



The Impact of ICT on Students' Educational Performances: an Overview of Higher Educational Institutions of the Far Flung Areas of Pakistan

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Abstract: The prime purpose of this study is to examine the effects of the availability of ICT resources on students' educational performances and also to check its usability and impact on students' educational performances in the higher institutions in the far-flung areas of Pakistan. A suitable sampling procedure was adopted to choose 400 students from the top six institutions of higher education in one of the largest provinces of the country i.e Balochistan. A survey-based closed-ended questionnaire containing a total of thirty-four items was used to collect data from the respondents. A quantitative research methodology has been employed to gather and analyze respondents' quantitative responses. Moreover, SPSS Software was employed to analyze the correlations between the hypotheses. The study results show that ICT has a great impact on students' educational performances. In today's era of ICT students mostly prefer ICT resources to complete their academic tasks. Furthermore, the results revealed that the institutions have limited funds and resources regarding ICT equipment. But the students are still making it possible to access various kinds of ICT applications in their institution. The students' have a positive attitude towards different types of ICT tools and resources, which they use for their academic and research purposes. There is a substantial positive linear association between the availability, accessibility, and usability of ICT resources and the students' educational performances. The findings of the current study also highlighted the weak areas in terms of the availability and accessibility of ICT resources in the higher educational institutions of Pakistan. Who is not allowing the students to use ICT resources to complete their educational tasks quickly. Present study findings will be helpful for the Government of Pakistan, HEC (Higher Education Commission), and for the teachers to understand the importance of ICT and to provide sufficient number of ICT-related facilities to the students for their better learning.

Keywords: ICT, Impact, Students, Higher Education, Performances, Balochistan, Pakistan

1. Introduction

In this modern era of science, the ICT (information and communication technology) is believed to be a means and an aim in itself for growth. The use of innovative technologies has transformed the world into a global homogenous village in which individuals from all over the world can easily connect and interact with one another since they live very next to one another [45, 33, 55]. There has been an exponential increase in the adoption and usage of ICT, which

has far-reaching effects on society and our daily lives. The application and impact of ICT are considered a topic of interest in a variety of areas of our daily lives like business, health, education, administration, and libraries [1]. Thus, it is not surprising to find increasing interest, attention, and investment being put into the adoption and utilization of ICT in all educational sectors around the world. Thus, educational administrators now make use of ICT as a teaching method and changing tool in the classrooms to improve students' academic performance. ICT-based instructional approaches

are being adopted and ICT-oriented academic programs are being offered by educational institutions all over the world [25, 41]. Therefore, educational institutions are using several devices of ICT such devices include the latest models of laptops, desktops, fax machines, Wi-Fi and internet devices, multimedia, and Smartphone to educate their students [18, 26]. For the better use of these devices, the instructors should be IT literate. When instructors are ICT trained and digitally literate then students are made to use ICT resources in their institutions for academic purposes in a better way. The implication of these approaches can result in students' creativeness and lead to enhancement of critical thinking skills and also provide individualized decisions for all students to vehemently express their level of comprehension. Moreover, the teachers should leave the students to be well prepared for ongoing technological advancement as well as change in workplaces and society according to the demand of the modern age [6, 7, 38, 53, 54, 60, 64].

Today the integration of ICT has turned out to be a requirement for the students for their education and learning processes. Due to the centralization of technological resources, students are now less dependent on teachers for learning; it also aids in instructing outside of the classroom [40]. Moreover, ICT usage in educational settings assists to break down place and time barriers. ICT-based knowledge transmission has been recognized to have a positive effect on teachers' teaching methods and also on pupils' learning process [4, 10, 42, 61].

However, due to students' easy access to these technological devices, it is more challenging to investigate the impact of technological devices such as Smartphone, laptops, and computers on students' educational and learning activities. In the technology-based settings, today's students study better and feel more at ease. Therefore, ICT integration in primary and secondary schools, colleges as well as in higher education institutions such as universities is essential. It is because of the undeniable fact that technology utilization in educational settings has a vast impact on educational aspects, as the ICT leads to successful teaching and learning outcomes with the aid and support elements and components of the ICT [32]. It can be accurate to propose that technology-based tools and equipment can help pupils learn practically any subject, starting with management sciences, mathematics, languages, humanistic, arts, and some other key fields [30, 57]. Additionally, when it comes to an effective teaching-learning process, staunch assistance and complimentary support are being given by ICT to instructors and students with the utilization of technological devices as learning aids [24, 33].

Computers and technology are not intended to replace instructors' skills; reasonably, these are viewed as additional tools for teaching-learning outcome enhancement and improvement. Due to the integration of ICT in educational settings, the teaching-learning process can now take place at a distance; due to the ICT integration in institutions, it is now possible to instruct and learn without physical classes. ICT integration, on the other hand, is a constant learning

process that ensures the provision of an active environment for teaching-learning rather than a one-time learning activity [36, 65].

On other hand, in Pakistan, ICT usage has witnessed a drastic increase in the past decade [9]. Since 2000, Pakistan's government has taken the lead in promoting a culture of ICT across the country by introducing the MOITT (Ministry of Information Technology and Telecommunication). The ministry of MOITT is actively assisting Pakistani individuals in developing their IT skills so that they can effectively undertake the demands of the modern world [5]. The Government of Balochistan initiated its digital policy in 2008 following the federal policy. Nevertheless, the province of Balochistan comparatively ranks the lowest among all the provinces of the country in terms of internet/digitization and digital literacy. Overall, ICT development is at a slow pace in Pakistan. But they are trying to develop the IT industry in all provinces of the country [8, 29, 49, 50, 56].

1.1. Statement of the Problem

In the current age the learning of technology for students is extremely valuable and important in the educational debate. ICT provides a threshold for teaching and learning in education and other organizations. ICT opens up a plethora of possibilities in the learning processes of all types of institutions in all over the world. However, there are still many obstacles in Pakistan, especially in Balochistan province, to transforming students' learning processes with the help of ICT. The non-availability of ICT resources, unskilled IT literate employees, teachers, and lack of government cooperation has badly affected the learning processes in public and private educational institutions of the province. So, all educational institutions in Balochistan require a proper and effective system for the effective use of ICT resources in the teaching and learning process [29]. Therefore, the current study will examine the impact of ICT resources on students' educational performances and will also investigate the positive or negative impact of the usage of ICT resources on students' educational performances.

1.2. Objectives of the Study

- 1) To analyze the presence of ICT resources in Balochistan's higher institutions and their impact on students' educational performances.
- 2) To assess the accessibility of ICT resources impacts on students' educational progress in higher educational institutions.
- 3) To investigate the potential use of ICT resources' positive or negative impact on students' educational achievement in the higher educational institutions.

1.3. Hypothesis

- 1) H1. There is a considerable association between the ICT resources availability and the enhancement of student educational performance in higher education institutions.

- 2) H2. ICT resources accessibility and students' academic performance are significantly associated in the higher institutions of Balochistan.
- 3) H3. There is indeed a significant connection between the ICT resources usability and enhancement of the quality of the education for the student in higher educational institutions.

Conceptual Model

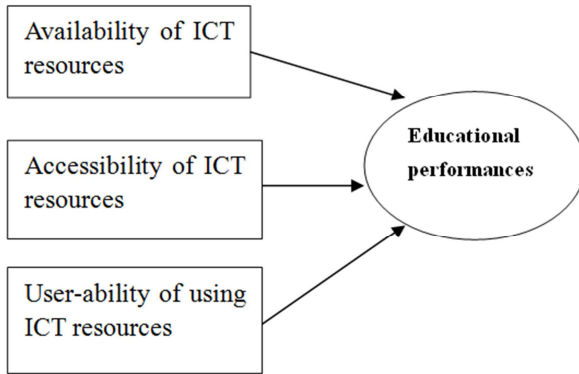


Figure 1. Conceptual model.

2. Literature Review

The Major factor in the modern age that has influenced every area of human life is ICT. Information communication technologies are powerful change agents, causing significant changes in the environment of humans [12]. A more significant improvement has been brought by these latest technologies in workplace circumstances, information dissemination, instructional methodologies, modern ways of learning, and most significantly in research and learning. A review of related literature was conducted to better comprehend the ICT impact on student's educational performance [16, 20, 21, 22, 35, 39, 44, 47, 48].

Moreover, Slechtova [58] reported the attitudes of students from various disciplines relating to ICT usage. Based on the previous study's findings, more than half of the respondents were enthusiastic as well as willing to make use of the ICT for their academic achievements and purpose. In addition, students' involvement and experiences were investigated by Conole *et al.* [17] in their study. Data from respondents were collected from four different departments at the University of UK. The findings of the study revealed that the respondents of various departments had undeniable and easy access to modern technology for the attainment of academic purposes. Thinyane [59] Examined 1st-year students' access to ICT tools for their academic attainments. For data collection purposes 290 respondents of two different universities in South Africa were surveyed. The findings revealed that the majority of the surveyed respondents were using technology to meet their academic needs.

According to Katz & Macklin [34] students with higher levels of ICT literacy may utilize their constituent abilities to enhance learning, or they may use their experience with ICT-mediated activities to improve learning, accessing, managing,

evaluating, and conveying information are examples of ICT literacy component abilities. Moreover, Hwang *et al.* [25] expressed how students can utilize ICT to access additional information as learning building blocks. Findings portrayed that students that could successfully manage and organize ICT material could also learn more quickly. Students who could review ideas more appropriately find and rectify faults by accurately interpreting ICT information. According to Pegler *et al.* [46] students who can effectively communicate via ICT can demonstrate their expertise on tests and will receive higher grades from their lecturers.

According to some studies, ICT and learning results showed a negative association between each other. More ICT literate students performed worse academically [14, 15, 19]. Carr [13] elaborated that pupils with more ICT exposure diverted from attaining their academic purposes or greater ICT literate pupils gain more risky anticipations or incline to immoral practices. Miller *et al.* [37] reported that pupils who opt for ICT undertaking over some traditional learning processes may be diverted and spend too much time on these IT-based apps. Another negative aspect Gubbels *et al.* [27] shows in their study is that students who devote their maximum time on surfing the internet and give less time to their activities on traditional learning, improve and acquire less, and show worse academic performance as well as an achievement than those who spend less time on internet [2, 11, 52, 62].

Wu *et al.* [63] Study results are against the above studies according to the findings of the study, higher ICT literate students usually have much superior academic accomplishment. Demographics, knowledge tests, and study design all moderated the positive relationship between academic activities and the ICT literacy of the students. Therefore, the current study is planned to investigate ICT resource's usability and positive or negative impact on students' educational performances.

3. Research Methodology

In this research, a structured (quantitative) approach was employed to accumulate data and both descriptive, as well as inferential statistics, were used for the analysis of the obtained data from the study participants.

3.1. Population and Sampling

The graduate-level and post-graduate level learners of six (6) top-ranked higher educational institutions in Balochistan were the targeted population of the study. The total number of respondents for this study was 400 students from different higher educational institutions in the province. The questionnaire was given to respondents from many fields, regardless of gender, age, discipline, and qualification. To acquire the data, a convenient sampling method was used.

3.2. Instrument

The main instrument in this study was a survey questionnaire with a total of 34 items, which were used to

examine the impact of ICT' on students' educational performance. A total of 400 questionnaires were circulated, with all the participants being guided to read the statements carefully and record their responses using a 5 point-Likert scale (5 = Strongly Disagree, 4 = Disagree, 3 = Natural, 2 = Agree, and 1 = Strongly Agree). The questionnaire was divided into five parts. Section A discusses the respondents' demographic background, which consists of four items: gender, age, disciplines, and academic qualification. Section B contains 7 items that investigated the availability of ICT resources and students' educational performances, and section contains 6 items that investigated the accessibility of ICT resources and students' educational performances. Section D contains 7 items that investigated how students' ability to use ICT resources impacts their education in higher educational institutions. Section E contains 9 items that examined the frequency of using ICT tools for personal and educational purposes. The data collection tool for this quantitative study was a questionnaire that was adapted and changed from the original questionnaire designed by [28]. This was deemed appropriate for the current study.

3.3. Procedure of Data Collection

The data was obtained in 3 weeks adopting a suitable distribution method. After 3 weeks, to get the study's outcome out of 400 questionnaires 330 questionnaires were properly filled and returned and considered as part of the current study.

4. Process of the Data Analysis

4.1. Demographic Information

Table 1 below reveals demographic characteristics of the respondents in the study area. The result shows that 220 (66.6%) respondents were male and 110 (33.3%) were female. Out of the 330 respondents, the major part of the respondents 240 (72.7%) of this study were between the age group of 20-25 years. While 60 (18.1%) participants belonged to the age group of 25-30 years, 30 (9%) respondents represented the age group of 30-35.

Out of 330 respondents, 219 (66.3%) were belong to the discipline of the natural sciences, 90 (27.2%) were belong to management sciences disciplines and 23 (6.9%) belonged to social sciences disciplines. A larger number of the respondent 219 (66.3%) were enrolled in Masters' degree programs, 70 (21%) participants were enrolled in BS degree programs, 25

(7.5%) respondents were enrolled in M.Phil and 16 (4.8%) Participants were enrolled in Ph.D. degree programs.

Table 1. Demographic Information.

| Demographical details | Frequency | Percentage |
|-----------------------|-----------|------------|
| Gender | | |
| Male | 220 | 66.6% |
| Female | 110 | 33.3% |
| Age | | |
| 20-25 | 240 | 72.7% |
| 25-30 | 60 | 18.1% |
| 30-35 | 30 | 9% |
| Disciplines | | |
| Natural Science | 219 | 66.3% |
| Social Science | 90 | 27.2% |
| Management Sciences | 23 | 6.9% |
| Course of Study | | |
| BS | 70 | 21% |
| Masters | 219 | 66.3% |
| M.phil | 25 | 7.5% |
| PhD | 16 | 4.8% |

Table 2 shows that ICT related facilities are helpful for students in their academic achievements. 290 (87.8%) respondents indicated "yes" ICT resources availability is helpful for them to fulfill their academic needs.

Table 2. ICT related facilities are helpful for students.

| ICT related facilities | Frequency | % |
|------------------------|-----------|-------|
| YES | 290 | 87.8% |
| NO | 40 | 12% |

Table 3 summarizes respondents' perspectives on the availability of ICT resources at their institutions. The respondents were given a list consisting of 7 equipment of ICT and were asked to determine the availability or non-availability of ICT facilities at their institutions. According to the results, 330 (100%) respondents reported a lack of computers in lecture halls. One positive aspect the respondents 280 (84%) indicated that the internet facility is available in the premises of their institutions. 230 (69%) respondents indicated that projectors were not available in the lecture rooms. Moreover, 214 (64%) indicated the non-availability of computer software in the computer labs. 180 (54%) respondents indicated non-availability of the video conferencing facility. Moreover, 219 (66%) respondents indicated the non-availability of the Digital lab facility. 270 (81%) pointed to the non-availability of E-journals and E-books' current versions in the libraries.

Table 3. Availability of ICT resources in the Institution.

| Statements | Availability (%) | Non-availability (%) |
|---|------------------|----------------------|
| Computers availability in lecture rooms | 00 (0%) | 330 (100%) |
| Internet (Wi-Fi) Availability in the institute | 280 (84%) | 50 (15%) |
| Projectors availability in the lecture rooms | 100 (30%) | 230 (69%) |
| Software's availability in the computer labs | 116 (35%) | 214 (64%) |
| Video conferencing equipments availability in the conference room | 150 (45%) | 180 (54%) |
| Digital Lab availability | 111 (33%) | 219 (66%) |
| E-journals/E-Books availability in the library | 60 (18%) | 270 (81%) |

The respondents were asked how often they have access to ICT resources at their institution. Table 4 reveals that 149 (45.4%) of respondents have access to ICT tools in the central libraries and 165 (50%) respondents have to access ICT tools in the computer lab for their educational and personal use. However, 253 (76.6%) respondents mentioned that they do not have ICT resources accessibility in their lecture rooms and 180 (54.5%) respondents highlighted that they do not have the accessibility to E-books and E-journals in the hostel room to work on their assignments and research

projects. Moreover, 260 (78%) respondents indicated that in the official time the ICT resources and databases accessibility is limited and very slow. It highlights that timing of access to the resources of ICT in the institutions have restricted the respondents from using it for their academic activities. Moreover, 130 (39%) respondents indicated that internet accessibility is not in their lecture rooms. Moreover, they highlighted that they can easily have access to internet in the library and computer labs premises and computer lab and use it for their personal and educational Purpose.

Table 4. ICT Resources Accessibility in the Higher Institutions.

| Statement | Never (%) | Not sure (%) | Sometimes (%) | Always (%) |
|---|-------------|--------------|---------------|-------------|
| Accessibility of ICT Tools in the Libraries | 129 (39%) | 16 (4.8%) | 149 (45.4%) | 35 (10.6%) |
| Accessibility of ICT in the Computer Labs | 25 (7.5%) | 40 (12.1%) | 165 (50%) | 100 (30.3%) |
| Accessibility of ICT in Lecture Rooms | 253 (76.6%) | 39 (11.8%) | 26 (7.8%) | 12 (3.6%) |
| Accessibility of E journals /E books in the hostel | 180 (54.5%) | 32 (9.6%) | 40 (12%) | 78 (23.6%) |
| Accessibility of ICT resources in the official time | 260 (78%) | 30 (9%) | 28 (8.4%) | 12 (3.6%) |
| Accessibility of internet in the lecture room | 130 (39%) | 53 (16%) | 135 (40.9%) | 12 (3.6%) |

In the very next query, the learners (respondents) were inquired to rate their ICT equipment utilization abilities and expertise. To assess this, respondents were handed a list of six ICT-based facilities statements and they were guided to indicate their ability and expertise on a given five-point Likert Scale. The results are presented in descriptive statistics and shown in table 5 below. Table 5 revealed that a larger segment of the respondents indicated their abilities and expertise is excellent in making use of the technology such as the utilization of internet and emails, databases applications

and power point application. Furthermore, the results also revealed that the capacity of the respondents for using Microsoft word application 173 (52.4%) which pointed that the respondents are using it for their academic purposes. However, the results also highlighted the weak areas such as video conferencing using ability and projects utilization ability and running different software's use-ability which needs improvement. As a result, the respondents were suggested to work on the weak areas to benefit themselves with the available ICT resources.

Table 5. ICT Resources Using Ability of Users.

| Statements | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|-------------------|-------------|------------|-------------|----------------|
| Users'-Ability of Microsoft Word Processing Application | 10 (3%) | 27 (8%) | 77 (23.3%) | 173 (52.4%) | 43 (13%) |
| Users'-Ability of Databases Application | 27 (8%) | 30 (9%) | 21 (6.3%) | 180 (54.5%) | 72 (21.8%) |
| Users'-Ability of Power Point Application | 10 (3%) | 59 (17.8%) | 19 (5.7%) | 190 (57.5%) | 52 (15.7%) |
| Users'-Ability of Video Conferencing Facilities | 126 (38%) | 143 (43.3%) | 14 (4%) | 32 (9.6%) | 15 (4.5%) |
| Users'-Ability of Projector | 129 (39%) | 159 (48%) | 17 (5%) | 12 (3.6%) | 13 (3.9%) |
| Users'-Ability of Internet and Email | 10 (3%) | 20 (6%) | 14 (4.2%) | 150 (45%) | 136 (41.2%) |
| Users'-Ability of different software application | 129 (39%) | 159 (48%) | 17 (5%) | 12 (3.6%) | 13 (3.9%) |

The respondents were asked that how often they use ICT resources for their educational purposes. 114 (34.5%) respondents indicated that they are using databases sometimes to compile their assignments. 197 (59%) respondents mentioned that they never use blogs. However, 189 (57.2%) respondents mentioned that they never use audio/videos for chatting with their teachers and educational experts to quarry about their subjects. One of the negative aspects highlighted in

the results was that majority of the respondents never use E-books, E-Journals, and E-libraries in their hostel room to fulfill their educational needs. On the bases of the results, it is clear that information literacy (IL) instructions are not been given in these libraries, therefore, the users are unable to access and use E-resources for their educational purposes. Moreover, the respondents are using encyclopedias/lexicons and monolingual dictionaries for their educational purpose.

Table 6. Frequency of usage of ICT tools.

| Tools | Almost (%) | Never (%) | Sometimes (%) | Often Almost (%) | Always (%) |
|------------------|------------|-------------|---------------|------------------|------------|
| Databases | 20 (6%) | 41 (12%) | 114 (34.5%) | 83 (25.1%) | 72 (21.8%) |
| Blogs | 10 (3%) | 197 (59.6%) | 100 (30.3%) | 13 (3.9%) | 10 (3%) |
| Audio/video chat | 30 (9%) | 189 (57.2%) | 91 (27.5%) | 10 (3%) | 10 (3%) |
| E-books | 10 (3%) | 200 (60.6%) | 95 (28.7%) | 15 (4.5%) | 10 (3%) |
| E-libraries | 30 (9%) | 185 (56%) | 82 (24.8%) | 13 (3.9%) | 20 (6%) |
| E-mail | 162 (49%) | 31 (9.3%) | 112 (33.9%) | 13 (3.9%) | 12 (3.6%) |
| E-journals | 30 (9%) | 155 (46.9%) | 125 (37%) | 10 (3%) | 10 (3%) |

| Tools | Almost (%) | Never (%) | Sometimes (%) | Often Almost (%) | Always (%) |
|--------------------------|------------|-------------|---------------|------------------|------------|
| Encyclopedias/lexicons | 20 (6%) | 123 (37.2%) | 141 (42.7%) | 34 (10.3%) | 12 (3.6%) |
| Monolingual dictionaries | 13 (3.9%) | 155 (46.9%) | 114 (34.5%) | 34 (10.3%) | 14 (4.2%) |

4.2. Hypotheses Testing

For the hypothesis testing, the existence of association between the predicted variable (Students' educational Performance) and the three predictors (ICT resources availability, ICT resources accessibility, and ICT resources users' ability of utilization) was tested via Pearson's Coefficient of Correlation test. And the analysis was used to infer the correlation between the study variables. The results of the Pearson Coefficient Correlation are given as follows.

Pearson Coefficient Correlation computed index value (0.912) with level of significance of (0.000) ($p < 0.05$) given in table 7 below indicates a positive linear association between the ICT resources availability and students' educational performance. Thus, it can safely be concluded that the existence of positive linear association is statistically significant for the two variables. So the hypothesis "There is a considerable association between the ICT resources availability and the enhancement of student educational performance in higher education institutions", is positively accepted.

Table 7. Availability of ICT resources and student educational performance.

| Study Variables | ICT Resources Availability | Students' Educational Performance |
|--------------------------------|----------------------------|-----------------------------------|
| ICT Resources Availability | 1 | 0.912 |
| Pearson Correlations | | 0.000*** |
| Sig. (two-tailed) | | |
| N | 330 | 330 |
| Students' Academic Performance | 0.912 | 1 |
| Pearson Correlations | | |
| Sig. (two-tailed) | 0.000 | |
| N | 330 | 330 |

*** Indicates Significance Level at 0.01% (two-tailed).

Table 8 below shows the Pearson Correlation analysis result which happens to present a positive linear association between ICT resources accessibility and students' educational performance. As indicated by the computed index of Pearson Correlation (0.952), and with a significance level of (0.000) ($p < 0.05$) also indicated that there is a statistically significant association between the two variables.

Thus, it can be safely concluded that learners' accessibility to ICT resources has a positive impact of their educational performance in higher educational institutions. So the hypothesizes "ICT resources accessibility and students' educational performance in the higher educational institutions" are correlated with each other. Therefore, the hypothesis is highly accepted.

Table 8. ICT Resources Accessibility and Students' Educational Performance.

| Variables | ICT Resources Accessibility | Students' Educational Performance |
|-----------------------------|-----------------------------|-----------------------------------|
| ICT Resources Accessibility | 1 | 0.952 |
| Pearson Correlations | | 0.000*** |
| Sig. (two-tailed) | | |
| N | 330 | 330 |
| Students' Learning | 0.952 | 1 |
| Pearson Correlations | | |
| Sig. (two-tailed) | 0.000 | |
| N | 330 | 330 |

*** Indicates Significance Level at 0.01% (two-tailed).

Table 9 demonstrates a positive linear association between, "user-ability of using ICT resources" and "student educational quality enhancement" as indicated by the computed index of Pearson Coefficient Correlation (0.958), and level of significance (0.000) ($p < 0.05$) also indicates that the results are statistically significant. Therefore, it can safely be concluded

that students' ICT resources utilization ability positively impacts students' educational quality enhancement in higher educational institutions. So hypothesis "There is indeed a significant connection between the usability of ICT resources and education quality enhancement for the student in higher educational institutions." is thus statistically accepted.

Table 9. ICT Resources Users' Ability and Student Educational Performance.

| Study Variables | ICT Resources Users' Ability | Students' Educational Performance |
|------------------------------|------------------------------|-----------------------------------|
| ICT Resources Users' Ability | | 0.958 |
| Pearson Correlations | 1 | 0.000*** |
| Sig. (two-tailed) | | |
| N | 330 | 330 |

| Study Variables | ICT Resources Users' Ability | Students' Educational Performance |
|-----------------------------------|------------------------------|-----------------------------------|
| Students' Educational Performance | | |
| Pearson Correlations | 0.958 | 1 |
| Sig. (two-tailed) | 0.000 | |
| N | 330 | 330 |

*** Indicates Significance Level at 0.01 % (two-tailed).

5. Discussion

The results elaborated that higher educational institutions in Balochistan do not have accessibility to all kind of ICT resources. As Balochistan is one of the largest provinces in the country but by means of resources its condition is worse. Though, there is non-availability of internet connectivity and adequate number of ICT equipment in the educational institutions but the results show that within the limited resources maximum of the students are using ICT resources to complete their educational tasks. Furthermore, the results show a positive significant linear association between the accessibility and availability, and usability of ICT resources and the students' educational performances. The findings demonstrated that ICT has an integral element in the students' educational outcomes in the modern age. It is the prerequisite of the students to acquire ICT resources and use it for their educational purpose. It supports students in their search for retrieval and review of numerous sources of information. It also assists students in completing their academic work more easily. At all level of students understand the value of ICT-related skills. Now they are trying to polish their IT skills because they realized that it allows them to be more productive academically. The findings also highlighted internet connectivity issue and slow speed issues. Therefore, the students face problems while accessing databases and downloading E-journals, E-books to complete their academic tasks. Same kind of study Ahmad & Sheikh [5] conducted to explore ICT impact on pupils' learning at university of Punjab. Findings show that Punjab university learners have been given an open access to various forms of ICT resources and applications. Furthermore, students have a suitable and sufficient needed equipment of ICT at door step and are familiar with a verity of ICT applications and resources that they employ for various educational accomplishments during their academic years. According to the findings of this study Punjab province is developed in all means of ICT facilities as compare to Balochistan. In Balochistan higher educational institutions realized the importance of ICT and are trying to provide all those facilities to their students which help them to achieve their academic goals. Moreover, Adedokun-Shittu & Shittu [3]; Geoffrey [23]; Saleem and Zahra [51]; Nisar-ul-Haq & Haque [43] in their studies also identified a positive linkage between user-ability, accessibility of ICT and student learning. The findings show the availability, use, knowledge, and efficacy of ICT can forecast its use and influence in the education sector. As a result, the findings of this study are quite comparable to and compatible with existing work on the ICT and its influence on students'

learning and education process which validate the results of the current study.

6. Recommendations

On the basis of the finding the following suggestions are given:

- 1) Higher educational institutions should organize information literacy (IL) programs in their libraries and train students, on how to access and use databases, E-journals, and E-books in an ethical manner for their academic purpose.
- 2) In all the educational institutions, Internet connectivity issues should be countered by the government and should expand internet facilities throughout the province aiming at pupils' utilization of Web-based electronic (E-Learning) resources like databases, E-journals, and as whole information related to their academic achievements and research work.
- 3) The competent authority such as the HEC (Higher Education Commission), and provincial as well as feral governments of Pakistan should ensure positive measures and provide ICT equipment in all educational institutions of Balochistan.
- 4) Government should appoint IT literate faculty in their institutions who may teach in a better way to their students about modern trends.

7. Conclusions

In the current age, ICT has turned to be an integral part of our daily life. The educational system has realized the importance of ICT and is adopting ICT-based teaching methods in their educational institutions for the students to learn more about the modern tools. Therefore, the current study is conducted to examine the ICT resources' availability, accessibility, and usability level and the impact on student's educational performance. The results show that although the higher educational institutions in Balochistan do not have the availability of a sufficient number of ICT equipment with their limited resources they are facilitating their students. The results show one of the positive aspects that are the level of the ICT resources usability among all the learners in this province is quite significant. The current study shows the bright aspects of usage of ICT and motivates the instructors and learners to adopt ICT tools for their better teaching and learning purposes. If the provincial and federal governments give more attention to developing ICT-based infrastructure in their institutions and appoint IT literate faculty so it can bring more meaningful results to students' learning process.

References

- [1] Abdullayev, A. A. (2020). "System of information and communication technologies in the education", *Science World*, Vol. 5 Issue No. 81 pp. 19-21.
- [2] Abbas, Q., Hussain, S., Rasool, S., & Review, G. S. S. (2019). "Digital literacy effect on the academic performance of students at higher education level in Pakistan." *Global Social Sciences Review*, Vol. 4 Issue No. 1, pp. 154-165.
- [3] Adedokun-Shittu, N. A., & Shittu, A. J. K. (2015). "Assessing the impacts of ICT deployment in teaching and learning in higher education: Using ICT impact assessment model". *Journal of Applied Research in Higher Education*.
- [4] Ahmed, S. and Sheikh, A. (2020). "Information and communication technology skills among library and information science professionals: a predictor of enhanced library services". *Journal of Librarianship and Information Science*, p. 961000620962162, doi: 10.1177/0961000620962162.
- [5] Ahmad, T., & Sheikh, A. (2021). "Impact of information and communication technologies (ICT) on student's learning: a case from university of the Punjab, Pakistan". *Digital Library Perspectives*.
- [6] Al-Emran, M., Elsherif, H. M., & Shaalan, K. (2016). "Investigating attitudes towards the use of mobile learning in higher education". *Computers in Human behavior*, vol. 56, pp. 93-102.
- [7] Andersson, S. B. (2006). "Newly qualified teachers' learning related to their use of information and communication technology: a Swedish perspective". *British Journal of Educational Technology*, Vol. 37 Issue No. 5, pp. 665-682.
- [8] Arfeen, M. I., & Nielsen, M. M. (2017), November). "Digital Government Initiatives in Balochistan: a case study". In *Proceedings of the Ninth International Conference on Information and Communication Technologies and Development*. pp. 1-5.
- [9] Arif, M. (2018). "ICTs and development Pakistan": a review. *Journal of Innovations and Sustainability*, Vol. 4 Issue No. 3, pp. 7-25.
- [10] Basri, W. S., Alandejani, J. A. and Almadani, F. M. (2018). "ICT adoption impact on students' academic performance: evidence from Saudi universities". *Education Research International*, 2018, pp. 1-9, doi: 10.1155/2018/1240197.
- [11] Beyens, I., & Valkenburg, P. M. (2022). "Children's Media Use and its Relation to Attention, Hyperactivity, and Impulsivity". in the *Routledge International Handbook of Children, Adolescents, and Media*, 202-210. Routledge.
- [12] Bosamia, M. (2013). "Positive and negative impacts of information and communication technology in our everyday life". *Dostupnona*: https://www.researchgate.net/publication/325570282_Positive_and_Negative_Impacts_of_Information_and_Communication_Technology_in_our_Everyday_Life [30. kolovoza 2021.].
- [13] Carr, N. (2020). "The shallows: What the Internet is doing to our brains". New York: Norton.
- [14] Chen, Y. F., & Peng, S. S. (2008). "University students' Internet use and its relationships with academic performance, interpersonal relationships, psychosocial adjustment, and self-evaluation". *Cyber Psychology & Behavior*, Vol. 11, Issue No. 4, pp. 467-469.
- [15] Chen, S. Y., & Tzeng, J. Y. (2010). "College female and male heavy internet users' profiles of practices and their academic grades and psychosocial adjustment". *Cyber psychology, Behavior, and Social Networking*, Vol. 13, Issue No. 3, pp. 257-262.
- [16] Comi, S. L., Argentin, G., Gui, M., Origo, F. and Pagani, L., (2017). "Is it the way they use it? Teachers, ICT and student achievement". *Economics of Education Review*, Vol. 56, pp. 24-39.
- [17] Conole, G., DeLaat, M., Dillon, T. and Darby J. (2008). "Disruptive technologies", 'pedagogical innovation': What's new?" Findings from an in-depth study of students' use and perception of technology. *Computers & Education*, Vol. 50 Issue No. 2, pp. 511-524.
- [18] Chuang, H. H., Weng, C. Y., & Huang, F. C. (2015). "A structure equation model among factors of teachers' technology integration practice and their TPACK". *Computers & Education*, Vol. 86, pp. 182-191.
- [19] Englander, F., Terregrossa, R. A., & Wang, Z. (2010). "Internet use among college students: tool or toy?" *Educational review*, Vol. 62, Issue No. 1, pp. 85-96.
- [20] Falck, O., Mang, C. and Woessmann, L., (2018). "Virtually no effect? Different uses of classroom computers and their effect on student achievement". *Oxford Bulletin of Economics and Statistics*, Vol. 80 Issue No. 1, pp. 1-38.
- [21] Fernández-Gutiérrez, M., Gimenez, G. and Calero, J. (2020). "Is the use of ICT in educational setting to higher student outcomes? Analysis from the Spanish Autonomous Communities". *Computers & Education*, Vol. 157, pp. 103969.
- [22] Flierl, M., Bonem, E. M., Maybee, C., & Fundator, R. (2018). "Information literacy supporting student motivation and performance: Course-level analyses". *Library & Information Science Research*, Vol. 40 Issue No. 1, pp. 30-37.
- [23] Geoffrey, O. (2010). "Effects of information and communication technology on students' learning: A case of Gulu university". *BAEd Thesis, Gulu University, Nigeria*.
- [24] Ghavifekr, S., & Rosdy, W. A. W. (2015). "Teaching and learning with technology: Effectiveness of ICT integration in schools". *International journal of research in education and science*, Vol. 1 Issue No. 2, pp. 175-191.
- [25] Goktas, Y., Yildirim, Z., & Yildirim, S. (2009). "Investigation of K-12 teachers' ICT competencies and the contributing factors in acquiring these competencies". *The New Educational Review*, Vol. 17 Issue No. 1, pp. 276-294.
- [26] Gómez-Fernández, N., & Mediavilla, M. (2018). "Do information and communication technologies (ICT) improve educational outcomes?" Evidence for Spain in PISA 2015.
- [27] Gubbels, J. C. G., Gubbels, J. C. G., Swart, N. M., & Groen, M. A. (2020). "Everything in moderation: ICT and reading performance of Dutch 15-year-olds". *Large-scale Assessments in Education*, Vol. 8 Issue No. 1.

- [28] Gulbahar, Y., & Guven, I. (2008). "A Survey on ICT Usage and the Perceptions of Social Studies Teachers in Turkey". *Educational Technology & Society*, Vol. 11 Issue No. 3, pp. 37-51.
- [29] Humbhi, Shahzadi and tareen, shabbir, (2021). "Measuring the Impact of ICT on Students' Academic Performances: Evidence from Higher Educational Institutions of the Remote Areas of Pakistan". *Library Philosophy and Practice (e-journal)*. 5476. <https://digitalcommons.unl.edu/libphilprac/5476>.
- [30] Hu, X., Gong, Y., Lai, C., & Leung, F. K. (2018). "The relationship between ICT and student literacy in mathematics, reading, and science across 44 countries: A multilevel analysis". *Computers & Education*, pp. 125, 1-13.
- [31] Hwang, G. J., Wu, P. H., & Chen, C. C. (2012). "An online game approach for improving students' learning performance in web-based problem-solving activities". *Computers & Education*, Vol. 59, pp. 1246-1256.
- [32] Jamieson-Proctor, R., Albion, P., Finger, G., Cavanagh, R., Fitzgerald, R., Bond, T., & Grimbeek, P. (2013). "Development of the TTF TPACK Survey Instrument. Australian Educational Computing", Vol. 27 Issue No. 3, pp. 26-35.
- [33] Karanasios, S. and Slavova, M. (2019). "How do development actors do 'ICT for development'? A strategy-as-practice perspective on emerging practices in ghanaianagriculture". *Information Systems Journal*, Vol. 29 Issue No. 4, pp. 888-913, doi: 10.1111/isj.12214.
- [34] Katz, I. R., & Macklin, A. S. (2007). "Information and communication technology (ICT) literacy: Integration and assessment in higher education". *Journal on Systemics, Cybernetics and Informatics*, Vol. 5 Issue NO. 4, pp. 50-55.
- [35] Khan, S. A., Bhatti, R. and Khan, A. A. (2011). "Use of ICT by Students: A Survey of Faculty of Education at IUB". *Library Philosophy and Practice*, 1. Paper 677. <http://digitalcommons.unl.edu/libphilprac/677>
- [36] Lau, W. W., & Yuen, A. H. (2014). "Developing and validating of a perceived ICT literacy scale for junior secondary school students: Pedagogical and educational contributions". *Computers & Education*, Vol. 78, pp. 1-9.
- [37] Miller, C. J., Marks, D. J., Miller, S. R., Berwid, O. G., Kera, E. C., Santra, A., & Halperin, J. M. (2007). "Brief report: Television viewing and risk for attention problems in preschool children". *Journal of Pediatric Psychology*, Vol. 32 Issue No. 4, pp. 448-452.
- [38] Moghavvemi, S., Sulaiman, A., Aziz, A. A., & Wai, P. S. (2017, July). "The impact of Facebook usage on academic performance". In *2017 International Conference on Research and Innovation in Information Systems (ICRIIS)* 1-5. IEEE.
- [39] Monjelat, N., Peralta, N., & San Martín, P. (2021). "ICT Knowledge and practices: instrumentalism or complexity? A study with Argentine primary teachers". *Perfiles educativos*, Vol. 43 Issue No. 171, pp. 84-101.
- [40] Mustafa, F., Khurshed, A., Rizvi, S. M. U., Zahid, A., & Akhtar, A. (2021). "Factors influencing online learning of university students under the covid-19 pandemic". *IJERI: International Journal of Educational Research and Innovation*, Issue No. 15, pp. 342-359.
- [41] Murthy, S., Warriem, J. M., & Iyer, S. (2017). "Technology integration for student-centered learning: A model for teacher professional development programs". In *Emerging practices in scholarship of learning and teaching in a digital era* (55-74). Springer, Singapore.
- [42] Nisar, M., Munir, E. and Shad, S. (2011). "Usage and impact of ICT in education sector; a study of Pakistan". *Australian Journal of Basic and Applied Sciences*, Vol. 5 Issue No. 12, pp. 578-583.
- [43] NisarulHaq, M., & Haque, M. (2018). "Investigating the Knowledge Sharing among students in Pakistan". *European Online Journal of Natural and Social Sciences: Proceedings*, Vol. 7, Issue No. 1 (s), pp-32.
- [44] Pardamean, B., & Suparyanto, T. (2014). "A systematic approach to improving E-learning implementations in high schools". *Turkish Online Journal of Educational Technology*, Vol. 13 Issue No. 3, pp. 19-26.
- [45] Park, Y., Meng, F., & Baloch, M. A. (2018). "The effect of ICT, financial development, growth, and trade openness on CO₂ emissions: an empirical analysis". *Environmental Science and Pollution Research*, Vol. 25 Issue No. 30, pp. 30708-30719.
- [46] Pegler, K., Kollewyn, J., & Crichton, S. (2010). "Generational attitudes and teacher ICTUse". *Journal of Technology and Teacher Education*, Vol. 18 Issue No. 3, pp. 443-458.
- [47] Pelgrum, W. J. and Law, N. W. Y. (2003). "ICT in education around the world: Trends, problems and prospects". UNESCO: International Institute for Educational Planning.
- [48] Sabir, N., & Naureen, S. (2017). "Impact of ict on academic achievement of governments econdary school students in Quetta City (Chiltan town)". *Balochistaniyat*, Vol. 6 Issue No. 01, pp. 23-35.
- [49] Saeed, S., Ahmed, M. and Malik, U. (2017). "Role of information communication technology (ICT) in 21st century", *Journal of Business Studies*, Vol. 13 Issue No. 2, pp. 124-147.
- [50] Salam, S., Yang, M., Shaheen, A., Movahedipour, M. and Zeng, J. (2017). "ICT and students' performance in Pakistan", *Human Systems Management*, Vol. 36 Issue No. 4, pp. 277-284, doi: 10.3233/HSM-17118.
- [51] Saleem, M., & Zahra, M. (2017). "Effects of ICT on student's learning at secondary level in private schools of the Punjab". *International Journal of Distance Education and E-Learning*, Vol. 3, Issue No. 1.
- [52] Salomon, A., & Kolikant, Y. B. D. (2016). "High-school students' perceptions of the effects of non-academic usage of ICT on their academic achievements". *Computers in Human Behavior*, Vol. 64, pp. 143-151.
- [53] Selwyn, N. (2007). "The use of computer technology in university teaching and learning: a critical perspective". *Journal of computer assisted learning*, Vol. 23 Issue No. 2, pp. 83-94.
- [54] Selwyn, N. (2007, October). "Web 2.0 applications as alternative environments for informal learning-a critical review". In *Paper for CERI-KERIS international expert meeting on ICT and educational performance*, pp. 16, 17.

- [55] Singh, H., Díaz Andrade, A. and Techatassanasoontorn, A. A. (2018). "The practice of ICT-enabled development", *Information Technology for Development*, Vol. 24 Issue No. 1, pp. 37-62, doi: 10.1080/02681102.2017.1283284.
- [56] Siddiqi, K., Baloch, G. A., & Undp, N. P. M. A. (2008). "Information Technology Policy Government of Balochistan", (June), pp. 1-27.
- [57] Skryabin, M., Zhang, J., Liu, L., & Zhang, D. (2015). "How the ICT development level and usage influence student achievement in reading, mathematics, and science". *Computers & Education*, Vol. 85, pp. 49-58.
- [58] Slechtova, P. (2015), "Attitudes of undergraduate students to the use of ICT in education". *Procedia-Social and Behavioral Sciences*, Vol. 171, pp. 1128-1134.
- [59] Thinyane, H., (2010), "Are digital natives a world-wide phenomenon? An investigation into South African first year students' use and experience with technology". *Computers & Education*. Vol. 55 Issue No. 1, pp. 406-414.
- [60] Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). "User acceptance of information technology": Toward a unified view. *MIS quarterly*, pp. 425-478.
- [61] Victor, A. A. and Bolanle, R. R. (2017). "Extent of information and communication technology (ICT) utilization for students' learning in tertiary institutions in ondo state. Nigeria". *Online Submission*, Vol. 3 Issue No. 3, pp. 2369-2376.
- [62] Walsh, J. L., Fielder, R. L., Carey, K. B., & Carey, M. P. (2013). "Female college students' media use and academic outcomes: Results from a longitudinal cohort study". *Emerging Adulthood*, Vol. 1 Issue No. 3, pp. 219-232.
- [63] Wu, H., Guo, Y., Yang, Y., Zhao, L., & Guo, C. (2021). "A meta-analysis of the longitudinal relationship between academic self-concept and academic achievement". *Educational Psychology Review*, Vol. 33 Issue No. 4, pp. 1749-1778.
- [64] Yuen, A. H., Law, N., & Wong, K. C. (2003). "ICT implementation and school leadership: Case studies of ICT integration in teaching and learning". *Journal of educational Administration*.
- [65] Yunus, M. M. (2007). "Malaysian ESL teachers' use of ICT in their classrooms: expectations and realities". *ReCALL*, Vol. 19 Issue No. 1, pp. 79-95.