and preparing students for the digital challenges of the future.

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