JOURNAL FOR SOCIAL SCIENCE STUDIES

An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063

Volume 4 • Issue 2 • June 2026

ICT INTEGRATION AND STUDENTS' LEARNING OUTCOMES IN HIGHER SECONDARY EDUCATION: EVIDENCE FROM DISTRICT SUDHNOTI, AZAD JAMMU AND KASHMIR

Umama Nazir[*1], Dr. Qaisara Parveen[2], Dr. Muhammad Arshad Dahar[3], Dr. Saadia Masood[4]

[*1]*M.Phil Scholar, Department of Education, PMAS-Arid Agriculture University, Rawalpindi, Pakistan*

[2]*Associate Professor, Department of Education, PMAS-Arid Agriculture University, Rawalpindi, Pakistan*

[3]*Assistant Professor, Department of Education, PMAS-Arid Agriculture University, Rawalpindi, Pakistan*

[4]*Associate Professor, Department of Statistics, PMAS-Arid Agriculture University, Rawalpindi, Pakistan*

[*1]umamakhan4353@gmail.com, [2]drqaisara@uaar.edu.pk, [3]drarshad1969@uaar.edu.pk, [4]saadia.masood@uaar.edu.pk

DOI: https://doi.org/10.5281/zenodo.22189321

Keywords

Information and Communication Technology; ICT integration; learning outcomes; electronic literacy; teacher use of ICT

Article History

Received: 28 April 2026

Accepted: 15 June 2026

Published: 30 June 2026

Corresponding Author: *

Umama Nazir

Abstract

The present study was aimed at examining the relationship of ICT integration with the students' learning outcomes at the higher secondary level in District Sudhnoti, Azad Jammu and Kashmir. The article is based on quantitative survey. A structured 39-item questionnaire on five-point Likert scale was administered to students, and 169 valid responses were obtained for analysis. Descriptive statistics, Cronbach's alpha, Pearson correlation and simple linear regression were used. The instrument demonstrated high internal consistency overall (α = .994) and subscale reliabilities ranged from .768 to .977. Students' access to ICT facilities was reported as favourable ($M = 4.07$, $SD = 1.02$), their ICT skills were strong ($M = 4.28$, $SD = 1.06$), they often used ICT in learning ($M = 4.22$, $SD = 1.10$) and perceived positive learning outcomes ($M = 3.96$, $SD = 1.12$). Conversely, the mean score of teacher ICT use was lowest ($M = 3.11$, $SD = 1.31$). Positive and statistically significant Pearson correlations were found between all reported ICT dimensions and learning outcomes; the strongest bivariate association with learning outcomes was for ICT facilities ($r = .984$, $p < .01$), followed by ICT motivation ($r = .983$, $p < .01$) and ICT skills ($r = .970$, $p < .01$). In the simple regression model, overall ICT significantly predicted learning outcomes, $R = .989$, $R^2 = .978$, adjusted $R^2 = .978$, $F(1, 167) = 7468.88$, $p < .001$. The results suggest that the educational value of ICT in this context is not only a matter of access to devices, but of quality of classroom use, student competence, motivation, and institutional support. However, the statistically significant associations are unusually strong and should be interpreted with caution, considering that the

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 2 • June 2026

data are cross-sectional, self-reported, and based on closely related composite measures. The study recommends targeted teacher professional development, reliable infrastructure and technical support, purposeful ICT-integrated pedagogy and fair access to digital learning opportunities.

1. INTRODUCTION

Digital technology is now a basic means by which educational institutions communicate, organize instruction, provide learning materials, and support assessment. It is no longer just an optional classroom tool. But the educational value of ICT is not defined by just having the computers, the connectivity or the multimedia equipment. More importantly, the question is whether technology is being used in ways that enhance students' opportunities to understand concepts, practise skills, get feedback, collaborate and learn autonomously. Similarly, the 2023 Global Education Monitoring Report of UNESCO states that technology can support access, engagement, quality of teaching and development of digital skills but its value depends on context, equity, sustainability and evidence-informed implementation (UNESCO, 2023).

Technology-enhanced learning research has therefore moved beyond the simple narrative of 'technology is good'. Kirkwood and Price (2014) suggest that technology should be considered in relation to the pedagogical purposes for which it is used, and Selwyn (2011) reminds us of the need to ask what educational problem the technology is meant to solve, rather than assuming that newer tools will automatically lead to better learning. The international evidence at the large scale also suggests that the link between ICT and achievement is more complicated than a simple positive effect. For example, Courtney et al. (2022) found based on several PISA cycles that positive attitudes, autonomy and perceived competence around ICT were more consistently associated with performance than the actual amount of ICT use. This distinction is important to interpreting evidence from environments where access to technology is increasing but its use in the classroom is uneven.

This is especially true for education systems that are geographically dispersed and relatively low resource. The educational institutions of District Sudhnoti Azad Jammu and Kashmir are functioning in different socio-economic and geographical conditions. The article highlights a local research gap i.e.; universities and urban institutions have got much more empirical attention as compared to higher secondary students in the rural districts of Azad Jammu and Kashmir. Thus, the study gives localized evidence of students' perceptions of ICT infrastructure, teacher and student ICT use, motivation, ICT skills, challenges and perceived learning outcomes. This attention to context is important, as one cannot assume that findings from other countries or from urban institutions will easily transfer to rural and mountainous educational contexts.

This paper is a contribution to the ongoing research. It does not only consider ICT as one exposure but considers the multiple dimensions of ICT integration and how they relate to learning outcomes. The article also contains more cautious language on causality. Design: Cross-sectional survey without experimental comparison group. The results are considered evidence of association and predictive relationship, not evidence that ICT led to improvement in academic performance.

1.1 Research Problem and Gap

Generally, the literature is supportive of a constructive role of technology in education, but there is no reason to expect the same effects in all educational environments. What technology can offer is a reality forged by the quality of implementation, teacher capacity, connectivity, maintenance, institutional leadership, and the digital competence of students. Pelgrum (2001) discussed barriers to ICT integration at the international level in terms of infrastructure and teacher related barriers. Albugami and Ahmed, 2015 stated that combination of organizational & human factors and equipment are important for successful implementation in secondary schools. Likewise, Sife et al. (2007) argued that in developing countries, technology adoption is limited where there is no adequate infrastructure, technical assistance, training or clear strategies for implementation of the technology.

The study reveals one major local tension. Although students generally perceived ICT resources as available and had reported strong ICT-related skills, teachers' classroom use of technology had the lowest overall mean among the study variables. This pattern poses a practical question. How strongly are ICT conditions and practices linked to students' reported learning outcomes when access and learner confidence are okay, but teaching practices are not consistently employing digital tools? The present article tries to answer this question based on the empirical results of the study.

1.2 Purpose and research questions

The study was conducted to explore the relationship between the integration of ICT and the students' learning outcomes at the higher secondary level in District Sudhnoti. The analysis addresses two broad questions: (a) what is the relationship between the integration of ICT and the learning outcomes of students? and (b) which ICT-related dimensions are more strongly related to those outcomes in the reported dataset?

1.3 Conceptual model

The variables in the study can be classified into a useful conceptual model in which ICT infrastructure and access provide the enabling conditions; teacher use, student use and ICT skills are the main modes of engagement and ICT motivation is an affective mechanism that can sustain continued participation. These conditions and practices should be reflected in the learning outcomes reported for students. ICT related challenges are perceived as contextual constraints that can reduce the benefits of technology when not addressed.

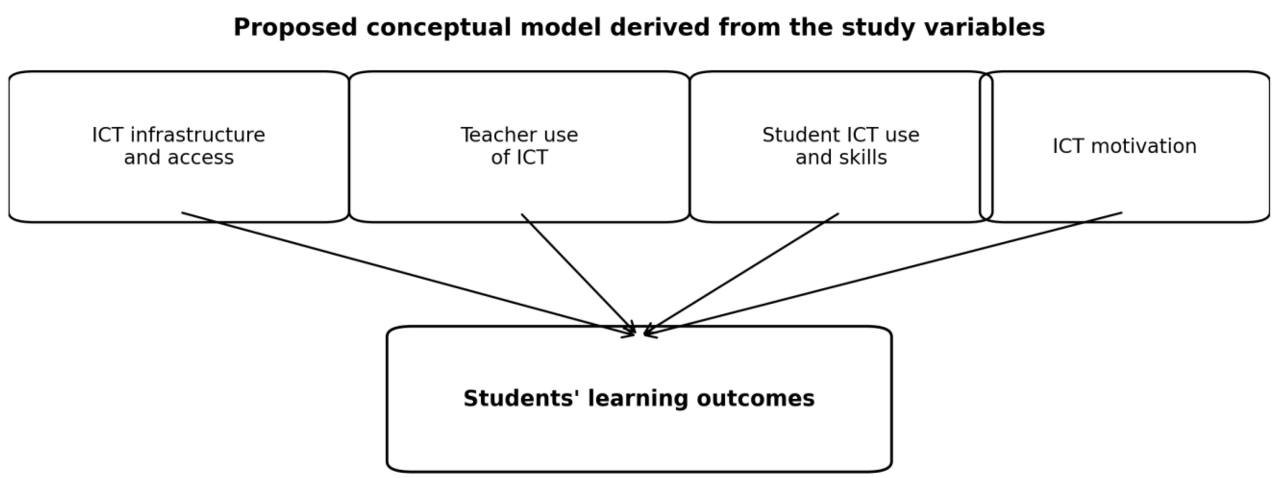

Figure 1. Conceptual Model of ICT Integration and Student Learning Outcomes

2. LITERATURE REVIEW

2.1 ICT as a Pedagogical Resource

ICT encompasses digital devices, connectivity, multimedia systems, software, communication platforms and online learning resources. In education its significance lies less in the device itself than in the learning activity it makes possible. According to Tinio (2003), ICT is a way of widening access to education especially in areas where distance and the scarcity of local resources limit conventional provision. Similarly, Bates (2015) places technology within the framework of instructional design; different media should be chosen according to the learning objectives, the nature of the subject matter, and the role that teachers want students to have in learning. These perspectives suggest that meaningful integration involves an intentional alignment of technology and pedagogy.

Constructivist and connectivist perspectives are also noted in the literature. The constructivist view of learning emphasizes the active participation of learners in inquiry, discussion and problem solving to construct knowledge. Digital resources can help by providing students with multiple representations of a concept, independent exploration of information, collaboration with peers, and rapid feedback. Connectivist thinking provides an extension to this discussion by focusing on learning in the networks of people, information sources, and technological systems. Both perspectives are relevant for higher secondary students, as the transition to higher education and employment increasingly requires independent information seeking, digital communication and evaluation of online sources.

2.2 Multimedia and Cognition Processing

The potential value of multimedia is also based on the processing of information. According to Mayer's cognitive theory of multimedia learning, people learn in a meaningful way when words and visuals are organized to support active cognitive processing and when unnecessary load is avoided (Mayer, 2009). Multimedia presentations, animations, diagrams and short explanatory videos are therefore particularly useful in making clear relationships that are difficult to convey through text alone. Not to argue that media are inherently superior, but rather that their effectiveness depends on instructional design and whether the added media help students to develop consistent mental representations.

2.3 Institutional Conditions and Capacity of Teachers

The literature often reflects the theme that the value of technology is mediated by teacher competence. A school may have Internet access and multimedia equipment, but if the teachers lack confidence, training, time, technical support or curriculum guidance, there will be no change in teaching. Albugami and Ahmed (2015) identified a number of factors affecting successful implementation of ICT in secondary schools. This reiterates the point that the adoption of technology is an organizational process and not a one-off purchase of equipment. Pelgrum (2001) also found that lack of infrastructure and teachers' preparedness are barriers to ICT integration.

This perspective helps explain variation in student access and teacher use. Classroom practice remains conventional but learners are able to gain relative confidence with digital devices through everyday exposure. The results support this possibility; student ICT skills was one of the top ranked dimensions and teacher ICT use was the lowest ranked. The pattern is of educational significance because the learning value of technology is contingent on the interplay of student capability and instructional design.

2.4 Evidence on ICT and Learning Outcomes

There is empirical evidence that ICT is related to higher levels of engagement, access to learning resources, and some academic outcomes, but the direction and magnitude of these relationships depend on purpose and context. The availability of ICT was positively related to students' learning skills in Pakistan (Wasif et al., 2012). International evidence is more mixed. Courtney et al. (2022) found that the amount of ICT use alone was not a consistent positive predictor of mathematics and science performance across PISA cycles, but students' positive attitudes to ICT, confidence and autonomy were more strongly associated. This distinction lends support to a deeper interpretation of the present study: perhaps meaningful, purposeful educational resources, rather than exposure to technology, are what are relevant.

The literature also warns against the assumption that technology can replace good teaching. Kirkwood and Price (2014) reviewed technology-enhanced learning and concluded that the educational value of technological innovations should be judged by the learning changes they support, not by novelty or adoption. Likewise, UNESCO (2023) states that the evidence on the

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 2 • June 2026

added value of digital technology is uneven and that technology should remain subordinate to clearly defined educational goals. This point is especially relevant to the current study because the reported regression relationship is extremely large. Such a finding warrants interpretation in conjunction with the study's measurement design and the possibility that strongly overlapping constructs have inflated statistical associations.

2.5 Research Gap District Sudhnoti

The local evidence base remains limited. The study reveals the scarcity of research conducted on the students of higher secondary schools in District Sudhnoti and other rural areas of Azad Jammu and Kashmir. This gap is important because educational technology is situated within physical, institutional and social circumstances that vary greatly between regions. A localized survey can thus be a starting point to identify which dimensions of ICT are relatively strong, where the major implementation weakness is, and what practical investments are likely to make the most difference.

3. METHOD

3.1 Research design and setting

This study employed quantitative, descriptive survey design. Data was collected from the students of higher secondary educational institutions situated in District Sudhnoti, Azad Jammu and Kashmir. The original study states that 200 participants were selected as the sample to be studied. The analytical tables and study summary show 169 valid responses from students. Therefore, 200 is not presented as the analyzed number, but the original sample-selection description is kept and 169 is treated as the final analytic sample in this article.

3.2 Sampling and participants

The target population was higher secondary students, male and female students of different academic backgrounds. The study reports simple random sample. The final data set comprised of 169 usable responses. The article does not create additional participant characteristics because the available materials do not report a complete response-rate calculation or a full demographic table. I would prefer to see conservative reporting rather than plugging the holes with assumed values.

3.3 Instrument

Data was collected by means of a structured questionnaire with 39 items. The instrument contained items on ICT facilities, teachers' use of ICT, students' use of ICT, ICT learning motivation, learning outcomes, ICT skills development, ICT challenges, and overall perceptions of ICT. The responses were obtained on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The first section of the study was collecting basic demographic information, and the second section was ICT related and learning-outcome statements.

3.4 Data analysis and reliability

Cronbach's alpha was used to assess internal consistency. Frequencies, percentages, means, and standard deviations were used as descriptive statistics. Pearson product-moment correlations were used to examine the associations between ICT variables and learning outcomes. Simple linear regression was used to test the prediction of learning outcomes by the overall ICT measure. SPSS was used for statistical analysis.

Ethically students were informed about the purpose of the study, participation was described as voluntary, confidentiality was assured and data collected for academic purposes. Thus, the procedures reported are consistent with standard expectations of educational research using survey methods.

4. Results

4.1 Reliability of the instrument

Table 1. Study variables internal consistence.

Variable	Items	Cronbach's α	Interpretation
ICT facilities	4	.966	Excellent

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal
ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 2 • June 2026

Variable	Items	Cronbach's α	Interpretation
Teachers' use of ICT	5	.970	Excellent
Students' use of ICT	3	.768	Acceptable
ICT learning motivation	6	.977	Excellent
Learning outcomes	5	.973	Excellent
ICT skills development	8	.984	Excellent
ICT challenges	5	.972	Excellent
Overall perception of ICT	3	.976	Excellent
Overall questionnaire	39	.994	Excellent

All subscales showed internal consistency (alpha) above or equal to a frequently used threshold of .70, with the student ICT-use scale having the lowest alpha value (α = .768). Internal consistency of the full questionnaire was very high (α = .994). The results indicate the internal consistency of the instrument. However, a coefficient as high as .994 can also be an indication of a high item redundancy. For reporting purposes, it is more informative to present the subscale coefficients rather than relying on the overall alpha alone.

4.2 Student Perceptions of access to ICT and Classroom Practices

Table 2. Student response to selected statements on availability and use of ICT in the classroom (N = 169).

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
ICT facilities available	4 (2.4)	5 (3.0)	15 (8.9)	40 (23.7)	105 (62.1)
Computer labs properly equipped	4 (2.4)	11 (6.5)	9 (5.3)	85 (50.3)	60 (35.5)
Internet available for learning	14 (8.3)	17 (10.1)	12 (7.1)	51 (30.2)	75 (44.4)
Multimedia projectors used	5 (3.0)	19 (11.2)	25 (14.8)	65 (38.5)	55 (32.5)
Teachers use multimedia	44 (26.0)	49 (29.0)	27 (16.0)	19 (11.2)	30 (17.8)
Teachers encourage ICT use	19 (11.2)	35 (20.7)	26 (15.4)	39 (23.1)	50 (29.6)

The item-level results show the clearest pattern in the distinction between access and pedagogical use. For example, 85.8% of the students agreed or strongly agreed that there were ICT facilities like computers and internet available at their college. Similarly, a high proportion (85.8%) agreed or strongly agreed that computer laboratories were well equipped. 74.6% responded positively to Internet access for learning. 71.0% agreed or strongly agreed that multimedia projectors were used in classrooms. The findings indicate that infrastructure was not perceived as the main weakness in the institutions that took part in the study.

The use by teachers was more limited. Only 29.0% of students agreed or strongly agreed that teachers used multimedia to explain lessons and 55.0% disagreed or strongly disagreed. Teacher encouragement was more positive with 52.7% agreeing or strongly agreeing that teachers encouraged students to use ICT for learning, but almost one-third disagreed or strongly disagreed. The pattern suggests that teachers may be aware of the value of technology but not consistently integrate it into daily instructional practice.

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal
ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 2 • June 2026

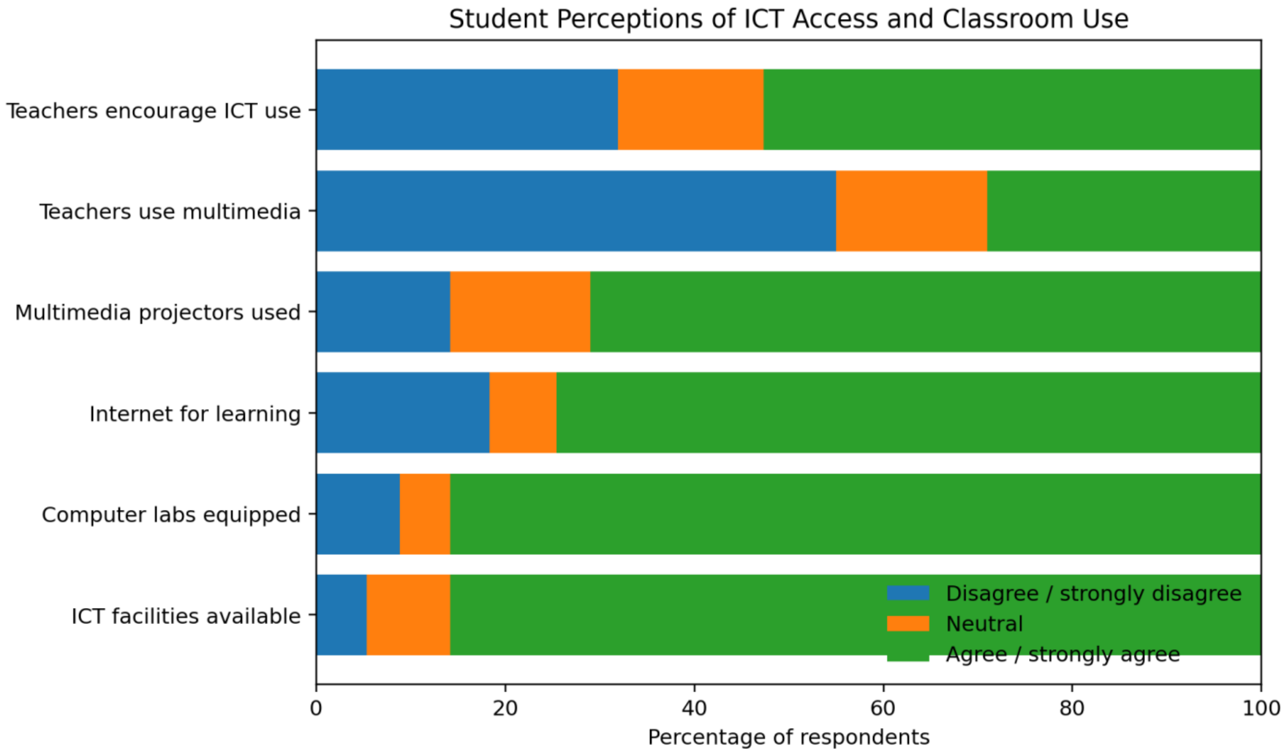

Figure 2. Responses on selected statements on access and use of ICT in classrooms

4.3 Descriptive statistics

Table 3. Descriptive statistics of key variables in the study.

Variable	N	Minimum	Maximum	M	SD
ICT facilities	169	1.00	5.00	4.07	1.02
Teacher ICT	169	1.00	5.00	3.11	1.31
Student ICT	169	1.00	8.00	4.22	1.10
ICT motivation	169	1.00	5.00	3.82	1.17
Learning outcomes	169	1.00	5.00	3.96	1.12
ICT skills	169	1.13	5.00	4.28	1.06
ICT challenges	169	1.20	5.00	4.10	1.10
Overall ICT	168	1.67	5.00	4.47	0.83

ICT skills had the highest domain mean (M = 4.28, SD = 1.06) followed by student ICT use (M = 4.22, SD = 1.10) and ICT challenges (M = 4.10, SD = 1.10). The ICT facilities also received a positive rating (M = 4.07, SD = 1.02). The mean of learning outcome scale was 3.96 (SD = 1.12) and mean of ICT motivation was between positive and very positive (M = 3.82, SD = 1.17). The lowest rating for all dimensions was teacher ICT use (M = 3.11, SD = 1.31) confirming the item level finding that classroom integration was not keeping up with access and student confidence.

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 2 • June 2026

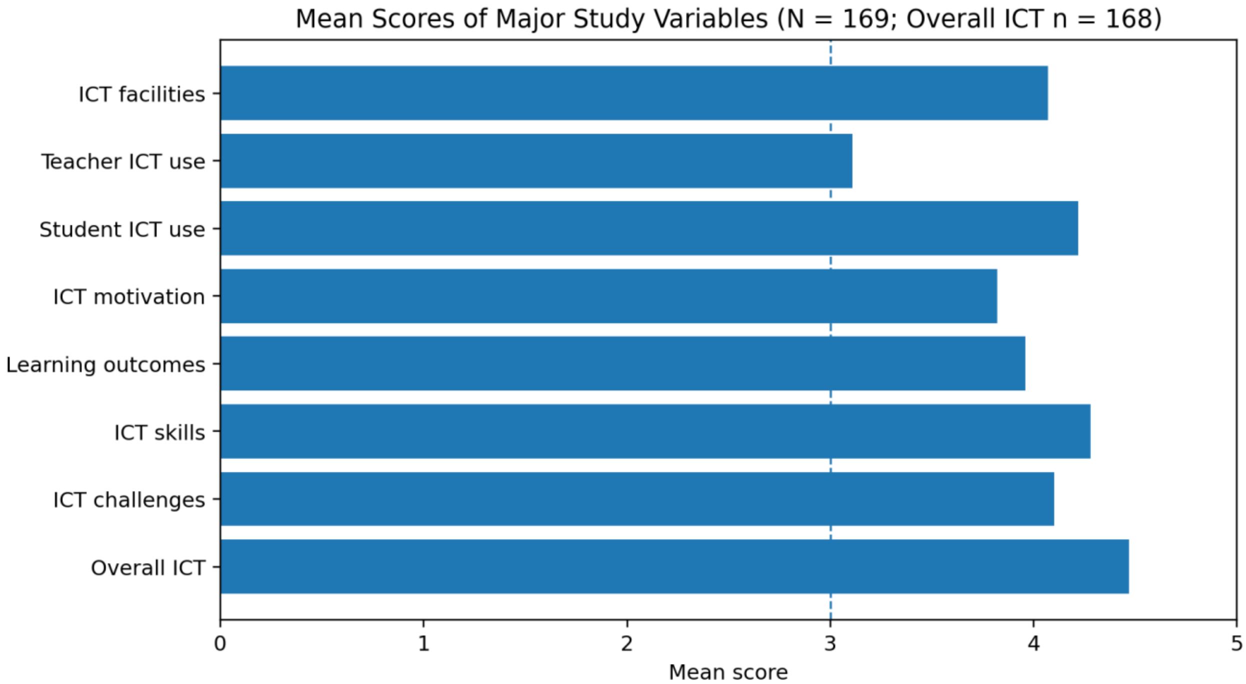

Figure 3. Mean scores of primary study variables. The dashed line indicates the neutral midpoint of the five-point response scale. The original data set reports a different maximum for the Student ICT composite, so means are given in a descriptive manner, without rescaling.

4.4. Links with learning outcomes

Table 4. Correlations between ICT dimensions and learning outcomes (N = 169).

ICT dimension	r	p	Direction/strength
ICT facilities	.984	< .01	Very strong positive
Teacher ICT	.918	< .01	Very strong positive
Student ICT	.869	< .01	Strong positive
ICT motivation	.983	< .01	Very strong positive
ICT skills	.970	< .01	Very strong positive
ICT challenges	.986	< .01	Very strong positive
Overall ICT	.942	< .01	Very strong positive

All measured ICT dimensions were positively and significantly related to learning outcomes at the .01 level. The strongest bivariate relationship was found in ICT challenges and learning outcomes (r = .986) followed closely by ICT facilities (r = .984) and ICT motivation (r = .983). Teacher ICT use (r = .918), student ICT use (r = .869), ICT skills (r =.970) and overall ICT (r =.942) were also very positively correlated. The coefficients show a very consistent pattern in the data. The magnitudes are however very large and should be treated with some caution. Because the constructs were collected through the same self-report instrument and appear to contain closely related perceptions, common-method effects and construct overlap may contribute to the observed correlations.

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 2 • June 2026

4.5 Regression analysis

Table 5. Simple linear regression predicting learning outcomes from overall ICT (N = 169).

Model statistic	Value
R	.989
R^2	.978
Adjusted R^2	.978
SE of estimate	.167
F(1,167)	7468.88
P	< .001

Table 6. Regression coefficients for overall ICT predicting learning outcomes.

Predictor	B	SE	β	t	p
Constant	-0.321	0.051	—	-6.284	< .001
Overall ICT	1.071	0.012	.989	86.423	< .001

The simple linear regression model was statistically significant, $F(1, 167) = 7468.88$, $p < .001$. The reported R^2 of .978 indicates that 97.8% of the variance in the learning-outcome measure was statistically accounted for by the overall ICT predictor in this sample. The coefficient for overall ICT was positive and significant ($B = 1.071$, $\beta = .989$, $t = 86.423$, $p < .001$). The study therefore supports the conclusion that higher overall ICT scores were associated with higher reported learning-outcome scores.

The magnitude of the model is notable. An R^2 of .978 is substantially larger than is typical in many observational education studies and should not be read as evidence that 97.8% of actual academic performance is caused by ICT. The outcome measure is a self-reported perception of learning. The predictor is an overall ICT perception score, collected from the same questionnaire. Therefore, some of the associations may be explained by shared measurement variance, shared response tendencies, and common-method variance. A more rigorous design would test the relation with independently-measured academic achievement, longitudinal data, or an intervention comparison.

5. Conclusion and Discussion

The key finding of the research is positive association of ICT with students' reported learning outcomes in District Sudhnoti. This result is consistent with the general direction of the literature on technology as a possible educational resource, but the pattern of the present study is more informative than the overall positive coefficient alone. The descriptive evidence suggests a particular implementation profile: students report moderate to strong access and skills, while teacher use of ICT is relatively modest. The central problem then is not simply the digital availability of resources but rather the conversion of these available resources into sustained instructional practice.

The high positive mean for ICT skills is promising. Student use of ICT is also relatively high and students appear to see themselves as able to use digital resources. This is consistent with the argument that students work more and more in digital environments and that upper secondary education should prepare students for higher education and work which require digital competence. These results are also consistent with the autonomy and attitudes toward ICT literature. Courtney et al. (2022) found that students' confidence, positive attitudes, and perceived autonomy with ICT were more highly correlated with academic performance than simple measures of the degree of ICT use by students. Therefore, the positive scores on ICT skills and motivation in the present study can be regarded as educational assets, provided they are linked to meaningful academic tasks.

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal
ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 2 • June 2026

The most actionable finding may be the lower teacher-ICT score. Students reported good access to computer facilities, laboratories, internet services and projectors but fewer students perceived that teachers used multimedia regularly to explain lessons. This gap is in line with the implementation literature which points to teacher confidence, professional development, technical support and integration in the curriculum. Albugami and Ahmed (2015) found that the main drivers of implementation are teacher and school level factors, while Sife et al. (2007) found that institutional support is important in developing countries. In practice, without equal investment in pedagogy, investment in infrastructure can result in technology that is underutilized.

A careful reading of the role of ICT challenges is needed. The ICT-challenges variable demonstrated a high mean ($M = 4.10$), and an extremely strong correlation with learning outcomes ($r = .986$). Direction is not intuitive if high scores mean more difficulty as one would expect more obstacles to constrain learning. This suggests either that the challenge scale was coded such that the meaning of more challenge equals worse learning is not straightforward or it captures a general perception of ICT-related conditions rather than barriers alone. The very high correlation among the predictor constructs also indicates that the questionnaire may be capturing a broad latent perception of good ICT conditions across multiple closely related dimensions. For example, the correlation of ICT facilities is .980 with ICT motivation, .985 with ICT challenges and .940 with overall ICT. Such values are much larger than would be expected if the constructs were highly distinct. This does not invalidate the descriptive findings but does mean that a future study should test discriminant validity, examine item wording, and potentially use factor analysis before interpreting the dimensions as fully independent predictors.

But local context counts, too. UNESCO (2023) notes that technology interventions need to be evaluated for equity, relevance, scalability and sustainability. The study finds out geographical, infrastructural and socio-economic constraints which can affect access and usage in District Sudhnoti. The findings therefore support a staged approach of consolidating the gains in access, building teacher capacity, ensuring reliable technical support, and concentrating use in the classroom on learning tasks where technology offers a clear pedagogical advantage. This method is more justified than increasing the number of devices.

6. IMPLICATIONS FOR PRACTICE AND POLICY

6.1 The Education of Teachers

The most obvious practical priority is professional development beyond basic digital proficiency. Training should cover lesson design, classroom management of technology use, multimedia explanation, formative assessment, collaborative learning, and digital resource selection for particular learning goals. Short, repeated workshops with peer demonstrations and coaching at school level are likely to be more helpful than isolated one-off sessions.

6.2 Technical assistance and infrastructure

There are positive signs in terms of perceptions of ICT availability, but infrastructure needs to be sustained. Schools need to ensure they have enough computer labs, good internet, multimedia equipment, backup power when necessary and access to technical staff who can perform basic repairs. The question is not simply whether a resource exists or not, but whether teachers can really rely on it in a real lesson.

6.3 Student use with intent to

Students should be encouraged to use ICT for academic purposes that involve active thinking, not passive consumption. However, from an educational perspective, unstructured screen time is less meaningful than research tasks, collaborative projects, digital presentations, structured online discussion, practice exercises, and information-evaluation activities. This is in line with broader evidence that the quality and purpose of use of ICT is at least as important as the frequency of use.

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 2 • June 2026

6.4 Institutional oversight and equality

Technology policy should also take into account students who might have less access outside the school setting. Institutions can avoid reliance on personal equipment by offering supervised access periods, shared devices, downloadable resources or other ways. Administrators should check the availability of ICT facilities and the extent of their actual use in classrooms and their contribution to the teaching and learning goals.

7. LIMITATION AND FUTURE RESEARCH DIRECTIONS

There are some limitations to note. First, due to the cross-sectional nature of the study, the relations reported cannot provide temporal order or causality. Second, the primary measures are self-reported perceptions rather than independent academic records, standardized achievement tests, classroom observations or usage logs. Third, the final analytic sample is 169, whereas the methodology section of the study reports a planned sample of 200. Fourth, the very large correlations and regression coefficients might be due to common method variance and overlap among composite constructs.

Larger and stratified samples from various districts of Azad Jammu and Kashmir, including student surveys, teacher surveys and classroom observation, and linking ICT use to independently verified measures of academic performance could strengthen the evidence base for future research. Longitudinal or quasi-experimental designs would be especially helpful in determining whether specific ICT interventions are raising achievement. Also confirmatory factor analysis or exploratory factor analysis could be used to explore empirically whether the ICT dimensions in this study are unique. Finally, mixed-method research can shed light on why teachers use technology less than students and institutional barriers that are not always visible in the numbers alone.

8. CONCLUSION

This study provides district level evidence that ICT integration is significantly related with students' reported learning outcomes at higher secondary level in District Sudhnoti. Students generally had positive attitudes toward ICT facilities, their own ICT skills and the use of technology. A clear weak point was the use of ICT by teachers, which was much lower than the other main dimensions. ICT in total showed a very strong and statistically significant prediction of learning outcomes in the regression analysis.

The conclusion is simple, but it is important. Better digital education is more than simply getting technology to more people. The bigger challenge is to translate technology into meaningful pedagogy through competent teachers, suitable digital resources, dependable infrastructure, technical support and equal access to students. The strength of the reported associations is extraordinary, and at the same time calls for methodological caution. These results are indicative of strong associations in a self-reported cross-sectional dataset and should not be interpreted as conclusive evidence that ICT was the cause of the learning gains observed. The results, overall, suggest that investment in ICT in District Sudhnoti should continue but with more focus on the quality of teaching, teacher development and rigorous evaluation of its impact on education.

REFERENCES

Albugami, S., & Ahmed, V. (2015). Success factors for ICT implementation in Saudi secondary schools: From the perspective of ICT directors, head teachers, teachers and students. International Journal of Education and Development using Information and Communication Technology, 11(1), 36–54.

Australian Qualifications Framework Council. (2013). Australian Qualifications Framework (2nd ed.). https://www.aqf.edu.au/

Bates, A. W. (2015). Teaching in a digital age: Guidelines for designing teaching and learning. Tony Bates Associates Ltd. https://opentextbc.ca/teachinginadigitalage/

Courtney, M., Karakus, M., Ersozlu, Z., & Nurumov, K. (2022). The influence of ICT use and related attitudes on students' math and science performance: Multilevel analyses of the last decade's PISA surveys. Large-scale Assessments in Education, 10, 8. https://doi.org/10.1186/s40536-022-00128-6

Dini, N. A. I., Ikhsan, M., Pamungkas, O., & Kuswanto, H. (2024). ICT-based teaching materials on science learning to improve 21st-century skills: A systematic review. International Journal of Recent Educational Research, 5(5), 1239–1251. https://doi.org/10.46245/ijorer.v5i5.679

Kirkwood, A., & Price, L. (2014). Technology-enhanced learning and teaching in higher education: What is "enhanced" and how do we know? A critical literature review. Learning, Media and Technology, 39(1), 6–36. https://doi.org/10.1080/17439884.2013.770404

Mayer, R. E. (2009). Multimedia learning (2nd ed.). Cambridge University Press.

Pelgrum, W. J. (2001). Obstacles to the integration of ICT in education: Results from a worldwide educational assessment. Computers & Education, 37(2), 163–178. https://doi.org/10.1016/S0360-1315(01)00045-8

Selwyn, N. (2011). Education and technology: Key issues and debates. Bloomsbury Academic.

Sife, A. S., Lwoga, E. T., & Sanga, C. (2007). New technologies for teaching and learning: Challenges for higher learning institutions in developing countries. International Journal of Education and Development Using Information and Communication Technology, 3(2), 57–67.

Tinio, V. L. (2003). ICT in education. UNDP-APDIP e-Primers for the Information Economy, Society and Polity.

UNESCO. (2023). Global education monitoring report 2023: Technology in education—A tool on whose terms? UNESCO.

Wasif Nisar, M., Munir, E. U., & Shad, S. A. (2012). Usage and impact of ICT in education sector: A study of Pakistan. arXiv. https://arxiv.org/abs/1206.5132