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RESEARCH PAPER

Role of Information and Communication Technologies (ICTs) in Students' Psychomotor Learning at Elementary Level

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ABSTRACT

The main objective of the study was to investigate how ICTs contribute to pupils' psychomotor development in elementary schools. This survey-based study utilized both quantitative and qualitative methods (QUAN-qual.), with a sample consisting of 96 elementary school teachers, and 288 elementary school children for a total sample size of 384 individuals. Research tools included questionnaires based on three parts: Part-1 Demographic; Part-2 Closed-ended; and part-three Open-ended questions from sampled respondents. Additionally an observation sheet was used for data collection specific to elementary class children. SPSS-24 was employed which involved utilizing relevant formulas such frequency measurement percentage measures standard deviation etc. thus enabling properly arranged results presented analyzed accurately according gathered statistics throughout this comprehensive investigation into role of ICT in students psychomotor learning found within elementary level environments across identified regions or locations examined by these researchers striving towards optimal outcomes possible under existing paradigms evaluated motivating continued progress forwards moving forward! The teachers and students surveyed agreed that recognizing use of ICT was a valid method. Overall, most respondents supported this approach.

KEYWORDS ICT, Psychomotor Learning, Elementary Education, ICT Tools, Computer Education

Introduction

Information and Communication Technology (ICT) encompasses the creation and integration of various technologies that enable the gathering, storing, processing, and sharing of information. Information Communication Technology has brought about significant changes across multiple sectors, especially in education, by offering new methods to deliver, access, and organize information.

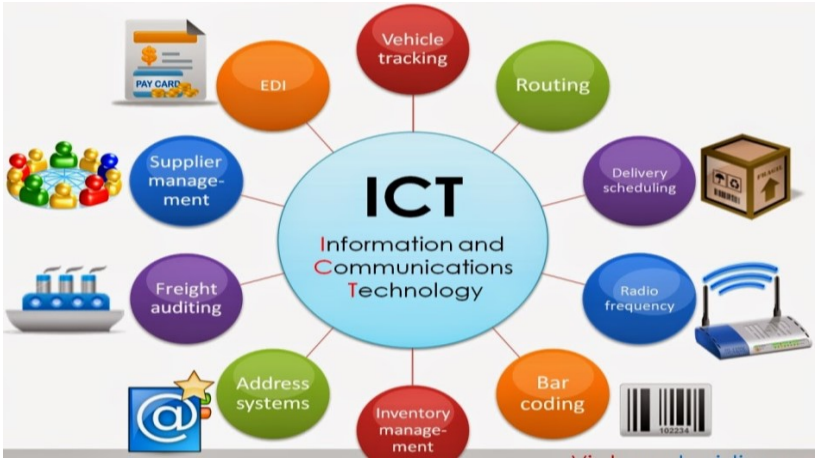

Figure 01 Information and Communication Technology

1960s-1970s: Information and Communication Technology (ICT) began to take shape during the 1960s with the introduction of early computing systems, such as mainframe computers, alongside the development of telecommunications technologies. Technological advancements have facilitated the development of today's information and communication technology through effective processing of informations and communications over long distances.

1980s: In the 1980s the personal computer entered popular culture and became more widely accepted in sectors such as education, government and business, together with its related developments, such as networking technologies. The personal computer integrated with sector applications represented a major change in the way the computer could be applied in society. The early 1990s saw the beginnings of the internet and the advent of the World Wide Web (WWW) the implications of access to and sharing information changed the landscape for everyone.

1990s: The expanded public access to the internet in the 1990s, facilitated by the improvements in web browsers and search engines, enabled people to use new digital tools, such as email or discussion groups and websites. The use of mobile phones increased, creating new ways of communicating beyond what was traditionally established with landline calls. 2000s: The advances achieved with broadband search technologies networks, wireless networking and mobile devices which included the Smartphone, and tablet, changed how often, easy, and how varying new Information Communication Technology applications, technologies, and practices have become normal practices in individuals' lives.

Needs of ICT in Education

Modern education now relies heavily on information and communication technology, which includes devices like computers, the Internet, and electronic delivery methods like radios, televisions, and projectors. Students can participate in a variety of computer-based activities primarily in schools, but there are also chances for more concentrated use at home, according to Kent and Facer (2004).

Significance ICT in Education

In the field of education Significance information communication technologies have significant place; as it have provided valuable functions in the realm of educational environment.

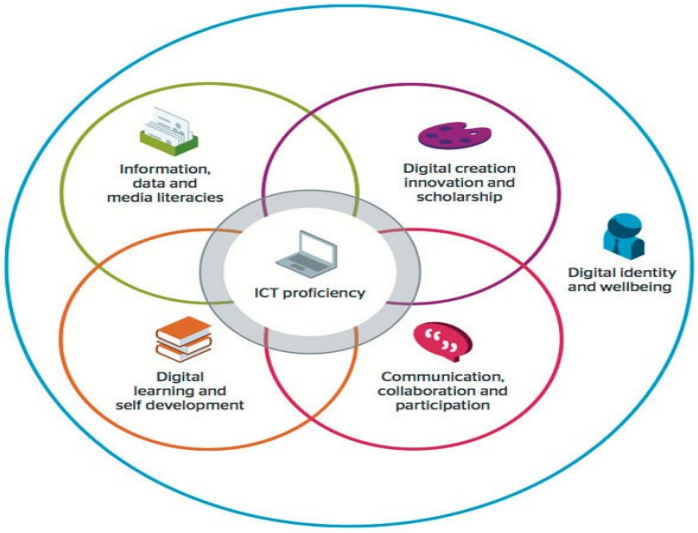

Figure 02 Significance Information and Communication Technology (ICT) in Education

Information Communication Technology is being used more and more to improve assessment, instruction, and learning. Experts have highlighted a number of technological advantages for education (Honey et al., 2005), such as:

1. Giving practice opportunities for increasingly difficult material.
2. Providing access to a range of information resources.
3. Aiding kids in visualizing difficult ideas.
4. Encouragement of data engagement, experiential learning, and real-time feedback.
5. Providing assistance with information management, problem-solving, and the development of intricate projects through the use of word processors, databases, and spreadsheets.

Most people agree that Information Communication Technology is a driving force behind reform and change in education. Information Communication Technology enhance learning quality and contextualize learning to real world circumstances when utilized properly, according to research (Shakir et al., 2011; Shakir et al., 2012; Hassan et al., 2024). Learning is a continuous process and that Information Communication Technology competency is crucial as students look for knowledge in ways other than the conventional ones. The students who participate actively in Information Communication Technology enhanced classrooms frequently make decisions and plan with the help of their teachers. Rich resources, including audio, video, and visual materials, are available online that can assist turn conventional classrooms into learner-centered spaces (Mughal et al., 2023; Hassan et al., 2024; Shaheen et al., 2025). Information Communication Technology is a broad category of technologies that facilitate the creation, sharing, storing, and communicating of information, according to Wertlen (2014). Video, multimedia, and educational software that blends text, sound, and images are useful tools for getting students interested in what they are studying (Akude&Juzie, 2011).Both the advantages and disadvantages of technology in primary education were studied by RafalWajszczyk (2014). They contend that using technology to help kids better understand lessons such as audio-visual aids, movies, and graphics can be easier than lecturing young students. Lastly, because it allows learners to improve their professional and individual talents essential for the nation's development, Information Communication Technology is seen as a vital learning resource (Hernández, 2017; Arshad et al., 2025).

Literature Review

Review of the literature summarize and evaluate the text of writing of the definite theme, and provide frame work to think about the possible consequence of innovative study. The main function of literature review is to provide evidence from preceding researches related to current research (Ahmad et al., 2022; Rao et al., 2023; Yousaf et al., 2025). According to the suggestions of the experts the technological advancement can improve educational system and it can make available various prospects for learners such as:

1. Coaching and performing
2. Access a wide variety of information and gaining knowledge from many sources.
3. Visualizing difficult to understand concepts.
4. Interacting with data, engage in hands-on learning, and getting feedback.
5. Organize information, solving problems, and producing sophisticated products using tools such as spreadsheets, databases, and word processors.

Information Communication Technology is considered as an influential instrument for the revolution and reorganization in the domain of education. Some preceding researches displayed that the proper usage of Information Communication Technology can advance excellence of education and unite knowledge to real life conditions (Anjum & Zafar, 2022; Naz & Zafar, 2023; Mazhar et al. 2024; Yaseen, et al. 2025). Education is an

durable enduring movement where students can transformation their prospects by pursuing knowledge, which advances from traditional approaches (Zafar et al., 2023; Fatima et al. 2024; Yaseen, et al. 2025). (. As time goes by, they will have to expect and be willing to seek out new sources of knowledge. Skills in using Information Communication Technology will be an indispensable prerequisite for these learners. Since learners are actively involved in the learning processes in Information Communication Technology classrooms, they are authorized by the teacher to make decisions, plans, and so forth (Naz et al., 2024; Saleem et al., 2024). Rafal wajszczyk (2014) focused on negative and positive effects of the usage of technologies in educational system at elementary school stage. According to them it's challenging to provide lectures at primary level learners as parallel to the usage of technology. Hernández, (2017) Information Communication Technology can be measured as valuable resources in learning, since they are proficient of achieving the guidance of students with assured personal and professional skills which suitable for the development of a country (Akram et al., 2022; Mumtaz, Zafar &Andleeb, 2024).

Bloom Taxonomy

Benjamin Bloom was the pioneer of Bloom taxonomy. He explores concept of learning theory which consist on three areas known as cognitive, affective, and psychomotor domains.

Figure 03, Bloom Taxonomy

The figure number two is showing three areas of Bloom's Taxonomy theory which are cognitive, affective, and psychomotor domains.

Psychomotor Domain

But here we concerned about psychomotor domain which comes during 1950 to 60s. This can be described on advanced stages of the activities from opinion to mastery of corporal skillfulness. Numerous dissimilar taxonomies occur.

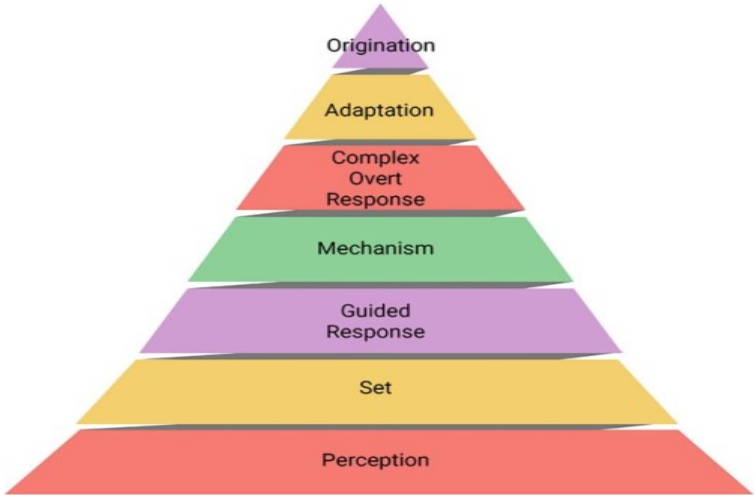

Figure 04. The Psychomotor Domain

The classification of educational objectives in the psychomotor domain as the figure is showing are origination, adaptation, complex overt response, mechanism, guided response, set and perception.

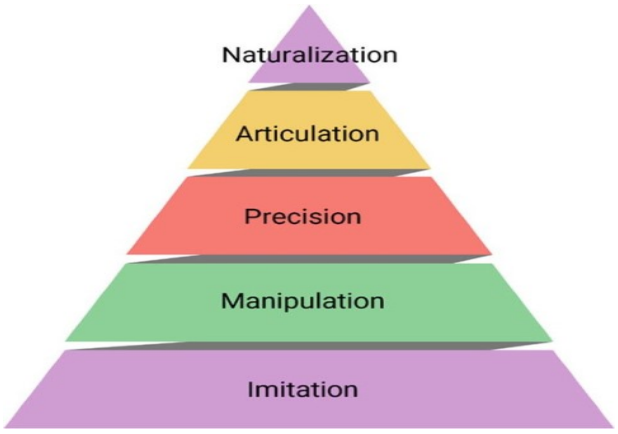

Figure 05. Harrow's Model of Taxonomy

This model of taxonomy was advanced by Harrow in 1972 which contained on naturalization, articulation, precision, manipulation, and imitation.

(Figure 06. Harrow's Taxonomy of Psychomotor Domain)

This model of taxonomy psychomotor domain was also advanced by Harrow in 1972 it contained on none discursive communication, skilled movements, physical activities, perceptual, basic fundamental movement and reflex movement.

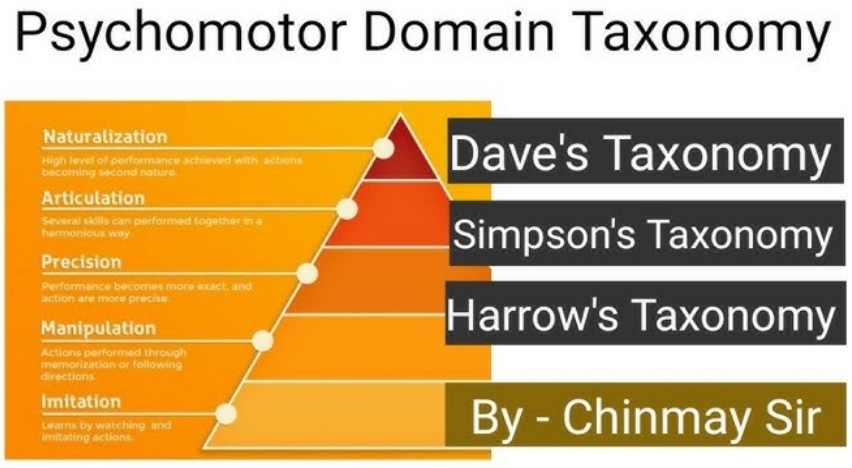

Figure 07. Psychomotor Domain Taxonomy

This model of taxonomy is known as Psychomotor Domain Taxonomy; included Dave's taxonomy, Simpson's taxonomy, and Harrow's taxonomy by Chinmay Sir

Zafar, Akram and Shakir, (2017) studied the integration Information Communication Technology in teacher education programs, learning, motivation and knowledge dissemination of prospective teachers. Zafar and Ullah, (2020) analyzed the how the Information Communication Technologies are motivating instructors' by enhancing their performance and abilities in Pakistani higher institutions. Iqbal, Riaz and Rashid, (2023) studied the effect of information and communication technology in ESL learning at college level. Ali, Zafar and Ullah, (2024) analyzed the role of information and communication technologies for affective learning of students at higher secondary schools. Bhayo et al. (2024) analyzed the impact of integrating information and communication technology on students' learning at early childhood education. Maitlo, Shah and Ahmed, (2024) examined use of information and communication techonologies in ESL instruction. Mazhar, Zafar and Ullah, (2024) analyzed the role of information and communication technologies in students' knowledge at university level. Mohiman, Ullah and Zafar, (2024) identified that Information Communication Technology is essential for skilled growth and contemporary instructional approaches for Mmadarassa instructors. Ahmad et al. (2025) examined the eminence of information and communication technologies in Pakistani educational setting. Yaseen et al. (2025) studied impact of information and communication technologies on students' higher-order learning skills at secondary school level. Instead of these preceding research studies there is still gap left as there is no single research conducted on the role of information and communication technologies in students' psychomotor learning at elementary level. The researchers find this gap and tried to fill this gap by using following methodologies.

Material and Methods

Research methodology is the part of the research study in which researchers give an account of the research methods, which they have used to conduct their research (Ahmad et al., 2023; Sadafet al., 2024; Soomro et al., 2025). The research utilized surveys as its methodology, with a focus on description. Both quantitative and qualitative (QUAN-qual.) approaches were employed, in conjunction with the explanatory sequential technique. "The population is defined as a set of individuals, data, or items from which a statistical sample is taken" (Younas et al., 2023). The target population for the study included the following groups within the Tehsil SDK area: Teachers from elementary schools. Students enrolled in elementary grades in elementary schools. The cluster random sampling technique was adopted. The sample of study comprised twenty-four (24) schools from Sadiq Abad Tehsil. Following was the sample size: Ninety six (96) elementary school ESTs and Two Hundred and eighty eight (288) children of elementary classes.

Results and Discussion

Table 1
Use of Computers

RPS	Stat.	Responses						SD	Mean
		1	2	3	4	5	Total		
Item.1	F	3	31	17.0	29	16	96	1.1764	3.2750
	%	3	33.0	18	30	16	100		
Item.2	F	3	5	35	26.0	27.0	96	1.0124	3.7250
	%	3	5.0	37	27	28	100		
Item.3	F	5	14	17.0	31	29	96	1.2065	3.6750
	%	5	15	18	32	30.0	100		
Item.4	F	0	10.0	14	50	22	96	.88252	3.8750
	%	0	10	15	52	23	100		

Item.5	F	5	14	26	41.0	10	96	1.0300	3.3750
	%	5.0	15	28	42	10	100		
Item.6	F	2	2.0	26	36	30	96	.95542	3.9000
	%	3	3	27.0	37	30	100		
Item.7	F	5	10	14.0	24	43.0	96	1.2184	3.9500
	%	5	10.0	15	25	45	100		
Item.8	F	12	26	10	22.0	26	96	1.4455	3.2500
	%	13.0	27	10	23	27.0	100		
Item.9	F	10	12	19.0	24	31	96	1.3375	3.5750
	%	10	13.0	20	25.0	32	100		
Item.10	F	2.0	14	49.0	14	17	96	1.0177	3.3000
	%	3	15	50	15.0	17	100		
Total	F	4	13	20	30	29	96	1.1265	3.7056
	%	4.0	15	22	29.0	30	100		

Item 1: Use of computer to plan and formulate sessions with students according to data the 33% research participants disagreed and the 3% participants strongly-disagreed, whereas the 30% participants agreed and the 16% participants strongly-agreed whereas the 18% participants remained undecided. Collectively, majority 46% (30%+16%) respondents agreed with the statement. SD 1.176 and mean 3.275 supported.

Item 2: Utilize a computer to explore and complete the practical aspects of course according to data the 28% participants strongly-agreed and the 27% participants agreed while the 5% participants disagreed and the 3% participants strongly-disagreed whereas the 37% participants remained undecided. Collectively, the majority 55% (28%+27%) research participants agreed with the statement. SD 1.0124 and mean 3.7250 supported.

Item 3: Use computer to integrate theory with practicum according to data the 32% participants agreed and the 30% participants' strongly-agreed while, the 15% participants disagreed; and the 5% participants strongly-disagreed whereas; the 18% participants remained undecided. Collectively, the majority 62% (32%+30%) participants were agreed with the statement. SD 1.207 and mean 3.6750 supported.

Item 4: Use computer to plan and create a schedule of classes according to data 52% participants agreed and the 23% participants were strongly-agreed while the 10% participants disagreed and 0% participants strongly-disagreed whereas the 15% participants remained undecided. Collectively, the majority 75% (52%+23%) participants agreed with the statement. SD .88252 and mean 3.8750 supported.

Item 5: Use computer to prepare notices, circulars and exam results according to data the 42% participants agreed and the 10% participants strongly-agreed whereas the 15% participants disagreed and the 5% strongly-disagreed whereas the 28% respondents remained undecided. Collectively, the majority 52% (42%+10%) participants agreed with the statement. SD 1.03000 and mean 3.3750 supported.

Item 6: Use a computer to create and calibrate an optimal learning environment for my students according to data the 37% participants agreed and the 30% participants strongly-agreed while the 3% participants disagreed and the 3% strongly-disagreed whereas the 27% remained undecided. Collectively, the majority 67% (37%+30%) participants agreed with the statement. SD .95542 and mean 3.9000 supported.

Item 7: Utilize a computer to track and manage the library's inventory and circulation systems according to data the 45% participants strongly-agreed and the 25% participants agreed while the 10% participants disagreed and the 5% participants strongly-disagreed, whereas the 15% participants remained undecided. Collectively, the majority 70% (45%+25%) participants were agreed with the statement. SD 1.2184 and mean 3.95000 supported.

Item 8: Utilize a computer to enhance my communication abilities according to data the 27% participants strongly-agreed and the 23% agreed while the 27% disagreed and the 13% participants strongly-disagreed whereas the 10% respondents remained undecided. Collectively, the majority 50% (27%+23%) participants agreed with the statement. SD 1.4455 and mean 3.2500 supported.

Item 9: Use a computer to execute my research work according to data the 32% participants strongly-agreed and the 25% participants agreed while the 13% participants disagreed and the 10% participants strongly-disagreed whereas the 20% respondents remained undecided. Collectively, the majority 57% (32%+25%) respondents agreed with the statement. SD 1.3375 and mean 3.5750 supported.

Item 10: Use a computer to monitor and control security and surveillance systems according to data the 17% participants strongly-agreed and the 15% participants agreed while, the 15% participants disagreed and the 3% participants strongly-disagreed whereas the 50% participants remained undecided. Collectively, the majority 32% (15%+17%) respondents agreed with the statement. SD 1.0177 and mean 3.3000 supported.

Collectively Table.1presents the: Use of Computer: Data analysis represents that 30% of elementary teachers are always, 29% of elementary school teachers are mostly,22% of elementary school teachers are sometimes,15% of elementary teachers are rarely,4% of elementary teachers are never, agreed with the given statements; as a whole majority of elementary teachers are always agreed with given statements. Mean score 3.7057 and SD1.1265 supported.

Findings

- According to data the frequency of 33% participants disagreed and frequency of 3% participants strongly-disagreed, while, the frequency of 30% participants agreed and the frequency of 16% participants were strongly-agreed whereas the frequency of 18% participants remained undecided. Collectively, the majority 46% (30%+16%) research participants were agreed with the statement that they use a computer to plan and formulate sessions with students. SD 1.1760 and mean 3.2750 supported. (Item:1)
- According to data the frequency of 28% participants strongly-agreed and the frequency of 27% participants were agreed while, the frequency of 5% participants disagreed and the frequency of 3% participants were strongly-disagreed whereas the frequency of 37% participants remained undecided. Collectively, the majority 55% (28%+27%) participants were agreed with the statement that they utilize a computer to explore and complete the practical aspects of course. SD 1.0124 and mean 3.7250 supported (Item:2)
- According to data the frequency of 32% participants agreed and the frequency of 30% participants were strongly-agreed while, the frequency of 15% participants disagreed and the frequency of 5% participants were strongly-disagreed whereas, the frequency of 18% participants remained undecided. Collectively, the majority 62% (32%+30%) participants were agreed with the statement that they use computer to integrate theory with practicum. SD 1.2065 and mean 3.6750 supported. (Item:3)
- According to data the frequency of 52% participants agreed and the frequency of 23% participants were strongly-agreed while, the frequency of 10% participants disagreed and 0% participants were strongly-disagreed whereas, the frequency of 15% participants remained undecided. Collectively, the majority 75% (52%+23%) participants were agreed with the statement. SD .88252 and mean 3.8750 supported. (Item:4)

- According to data the frequency of 42% participants agreed and the frequency of 10% participants were strongly-agreed while, the frequency of 15% participants disagreed and the frequency of 5% participants were strongly-disagreed whereas, the frequency of 28% participants remained undecided. Collectively, the majority 52% (42%+10%) participants were agreed with the statement that they use computer to prepare notices, circulars and exam results. SD 1.03000 and mean 3.3750 supported. (Item:5)
- According to data the frequency of 37% participants agreed and 30% participants were strongly-agreed while, the frequency of 3% participants disagreed and 3% participants were strongly-disagreed whereas, the frequency of 27% participants remained undecided. Collectively, the majority 67% (37%+30%) participants were agreed with the statement that they use a computer to create and calibrate an optimal learning environment for students. SD .95542 and mean 3.9000 supported. (Item:6)
- According to data the frequency of 45% respondents strongly-agreed and the frequency of 25% participants were agreed while, the frequency of 10% participants disagreed and the frequency of 5% respondents were strongly-disagreed whereas, the frequency of 15% participants remained undecided. Collectively, the majority 70% (45%+25%) participants were agreed with the statement utilize a computer to track and manage the library's inventory and circulation systems. SD 1.2184 and mean 3.95000 supported. (Item:7)
- According to data the frequency 27% participants strongly-agreed and the frequency of 23% participants were agreed while the frequency of 27% disagreed and the frequency of 13% participants were strongly-disagreed whereas, the frequency of 10% participants remained undecided. Collectively, majority 50% (27%+23%) participants were agreed with the statement that utilize of a computer to enhance communication abilities. SD 1.4455 and mean 3.2500 supported. (Item:8)
- According to data the frequency of 32% participants strongly agreed and the frequency of 25% participants were agreed while the frequency of 13% participants disagreed and the frequency of 10% were strongly-disagreed whereas, the frequency of 20% participants remained undecided. Collectively, majority 57% (32%+25%) participants were agreed with the statement. SD 1.3375 and mean 3.5750 supported.(Item:9)
- According to data the frequency of 17% participants strongly-agreed and the frequency of 15% participants were agreed while the frequency of 15% participants were disagreed and the frequency of 3% were strongly-disagreed whereas, the frequency of 05% remained undecided. Collectively, the majority 32% (15%+17%) participants were agreed with the statement use a computer to monitor and control security and surveillance systems. SD 1.0177 and mean 3.3000 supported. (Item:10)
- Collectively Data analysis represents that 30% of elementary teachers are always, 29% of elementary teachers are mostly,22% of elementary school teachers are sometimes,15% of elementary teachers are rarely,4% of elementary teachers are never, agreed with the given statements. As a whole majority of elementary teachers are always agreed with given statements. Mean score 3.7057 and SD1.1265 supported.

Discussion

The study was related to use of computers. The research study indicated that minority of the research participants were strongly disagreed and disagreed; whereas majority the respondents were strongly agreed and agreed; while a small number of research contributors remained ambiguous about the statement that the use of computer to plan and formulate sessions with students. The research study illustrated that minority of the research participants were strongly disagreed and disagreed; whereas majority the respondents were strongly agreed and agreed; while a small number of research

contributors remained ambiguous about the statement that to utilize computer to explore and complete the practical aspects of course. The study affirmed that minority of the research participants were strongly disagreed and disagreed; whereas majority the respondents were strongly agreed and agreed; while a small number of research contributors remained ambiguous about the statement that to use computer for integrate theory with practicum. The research study showed that minority of the research participants were strongly disagreed and disagreed; whereas majority the respondents were strongly agreed and agreed; while a small number of research contributors remained ambiguous about the statement that use computer to plan and create schedule of classes. The research study explored that minority of the research participants were strongly disagreed and disagreed; whereas majority the respondents were strongly agreed and agreed; while a small number of research contributors remained ambiguous about the statement that to operate computer for draft notices, circulars, and examination outcomes. The research study demonstrated that minority of the research participants were strongly disagreed and disagreed; whereas majority the respondents were strongly agreed and agreed; while a small number of research contributors remained ambiguous about the statement that use of a computer to design and fine-tune a productive learning atmosphere for students. The research study illustrated that minority of the research participants were strongly disagreed and disagreed; whereas majority the respondents were strongly agreed and agreed; while a small number of research contributors remained ambiguous about the statement that use of computer to maintain the library's inventory system. The research study illustrated that minority of the research participants were strongly disagreed and disagreed; whereas majority the respondents were strongly agreed and agreed; while a small number of research contributors remained ambiguous about the statement that to use a computer to improve communication skills. The research study illustrated that minority of the research participants were strongly disagreed and disagreed; whereas majority the respondents were strongly agreed and agreed; while a small number of research contributors remained ambiguous about the statement that to use of computer in academic and research-related tasks. The research study illustrated that minority of the research participants were strongly disagreed and disagreed; whereas majority the respondents were strongly agreed and agreed; while a small number of research contributors remained ambiguous about the statement that to use of computer to supervise and regulate security. The overall results revealed that majority of the participants responded positively to the given statements.

According to Sutopo (2012) the two main components of information and communication technology in education are information technology and communication technology.

Conclusion

Concluded that in the present research study entitled "Role of Information and Communication Technologies (ICTs) in Students' Psychomotor Learning at Elementary Level" ten items were questioned from the research participants, in the response of first statement majority of the students responded positively. In the response of second statement majority of the students responded positively. In the response of third statement majority of the students responded positively. In the response of fourth statement majority of the students responded positively. In the response of fifth statement majority of the students responded positively. In the response of sixth statement majority of the students responded positively. In the response of seventh statement majority of the students responded positively. In the response of ninth statement majority of the students responded positively. In the response of tenth statement majority of the students responded positively. Overall, the results demonstrated that mainstream of the research contributors responded positively to the statements inquired in the questionnaire.

Recommendations

Following were the recommendations of the study:

- The study recommended that teachers may use the computer in teaching learning process to improve students' psychomotor learning at elementary level.
- Encourage students to work together on projects that require psychomotor skills, using online tools for communication and collaboration.
- Use online quizzes and interactive exercises to assess student understanding and identify areas where they may need additional support.
- Use technology generates personalized tracks of learning that, provide individual learner requirements and learning styles.

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