Rural-Urban Divide in Access to ICT Devices, Skills and its Usage among Government School Students and their Perception towards ICT Education

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Abstract:

In the 21st century every sector has been emerging with new technological changes in terms of digitalisation and communication. Particularly in the field of industries and service sector rapid changes can be seen at all levels. In order to get jobs in this 21st century the students should equip with the required technical skills where they can sustain themselves for better future. In every individual's day to day life activities the Information and Communication Technology (ICT) has become an essential part. Then how best the government schools in India are equipped with Information and Communication Technology (ICT)? As part of PhD the researcher has conducted the study to assess the Information and Communication Technology (ICT) skills among rural and urban school students and its usage in government secondary schools in Telangana State. A total sample of 1824 government secondary school students of 8th, 9th & 10th class were selected for the study from Warangal Rural and Warangal Urban districts. Chi-square test and t-test were performed to analyse the differences. The study reveals that there is statistical significant difference between the rural and urban students' availability of ICT devices - smart mobile (p=0.0041) and computer (p =0.0042) at their homes. Only one-fourth of the rural and urban students had given correct answers to basic computer related questions and having very poor computer skills. Both urban and rural students had perceived positively asserting that there will be an impact of ICT usage on learning.

Key words: digitalisation, jobs, skills, students, government schools, rural, urban.

1. Introduction:

The word Information and Communication Technology (ICT) is used in different contexts and has various connotations. For educational purpose Information and Communication Technologies is defined as the information that can be store, create and transmit though a set of various technological devices and resources. These devices and resources include hard wares, computers, radio, television, internet (e-mails, websites) any other live and recorded broadcasting technologies (UNESCO, 2009).

ICT is one of the fast developed fields of technology in the global society. India among the developing countries is trying to reach a significant position in development of ICTs (Roy, 2012). The application and usage of ICT in school education is a new

developmental initiative in India though it was mentioned decades back in the Education Policy in 1991. The ICT usage in Indian schools especially in government schools was not abundantly executed. Thus, research studies in this area were not seen more in India and also in other lower and middle income countries. Mostly the studies have been conducted in high income and upper-middle income countries.

The use of ICT will soon become dynamic force for purposeful, constructivism and inclusive student management (Madden D C, 2014). Having access to the web-based educational tools and use of computer had brought changes among the student community in three essential areas like research, assessment and collaboration. Further, changes were seen in the student learning environment holistically contributes more classroom engagement, behaviour and interactions (Light, D., & Pierson, E., 2014). It was also found in many empirical researches that there was a significant relation between the students ICT literacy and their academic achievements and this was high in female students rather than male students also states that students having ICT application skills were good compared to theoretical ones. (Lei, H., Xiong, Y., Chiu, M. M., Zhang, J., & Cai, Z., 2021). Another study in Australian schools found that with the usage of ICT in schools through an organization and design-based pedagogy there was high student engagement and learning in the classroom (Gorris H. A., Sellings, P. & Echter, A., 2021). The provision of ICT in schools will enrich the students with availability of massive information which improves their learning environments (Gunjan N, 2014). Another study argues that students learning skills were improved with the availability of ICT in education also states that modern technologies of ICT are highly required and helpful for the students to enhance their knowledge and skills further make them to better prepare their projects and assignments (Wasif, M. N., Munir, E. U., & Shad, S. A. 2011).

2. Methodology:

The study has collected data in 72 government secondary schools by conducting survey in two districts namely Warangal Rural (39 schools) and Warangal Urban (33 schools) of Telangana State. For selection of students, a sample of 10 students from each class of 8th, 9th and 10th comprising 30 students from each sample school were chosen for the study. A total of 2160 students constituted the sample. After completion of the survey administration, 1829 complete responses were obtained. A self-report structured questionnaire has been administered to the sample school students. Questionnaire was prepared in Telugu (local) language for easy understandable to respondents.

The information pertaining to the student's usage of computers, skills in using computers, various activities performed through ICT in their daily life, usage of ICT for learning, and their perception towards digital/ICT in learning has been collected.

3. Results:

3.1. Demographic Profile of the Sample Students:

A total of 1824 students of 8th, 9th and 10th classes in the selected government secondary schools were enquired and data has been collected. The demographic details like area, gender, class and medium of these sample students were gathered. Variable wise sample students' details were presented below.

Table 1. Summary of Demographic details of Sample Students (8th to 10th class)

S. No	Variable	Frequency	Percentage (%)
1	**Area**		
	Rural	865	53.0
	Urban	959	47.0
2	**Gender**		
	Male	907	49.7
	Female	917	50.3
3	**Education**		
	8th class	556	30.5
	9th class	665	36.5
	10th class	603	33.1
4	**Medium**		
	Telugu	371	20.3
	English	1453	79.7

The above table represents that an equal proportion of sample students were selected based on area (rural and urban) with small variation. It is found that little more than half (53 percent) of the students belongs to Warangal Rural district. And little less than half (47 percent) students belong to Warangal Urban district.

Regarding gender distribution it is observed there is an equal proportion among male and female students. Out of total 1824 sample student respondents 917 respondents are female

The table 3.1 also represents the class-wise distribution of sample students. It is observed that little more than one-third (36.5 percent) of the students are studying 9th class. This was followed by one-third (33 percent) of students studying 10th class. Lastly, little less than one-third (30.5 percent) of the students are pursuing 8th class. Overall, it is found that there is an equal proportion of students.

3.2. Access to ICT devices (TV and smart phone) at Students home:

Table 2. Rural and Urban wise sample students having access to digital devices at their homes

ICT devices available at home	Location	N	Yes (%)	No (%)	df	Chi-square value	Sig. (2-tailed)
Television	Rural	959	97.9	2.1	1	0.146	0.703
	Urban	865	98.4	1.6			
Smart phone	Rural	959	86.1	13.9	1	4.159	0.041*
	Urban	865	89.3	10.7			
Computer	Rural	959	2.2	97.8	1	4.151	0.042*
	Urban	865	2.5	97.5			

*Significance level 0.05

The sample rural and urban government secondary school students were asked to mention about the ICT devices namely television, smart phone and computers available at their home. The data from the table depicts that access to television and smartphones can be seen high propotion in both rural and urban students. A vast majority of about 98 percent of the rural and urban students reported that they are having access to watch television at their home. Similarly, about 89 percent of urban students expressed that smart mobiles are available at their homes compared to 86 percent of rural students. It is found that there is significant statistical difference between the rural and urban students in the availability of smart phone at their homes. Other research studies also have shown that the availability of smartphones in rural Telangana has increased doubled from 29.6 percent in 2018 to 67.3 percent in 2021 (ASER Report, 2021). The increase in use of smartphone might be due to lockdown where parents thought that their children can learn something through online video lessons from various sources. Regarding availability to computers, not even 3 percent of the rural and urban students are having access to computer at their homes and found that there is significant statistical differnce between the rural and urban students in having access to computer.

3.3. Rural-Urban wise Students Computer Usage in Government Schools:

An analysis of gap between Rural-Urban students on the usage of computer has been performed using chi-square test and the detailed results were presented below:

Table 3. Rural and Urban wise sample students who used computer at least once

Variable	Location	N	Yes (%)	No (%)	df	Chi-square value	Sig. (2-tailed)
Students used computer at least once	Rural	959	57.0	43.0	1	27.909	0.000*
	Urban	865	69.0	31.0			
	Total	1824	62.7	37.3			

*Significance level at 0.05

From the table, the data reveals that 57 percent of rural students used computer at least once in their life as compared to 69 percent of urban students. It shows that there was a gap of 12 percent among rural-urban students who used computers. Besides, out of total student respondents of 8th, 9th & 10th classes more than one-third (37.3 percent) said they had never used computer. Chi-square test was conducted between rural and urban students usage of computer at least once, the test result shows that there is statistical significant difference (P<0.05) between the rural and urban students usage of computers in their life time.

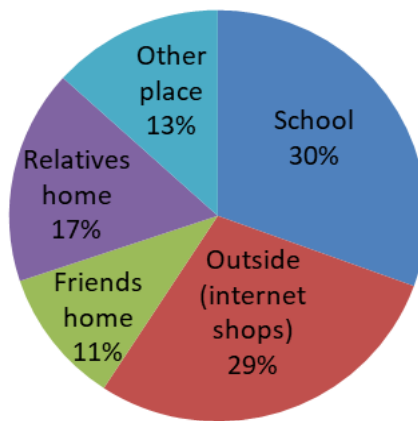### 3.3.1 Student's use of computers at various places (schools, home, outside, others):

Figure 1. Percentage of students' responses on their use of computer at various places

Of the students who used computers at least once were asked to mention the place where they used the computer. From the figure 3.3 it is found that less than one-third students reported that they used computer in their schools (30 percent) and outside - internet shops (29 percent) respectively. Around 17 percent said they used computer in their relatives' home. Only 13 percent and 11 percent students used computers at other places and their friend's home respectively. Overall the data suggests not even one-third students had used computers in their schools.

3.4 Analysis of Sample student's ICT skills:

An attempt has been made to assess the computer skills of government secondary school students. The students were asked to respond to four questions that are related to the basic computer knowledge and skills like how to open a folder using mouse, minimize any window, position of the clock/time on desktop and saving any file/document. The test results were presented below:

Table 4. Rural and Urban students' responses to the basic computer related questions

S.No	Question	Area	Correct answer	Wrong answer	Don't know
1	___ clicking the mouse opens an item on computer?	Rural	31.9%	21.1%	47.0%
		Urban	39.5%	17.8%	42.7%
2	If any window is opened on computer, which of the following button is pressed using mouse to minimize the window?	Rural	19.1%	29.0%	51.9%
		Urban	19.8%	34.7%	45.5%
3	On computer screen the clock is present on the _____ side of the taskbar?	Rural	32.9%	19.6%	47.5%
		Urban	32.4%	29.8%	37.8%
4	To save a new file___ key will be used in Keyboard?	Rural	13.2%	21.6%	65.3%
		Urban	15.6%	22.9%	61.5%
Total Average		**Rural**	**24.3%**	**22.8%**	**52.9%**
		Urban	**26.8%**	**26.3%**	**46.9%**
		Total	**25.6%**	**24.6%**	**49.9%**

From table 3.3, the data compares computer skills between rural and urban government school students. It is found that there is very small variation (3 percent) between rural and urban students where little less than one-fourth (24.3 percent) of the rural students and little more than one-fourth (26.8 percent) of urban students had chosen correct answers. Overall, it is observed that half (50 percent) of the students from both urban and rural had chosen the option don't know, this indicates that students are not aware of basic computer knowledge and skills. These findings show that both rural and urban secondary government school students are having poor basic computer skills.

3.5 Analysis of Sample Students responses on various activities performed using ICT:

The study has been examined about the student's involvement in performing various activities using ICT in their day-to-day life. In this 21st century the habit of using digital devices has been increasing. If these ICT devices are used for good purposes then it will contribute greatly to an individual both personally and professionally. Hence, this study has made an attempt to assess the students ICT activities by mentioning 15 activities. The response categories to these activities were 'never', 'rarely', 'sometimes' and 'regularly'. The

activities were grouped in to three categories namely educational purpose, entertainment purpose and computer & internet related. The students were asked to choose the frequency with which they had undergone the ICT related activities for the above mentioned purposes. The results of the students' responses to each category were mentioned below:

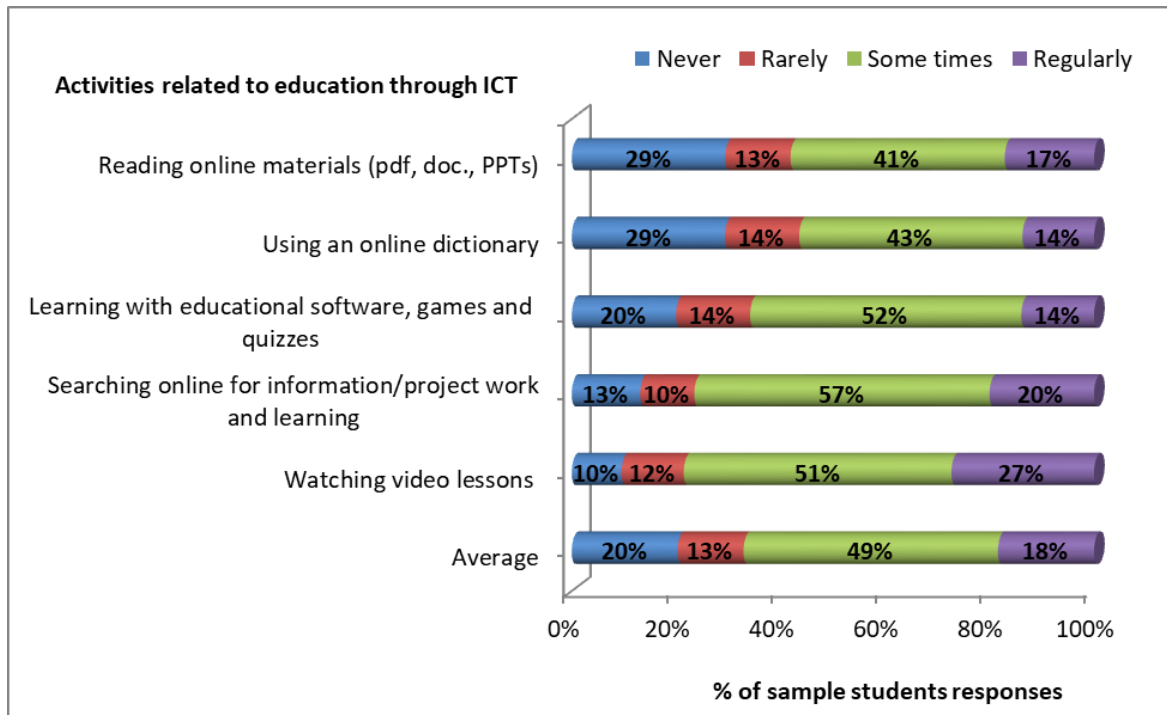### 3.5.1 Students' responses on activities related to education using ICT:

Figure 3. Percentage of student's responses on using ICT for educational activities

The figure 3.3 represents the students activities related to educational purposes. The data reveals that about 41 percent of the students expressed that they read online materials sometimes and 17 percent students regularly do this activity. But nearly 30 percent students had never read online materials (pdf, PPTs, docs.) and 13 percent rarely do this activity for learning purpose. Besides, similar findings can be seen for the activity of using an online dictionary.

For the activity of learning through educational software/apps, games and quizzes, the majority (52 percent) of the students reported that sometimes they are undertaking this activity. While, about 14 percent students each said they are regularly and rarely used the ICT devices for this activity respectively. However, 20 percent students expressed that they had never used ICT device for learning through educational software/apps, games and quizzes.

It was interesting to found that more than half (57 percent) of the students reported that sometimes they are searching in online to gather information or project work and learning. About 20 percent students said they are doing this activity regularly. However, 13 percent students expressed that they had never done this activity and further only 10 percent students rarely search in online for information and learning purposes.

Strikingly students frequency on watching video lessons is little high compare to other activities where little more than half (51 percent) and more than one-fourth (27 percent) students had reported that they watch the video lessons sometimes and regularly respectively.

Further 12 percent students said they rarely watch the video lessons. Only 10 percent students had never watched the video lessons.

Of these five activities related to education through ICT, on average nearly majority (60 percent) of the students reported than they had undergone these activities at sometimes or regularly. About 13 percent students rarely performed these activities. However, one-fifth (20 percent) students reported that they have never had such activities using ICT devices.

3.5.2 Students' responses on activities related to entertainment using ICT:

The figure 3.4 records the percentage of the students responses on using ICT for entertainment related activities. About little less than half (45 percent) and more than one-fourth (28 percent) of the students reported that they had used ICT for listening to music at sometimes and frequently respectively. While, 11 percent students said they rarely listen to music and 17 percent students reported that they had never used ICT for the activitiy of listening to music.

Similarly for watching movies or entertainment program the students reported that 51 percent used ICT devices for this and about 28 percent are frequntly used ICT to watch movies/entertainment programs. Only 14 percent students said they rarely used ICT for this activity and 13 percent students had never used ICT for watching entertainment programmes or movies.
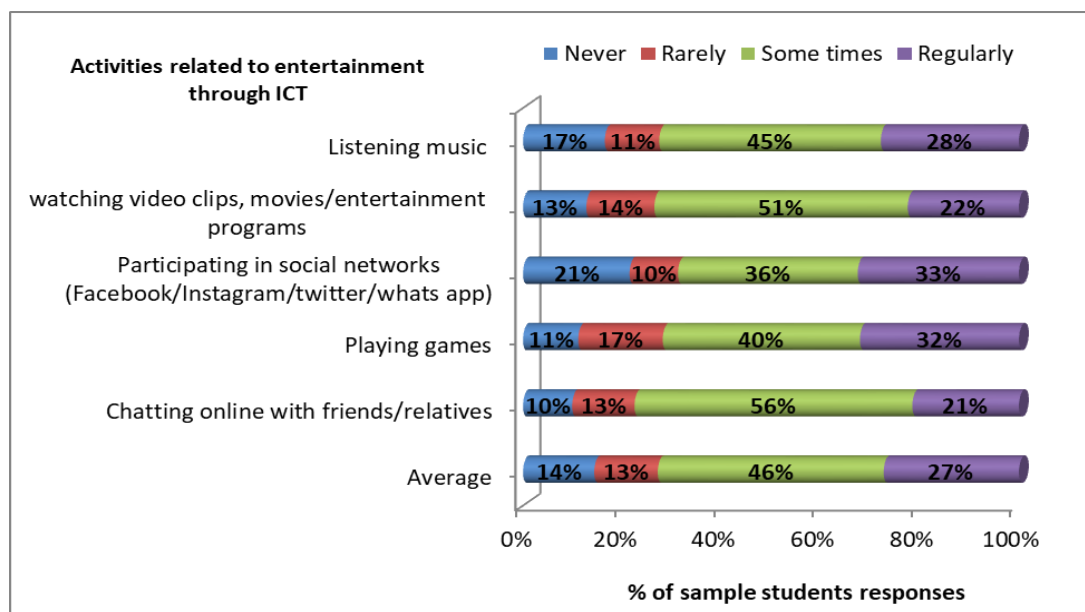

Figure 4. Percentage of sample student's responses on using ICT for entertainment activities

Of these above five activities, high proportion (33 percent) students reported that they are regularly carrying out the activities of participating in social networks and playing games compared to other activities respectively. However it is striking to found that one-fifth (21 percent) students said that they had never participated in social networks. It might be because the respondents are of various grades (8th, 9th and 10th) and age where they may not be eligible or aware of the few social networks (facebook/twitter/instagram).

Overall, on average more than 70 percent of students reported that they used ICT for entertainment related activities at sometimes and regularly. Only 13 percent students are rarely did these activities and 14 percent reported that they had never used ICT for entertainment related activities.

3.5.3 Students' responses on activities related to computer and internet:

The figure 3.5 represents the student's responses on ICT usage for computer learning and internet activities. It is found that on average high proportion (37 percent) of students reported that they had never did any of the activities related to computer learning and internet. Nearly half (49 percent) and less than half (72 percent) of the students report that they had never opened & saved MS word file and worked on paint in computer. However, on average more than one-third (36 percent) and one-tenth (13 percent) students did these activities related to computer and internet at sometimes and regularly respectively.
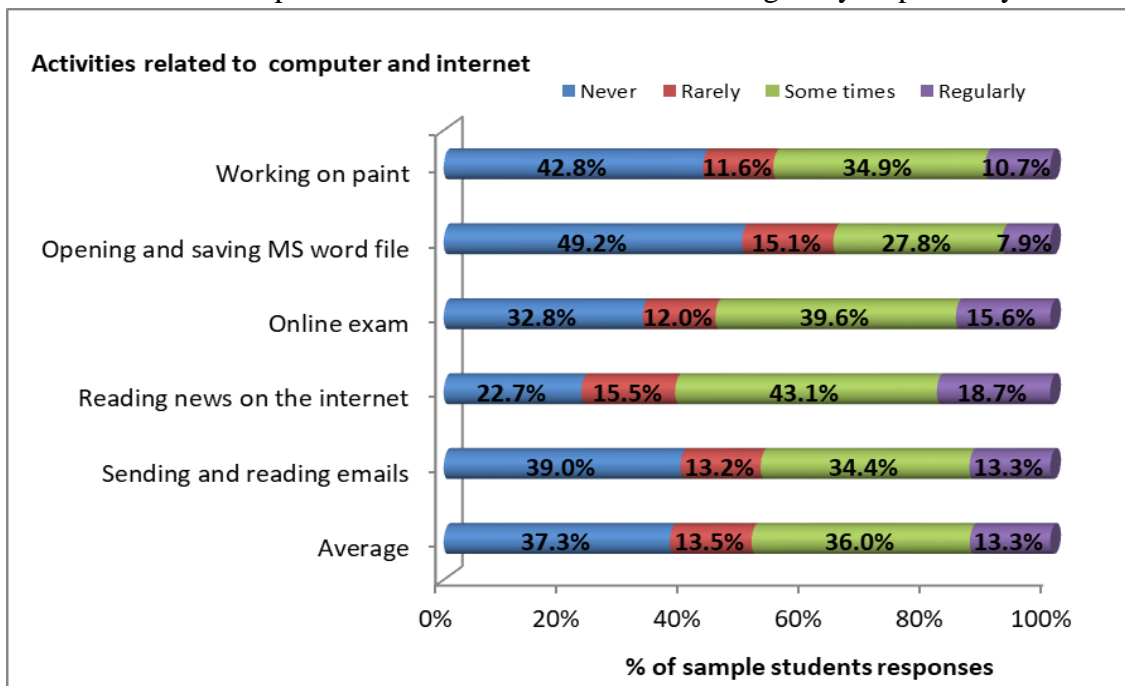

Figure 5. Percentage of student's responses on using computer learning and internet activities

Of the above five activities, reading news on the internet activity has high proportion with 43 percent and 19 percent students who did this activity at sometimes and regularly. About 15 percent students reported that they rarely read news on the internet. Also, it is little interesting to found that more than half (55 percent) of students expressed that they had undergone online exams at sometimes and regularly.

3.5.4 Overall students' responses on three categories of activities:

The three categories of activities namely education, entertainment, computer learning usage were combined and the cumulative students' responses have been presented in the above figure. The data shows that of three categories of activities, with high proportion (46

percent and 27 percent) of students reported that they had carried out the activities related to entertainment at sometimes and regularly compared to other two categories of education and computer & internet skills related activities.
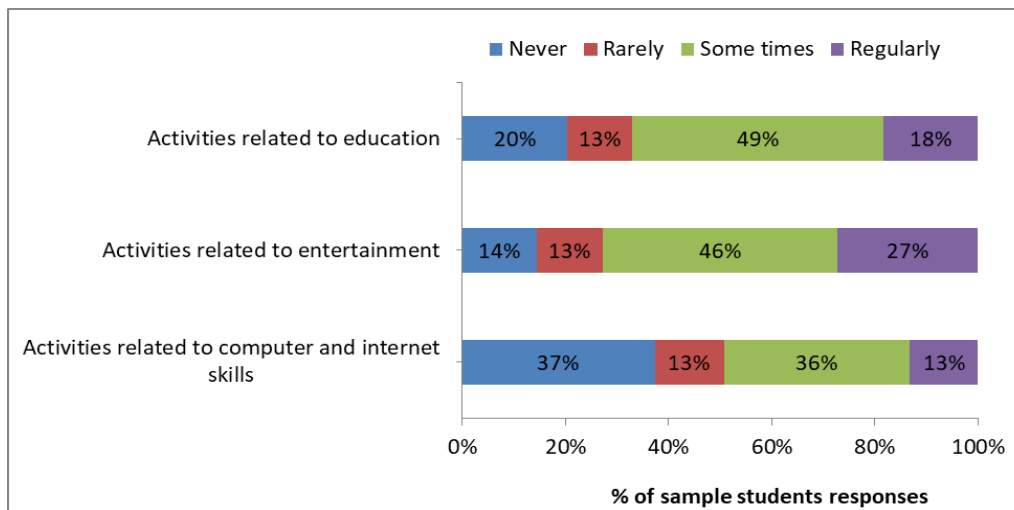

Figure 6. Percentage of sample student's responses on various activities through ICT

However, 49 percent and 18 percent students reported that they performed the education related activities at sometimes and regularly respectively. But it is disappointing to found that more than one-third (37 percent) students report that they had never did the activities related to computer learning and internet usage through computer. It shows the unavailability of computers at their schools and homes.

Table 5. Various ICT activities comparison between rural and urban school students

Variable	Location	N	Mean	Std. Deviation	Mean difference	t	Sig. (2-tailed)
Educational Activities	Rural	959	2.7391	0.57488	0.18257	6.289	0.000*
	Urban	865	2.5565	0.65635			
Entertainment Activities	Rural	959	2.8943	0.54871	0.07785	2.77	0.006*
	Urban	865	2.8164	0.64151			
Internet and Computer Activities	Rural	959	2.2811	0.65278	0.06124	1.965	0.05
	Urban	865	2.2199	0.67609			

*Significance level at 0.05

T-test has been conducted to compare the urban and rural school students ICT activities related to education, entertainment and Internet & compute. The results shows that

there is significant difference between rural and urban school students in performing activities of education and entertainment using ICT. However, the effect size is very small where $r^2 = 0.002$ and $r^2 = 0.022$ for variables education and entertainment which has small effect size.

3.7 Student's attitude on the impact of ICT usage in learning:

The study also gathered information about students' attitude or their opinion whether ICT usage will have any impact on learning or not. For this, five positive statements are given with response categories as 'not at all', 'a little', 'somewhat', 'a lot' (ranging from 1 to 4 scale). In this, the students were asked to select one response for each statement. The percentage of sample students' opinion is mentioned below in detailed:

Table 6. Rural and urban students' responses on impact of ICT usage in learning

S.No	Statement	Location	N	Mean	Std. Deviation	Mean difference	t	Sig. (2 tailed)
1	You concentrate more on what you are learning	Rural Urban	938 863	3.25 3.13	0.868 0.944	0.112	2.623	0.009*
2	You feel more independent in your learning (find out more about things you are interested)	Rural Urban	938 863	3.07 3.07	0.973 0.947	0.005	0.112	0.911
3	You understand more easily what you are learning	Rural Urban	938 863	3.31 3.21	0.808 0.924	0.102	2.511	0.012*
4	You remember more easily what you have learnt	Rural Urban	938 863	3.27 3.15	0.881 0.965	0.116	2.683	0.007*
5	ICT improve the atmosphere in the class (there is less disruption)	Rural Urban	938 863	2.91 2.90	0.943 0.996	0.011	0.242	0.809

*Significance level at 0.05

From the above statisticle table, it is found that students have given postive responses to all the statements with mean value equal and more than three. It shows that sample rural and urban students were favoured towards the ICT usage asserting that it has an impact in learning. T-test has been performed to analyse the difference between the rural and urban students' opinion. The test results found that there is statistical significant difference between the rural and urban students opinion in first, third and fourth statements where rural students are high in favour compared to urban students stating that usage of ICT will have an impact in their learning.

4. Discussion and Conclusion:

There were few research studies in India on examining the ICT related activities in government schools and analysing computer skills of government school students. Though there are studies related to availability of ICT facilities in government schools but it's usage by students and their ICT skills were not analysed. This study has made an attempt to assess the availability of ICT devices like computers, smart phones and Television in government students homes. The study analysed and identified key results where there was a rural-urban gap of 12 percent among students who used computers at least once. Besides, out of total student respondents of 8th, 9th & 10th classes more than one-third had never used computer at least once in their life time. Irrespective of urban and rural government students not even one percent having access to computers in their homes. Also, it is discouraging to know that more than two-third students had not used computers in their schools. This result can be supported with the UDISE-plus 2020-21 data which shows that in Telangana State only 25 percent of government schools are having computers (UDISE-plus, 2021). Also another study report that has conducted survey in Govt. schools of Gautam Buddha Nagar district, Uttar Pradesh and adjoining areas reveal that in Govt. schools the status of computer amenities is not satisfactory and schools lack basic support system in order to make effective use of the computers and ICT facilities (Gopal Krishna Thakur, 2014).

In this study another key findings reveal that both rural and urban government secondary school students are having poor computer skills as the students don't know how to use mouse, minimising any window and saving a file. When these students enter higher education, they may get scared to use computers, unable to compete with other students who studied in private schools and could not get any computer related jobs which are essential in 21st century. There are few research studies indicate that in Malaysia ICT literacy course was introduced as part of their school curriculum at secondary level (Grade 7 and Grade 8) through which students basic ICT skills like word processing, spreadsheet, slide presentation skills were improved (Umar, I. N., & Jalil, N. A. 2012).

Regarding ICT related activities performed by the students only 18 percent are doing educational activities. It is very disheartening to found that high proportion (37 percent) of students reported that they had never did any of the activities related to computer learning and internet using in their life time and nearly half (49 percent) of the students report that they had never opened & saved MS word. Some studies stated that educators who continuously not recognising the significance of ICT and non-participant in its implementation are also the utilisation of ICT and its implementation are also discouraging the students to learn 21st century learning skills, where such skills are deemed to be more crucial for their analytical thinking and career growth (Luterbach and Brown 2011). There was a learning crisis in India in terms of digital learning process, in the recent times UNESCO high level committee expressed that there is urgent call to invest in learning to achieve Sustainable Development Goal (SDG) four by improving 21st century skills and digital learning.

But it is interesting to found that both rural and urban government students believe that there is positive impact with the usage of ICT in learning process. This is because; during

lockdown the lessons were taught in digital mode through television and other apps by government and other private agencies. Though the students are interested towards digital lessons and learning through digital modes the provision of ICT infrastructure, digital lessons and their maintenance are the key obstacles in government schools. The previous studies conducted in Karnataka State reveals that parents of the students in rural areas perceived the importance of computer courses and had many hopes for the next generation as there were changes in their villages after the availability and usage of computers in their local schools (Pal, J., Lakshmanan, M., & Toyama, K. 2009). In India, there is an urgent need to equip the ICT infrastructure facilities in all the government schools with pragmatic approach where all the students have to be enriched with 21st century skills.

Acknowledgments:

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