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An analytical study on integration of pedagogy and technology in secondary science classes of India during COVID-19

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Abstract

This study examines the importance of integration of pedagogy and technology in secondary science classroom of India in light of the COVID-19 pandemic. The researchers in this study focused on four types schools. Twenty-two teachers and eighty students have taken part in this research. Looking to the COVID-19 situation data is generated through telephonic contacts, e- mails and Google meets. Researchers used a mixed method and followed qualitative as well as quantitative data analysis. According to teachers from all four kinds of schools, technology is a necessary instrument for advancing education in the COVID-19 period. According to the study, factors influencing effective pedagogy and technology integration include necessary infrastructure, technical support, teacher training, supportive school management, skilled and motivated teachers etc. Integration of ICT with pedagogy makes learning engaging and entertaining. It encourages inquiry-based learning, cooperative learning, creative and critical thinking among students. It provides opportunity for students to receive materials in multiple formats like videos audio recordings, text materials etc. Though it facilitates individualized student paced learning, satisfying needs of diverse learners, but still not every sort of school uses the same technology. Poor attendance, face to face interaction, poor interconnectivity, health problems for teachers and students, are some of the obstacles encountered during online classes. In the light of 4th generation industrial revolution education system is going to be changed to adapt technological interventions in education. So, the educators and teachers need to be fully prepared to accept, learn and adapt the upcoming technological advancements.

KEYWORDS: Pedagogy, Technology, ICT, COVID-19, Secondary Science Class.

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1. Introduction

This paper explores the importance of integrating pedagogy and technology in education through Information and Communication Technology (ICT) at the secondary level. It suggests that investments of ICT in classrooms are becoming more effective day by day. The world is experiencing the fourth industrial revolution and everyone from school children to adults working in diverse sectors are comfortable with ICT tools and gadgets. Still there is a need to offer the necessary infrastructure, technical assistance, teacher training and supportive school administration for the integration of ICT into pedagogy. Thus, the process of integrating pedagogy and technology particularly in secondary science classes is a complex process. It is influenced by a number of variables such as the skills, motivation of teachers to adapt technology, their leadership qualities, supportive school environment etc. In the present era, the world is experiencing numerous environmental, economic and social problems, along with natural disasters such as earthquakes, cyclones, floods, health risks like COVID-19 etc. Due to all these obstacles, the school education system at times comes to a standstill. During difficult times, technology is a necessary instrument for overcoming the aforementioned obstacles and ensuring the continuation of good education. Integration of ICT with pedagogy simultaneously makes learning dynamic and engaging.

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It also fosters cooperative and inquiry-based learning. It gives pupils with various opportunities for critical and creative thinking. With the help of various multimedia tools students can construct and demonstrate a number of in-class projects. In addition, India is a big country with many social, geographical and economic regional variances in its educational system. There are several sorts of schools that vary with regard to school organization, culture, facilities, medium of instruction etc. In the current study, the researchers classified four categories of schools in India, including Type-4 schools with complete digital facilities. These are the privately run English medium schools following the Central Board of Secondary Education (CBSE) curriculum. Type-3 schools are those schools which are Government run English medium, Kendriya Vidyalayas (KVs). These schools are managed by central government and follow CBSE curriculum. They have average digital facilities. The next type of schools chosen for this research is Type-2 schools with modest digital amenities. These are state board vernacular Odia medium private schools. These schools follow state board curriculum. Type-1 schools do not have any digital facilities. These are state government run Odia medium schools. The researchers investigated teachers' perspectives on the integration of pedagogy and technology in all kinds of schools, as well as students' perspectives on the integration of pedagogy and technology in secondary science classrooms. The use of technical resources varies by types of schools. This research also examines the elements that influence the integration of pedagogy and technology as well as the advantages and problems of such integration. Here to represent the school education system of India, researchers have purposefully selected four different types of schools. These four different types of schools not only vary according to their digital facilities, but also in their school culture, curriculum and medium of instruction. This kind of selection of schools provides opportunities to investigate various factors influencing use of technology to continue education during COVID-19 pandemic. Choosing teachers and students as participants from different types of schools also promotes to find out their perception on integration technology in pedagogy.

2. Review of literature

To effectively execute reform-based scientific education in the 21st century, instructors need to employ technology as a tool in their pedagogical toolbox. In the current situation the globe is experiencing many environmental, economic and social difficulties such as natural disasters like earthquakes, cyclones, floods, health hazards as COVID-19 and economic upheavals in society. These problems greatly influence human life and school education is not an exception to it. To address all of the aforementioned issues, integration of technology and pedagogy is unavoidable. The sudden emergence of the COVID-19 pandemic, lockdowns, shut downs and social distancing norms need an urgent shift in school education to an online style of instruction (Das, 2021). Still various educational organizations are not in a situation to fully support online learning as they were following only the traditional method of teaching (Dhawan, 2020). ICT is considered as a "major tool for building knowledge societies" (UNESCO, 2003, 1). At the same time online learning has its own challenges and drawbacks (Gilbert, 2015). It provides innovation and support curricular reforms to meet the need of global citizens. The online training framework in India has been perceived as another support in the ongoing time (Kiran&Popuri, 2013). Various studies have been conducted to find out teachers' role, their belief and practice in implementation of ICT integrated curriculum (Nachmias et al. 2008; Somekh 2008; Webb 2002). Use of technology by the teacher is mostly dependent on their perception, belief and the benefits they get from technology integrated class. Thus, it is important to find out teachers' perception and their view regarding integration of technology with pedagogy. According to some studies ICT use strengthens traditional practices, some teachers find it difficult to adapt to change and bring innovation in teaching and learning with the help of technology (Cuban, Kirkpatrick, and Peck 2001). Integration of ICT with pedagogy is a complex process and several internal and external factors play important role in successful integration of ICT with pedagogy (Davis et al., 2009; Ertmer, 2005; Law et al., 2005; Nachmias et al., 2004; Tearle, 2003). One of the major hurdles to successfully implement ICT comes from the traditional culture of schools (Pelgrum, 2001; Wilson, Notar & Yunker 2003; Williams, 2005). Some studies point out educational innovations attempted through ICT may lead to development and advancement in student's learning (Wong & Li, 2008).

In this study, the researcher highlights teachers' and students' perspectives on the use of ICT in teaching and learning processes in various kinds of schools in India. In this COVID time students mostly depend on digital resources to continue learning through the Internet, Television or Radio. Teachers have to integrate technology with pedagogy to continue teaching for which they may not have got proper training. There are several learners in different schools who come under marginalized groups, they don't have access to digital learning resources. So, these students, teachers as well as the entire school systems are lagging behind. Some of the challenges faced during online class are poor attendance, lack of personal touch and lack of interaction due to connectivity issues etc. in some cases where students are not fully getting opportunities for proper integration of pedagogy and technology in classes, they develop negative attitude towards the education system (Senthikumar & Pandian, 2021). On the other hand, there are several schools in different

cities in India which are fully equipped with digitalization and could successfully carryout education during COVID-19. Similarly, there are schools which are in hybrid mode of digitalization and traditional teaching. The objective of the present work is to focus on four important aspects of integration of pedagogy and technology in secondary science classes during COVID-19 outbreak. Firstly, it explores the perception and view of teachers from all the four different types of schools, regarding integration of pedagogy and technology. Secondly it attempts to find out students view and experience regarding integration of pedagogy and technology during COVID-19. The third point of focus of this study is to find out the factors influencing successful digitalization and integration of pedagogy and technology in secondary science classes. The fourth point of study is the benefits and challenges before all the above mentioned four types of schools for integration of pedagogy and technology in secondary science classes.

3. Methodology

The present study is exploratory in nature. Here researchers followed mixed method of research. Data is being generated by qualitative as well as quantitative method. Various self-made tools were designed to collect data. Looking to the COVID situation, data were mostly generated through telephonic contact, emails, WhatsApp chats and zoom meetings with the participants.

3.1. Participants

Here purposive selection of participants is being carried out to study the influence of integration of pedagogy and technology in secondary science classes. Data are generated from 22 science teachers available in about 8 schools of the city of Odisha, India. Students from respective classes participated in the research study. In the present study researcher purposefully selected four different kinds of schools. Two number of schools from each type of school are selected for the present study. The Type-1 schools do not have any digital facilities. These are state government run Odia medium vernacular schools. The next type of schools chosen for this research is Type-2 schools with modest digital amenities. These are state board vernacular Odia medium private schools. These schools follow state board curriculum. Type-3 schools are Central Government run English medium, Kendriya Vidyalayas (KVs). These schools also follow CBSE curriculum. They have average digital facilities. Type-4 schools with complete digital capabilities. These are the privately run English medium schools following Central Board of Secondary Education (CBSE) curriculum. Here researchers investigated teachers' perspectives on the integration of pedagogy and technology in all kinds of schools, as well as students' perspectives on the integration of pedagogy and technology in secondary science classrooms. The use of technical resources varies according to the type of schools. A total of five teachers from Type-1 schools, six teachers from Type-2 schools, five teachers from Type-3 schools and six teachers from Type-4 schools are selected. Ten students from each school are selected for focus group discussion.

3.2. Tools

The various tools used in the present study to generate qualitative data are Semi structured Interview with science teachers (Through telephonic contacts and Google meets). Open ended questionnaire to teachers for reflective writing (Through e-mails and WhatsApp

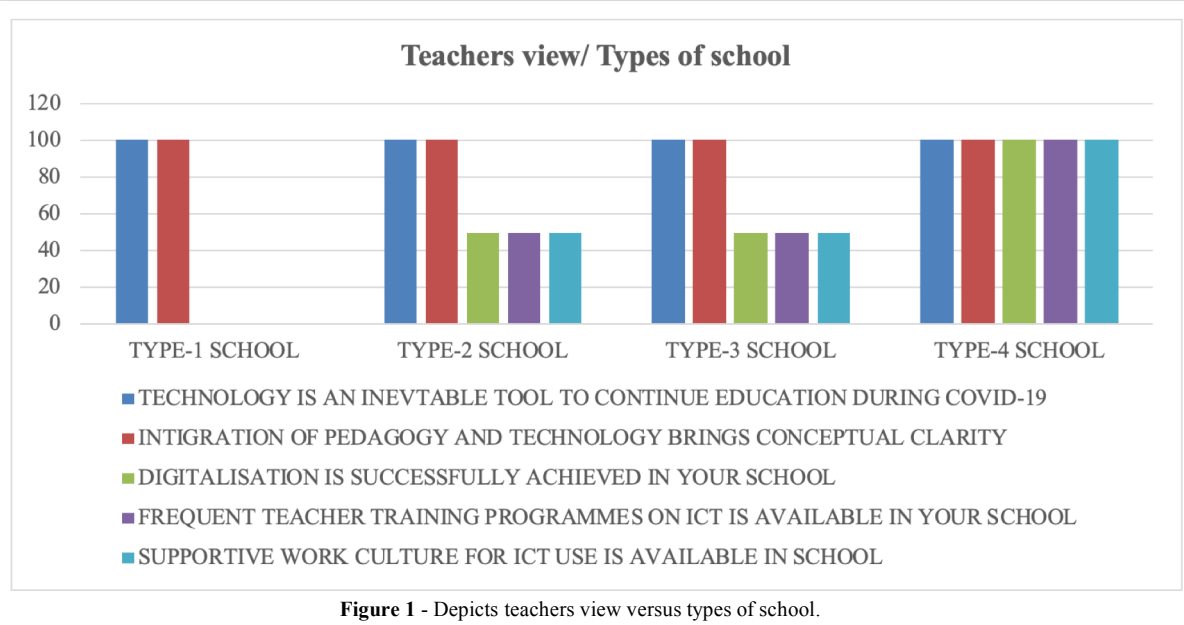

Figure 1 - Depicts teachers view versus types of school.

Teachers view	Types of school			
	Type -1	Type-2	Type-3	Type-4
Technology is an inevitable tool to continue education during COVID-19	Agree	Agree	Agree	Agree
Integration of pedagogy and technology brings conceptual clarity in abstract concepts in science	Agree	Agree	Agree	Agree
Digitalisation is successfully achieved in your school	Not yet	Not fully attained	Not fully attained	Completely digitalised classroom facility is available
Frequent teacher training programmes are available for use of ICT as a tool	No such program is available	Available but not sufficient	Available but not sufficient	Completely digitalised classroom facility is available
Supportive work culture for integration of technology and pedagogy	Mostly not found	Available but not sufficient	Available but not sufficient	Yes, available Fully cooperative and supportive staff, management and positive work culture is found

Table 1 - Representing teacher's view regarding integration of pedagogy and technology in secondary science classes in all the four types of schools.

Students view	Types of school			
	Type-1	Type-2	Type-3	Type-4
Could you attend online classes during first lockdown?	No	No	No	Yes
What are the teaching learning facilities available during COVID-19?	You tube videos, National TV channels, Radio, Telephonic messages from teachers	You tube videos, National TV channels, Radio, Telephonic messages from teachers	You tube videos, National TV channels, Radio, Telephonic messages from teachers	Regular online classes by teachers in zoom meeting
Are you satisfied with digital facilities available for learning during COVID-19?	No	No	No	Yes
Do you have conceptual clarity in science lessons?	Develop conceptual clarity by self-learning	Video lessons help for conceptual clarity but immediate clearing of doubt is not possible	Video lessons help for conceptual clarity but immediate clearing of doubt is not possible	Yes, as the classes are supported with video lessons, interaction with teachers, group discussion with classmates, immediate clearing of doubt is possible, it brings conceptual clarity.

Table 2 - Showing students view regarding integration of pedagogy and technology during COVID-19.

or telephonic messages). Focus group discussion with students (In WhatsApp groups, Google meet and telephonic contacts). Open ended questionnaire to students (Through emails and telephonic group chats). Looking to the objective of the present study, researchers developed self-made tools. The questionnaire for semi structured interview, open ended questionnaire and focus group discussion are first developed by the researchers as per the four objectives considered in the study. These questions are then

verified by one school head master, one senior science teacher having more than ten years of experience. At the same time questions for all the above tools are analyzed by professors in department of psychology and education of the state university. Once the tools are prepared, these are administered in the initial level for a pilot study taking four teachers and ten students. After pilot study some questions of repetitive nature are removed. These tools are used to collect qualitative data.

3.3. Process of data analysis

Qualitative data are generated by using the above-mentioned tools and are analyzed by using qualitative interpretative data analysis methods. Researchers followed open coding method for data analysis. Data generated from different tools are gathered and analyzed for specific tools in a particular school. For example, the data generated from open ended questionnaire were collected which are present in the form of text messages, e-mails, WhatsApp chats. The data collected in these formats are segregated for each

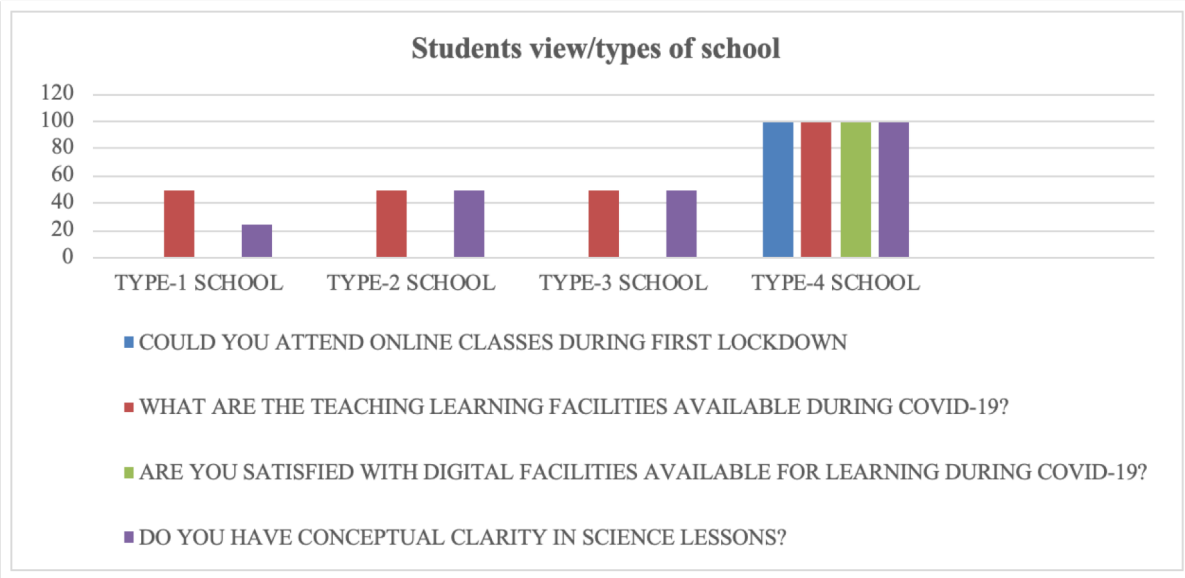

Figure 2 - Depicts students view versus types of schools.

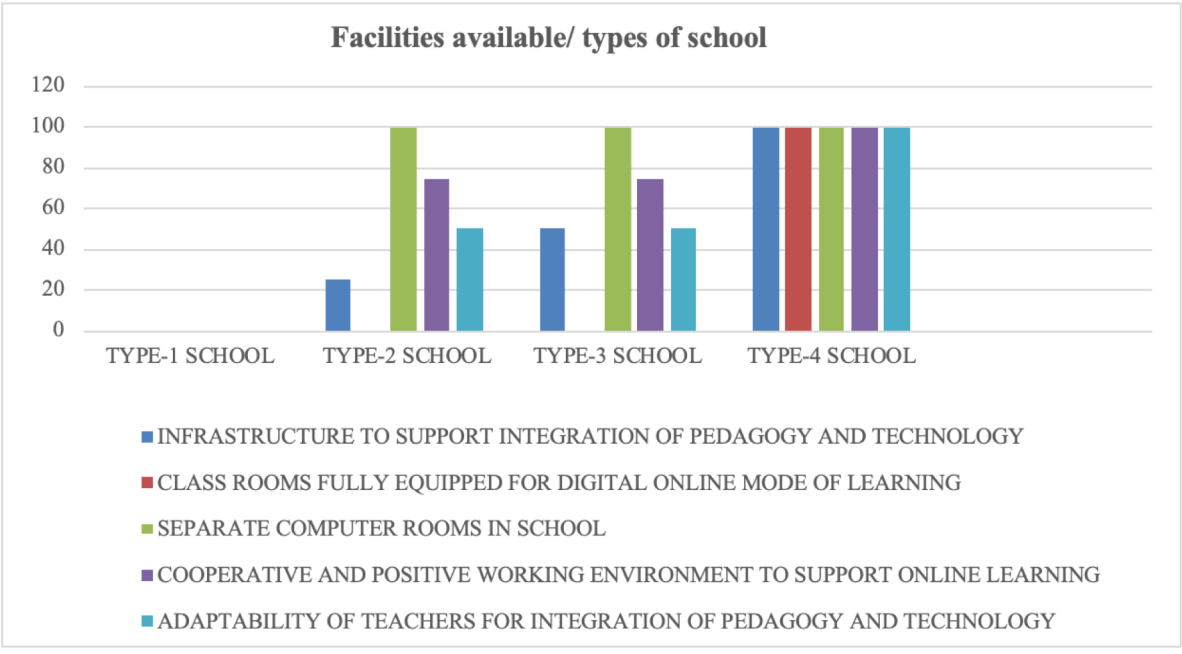

Figure 3 - Depicts the facilities available versus types of school.

Factors influencing integration of pedagogy and technology in secondary science classes	**Types of schools**			
	Type-1	**Type-2**	**Type-3**	**Type-4**
Infrastructure to support integration of pedagogy and technology	Not available	Underdeveloped	Available but not fully developed	Fully developed
Class rooms fully equipped for digital online mode of learning	Not available	Not available	Not available	Available
Separate computer rooms in school	Not available	Available	Available	Available
Cooperative and positive working environment to support online learning	Not available	Available	Available	Very good work culture and cooperative environment for integrating technology with pedagogy
Adaptability of teachers for integration of pedagogy and technology	Lacking	Improving	Improving	Very good technically trained teachers available.

Table 3 - Showing factors influencing integration of pedagogy with technology during COVID-19.

Opportunities/ Challenges	**Types of school**			
	Type-1	**Type-2**	**Type-3**	**Type-4**
Opportunities during online learning	Continued education with alternate mode of learning like television portals, radio, YouTube videos and telephonic contact with teachers	Continued education with alternate mode of learning like television portals, radio, YouTube videos and telephonic contact with teachers	Continued education with alternate mode of learning like television portals, radio, YouTube videos and telephonic contact with teachers	Continued education in a safe environment from home, opportunity for multiple presentation, explanation and exploration for both students and teachers well-equipped and trained for digital and distance mode of interactive learning
Challenges faced due to online learning	Lagging behind in course completion, lacking conceptual clarity in students, lack of parent's involvement, lack of personal touch, connectivity issue	Lagging behind in course completion, lacking conceptual clarity in students, lack of parent's involvement	students, lack of parent's involvement, lack of personal touch, connectivity issue Rising health issues in teachers and students due to increased screen	Rising health issues in teachers and students due to increased screen time, increasing work pressure for teachers, missing outdoor games for students

Table 4 - Represents opportunities and challenges faced by the schools for integration of pedagogy and technology during COVID-19.

question and for each type of school. Open manual coding is being carried out by the researchers. Theme is being generated from the codes and major themes for each question for each school type is being collected. From the central theme appropriate response to the question is being found out. The same process is being followed for semi structured interview and focus group discussion. The collected data are also segregated as per the objective of the study and a quantitative analysis of percentage calculation for a specific response is being generated. These quantitative data are than plotted in the form of Bar graph. The graphical presentation and qualitative data generated are triangulated to reach to major findings. This process is followed as per the objective of the research work.

3.4. Delimitation of the Study

In the present study researchers are confined to Science Teachers working in secondary schools in certain cities in the Indian state of Odisha, such as Bhubaneswar and Cuttack. This study has also taken view of students available in secondary schools in the same city.

4. Data analysis and interpretation

The first objective of the research study is to find out teachers' perception regarding integration of pedagogy and technology in secondary science classes. Analysis of qualitative data revealed that all the teachers in the four different types of schools taken in this study is having the view that technology is an inevitable tool to continue education during COVID-19 pandemic. Teachers from Type-4 schools mentioned ICT makes their classrooms better places to teach and learn. Teachers from all the four types of school agree that ICT tools help to bring conceptual clarity in understanding difficult scientific concepts. At the same time teachers from Type-1 schools mention they could not use ICT tools during first lock down as they lack infrastructural facilities and a readiness to start online classes. They also mentioned supportive school organizations, infrastructures, teacher training and a variety of instructional materials for educators, parents and students are necessary for effective ICT usage in the classroom. Teachers from both Type-2 and Type-3 schools agree that they have teacher training programs for conducting online classes using ICT tools. But these training are not sufficient to carry out the same. For Type-1 schools teacher training programs are not available. Teachers from Type-4 school mentioned they have supportive work culture for integration of pedagogy and technology. So, they could immediately start online classes within few days of first lock down. Teachers from Type-1 schools mentioned they don't have supportive school culture, environment and infrastructure to start online classes. The perception of teachers in different types of school is being mentioned in Table 1. The major perception of teachers regarding implementation of online class in the four different types of schools are presented in a graphical form in Figure 1. The figure depicts that in all the four types of schools all the teachers agree that technology is an inevitable tool to continue education during COVID-19 and integration of pedagogy and technology brings conceptual clarity in science lessons. Regarding digitalization facilities in school Type-1 school teachers have zero response. It means there is no successful digitalization in their school. There is fifty percent response regarding availability of digital facilities in Type-2 and Type-3 schools. When it is verified with data plotted in Table 1 it is found that teachers in these two types of school mention digitalization is available but not sufficient. At the same time Type-4 schools have hundred percent response regarding digital facilities.

Similarly, there is no satisfactory response regarding teacher training programme and supportive school culture in Type-1 schools. This is also in confirmation with qualitative data generated. Type-2 and Type-3 schools show fifty percent response and Type-4 school show hundred percent response for frequent teacher training and supportive work culture.

As per the second objective of the study qualitative data being generated regarding students view on integration of technology in their classes. These data have also been shown in Table 2 and plotted in Figure 2 in a graphical presentation. These data show Type-1, Type-2, and Type-3 school students could not attend to their classes during the first lock down of COVID-19. Only Type-4 school students mention that they could attend to online classes during first lock down. Figure 2 also mention the same response. Type-4 school show hundred percent response. Students in the first three categories of schools reported that they were unable to carry out their education during the first lockdown at COVID-19. While the fourth group of students mentioned that they are having resources to attend frequent online classes through Zoom or Google Meet. According to students in the first three categories of schools, YouTube videos, national Television channels, radio and telephonic messages from teachers are sources to facilitate teaching and learning during COVID-19, whereas students in Type-4 schools stated that they attend regular online classes from home. The research also shows that pupils in the first three categories of schools are dissatisfied with the existing digital facilities, but students in the fourth group are happy. During the initial lock down, pupils from Type-1 school said that they were unable to attain any conceptual clarity in science lessons. While students from Type-2 and Type-3 said that video lessons helped them with conceptual clarity, but immediate clarification of some doubts was not attainable. At the same time, students from Type-4 School said that their courses were accompanied by video lessons as well as interaction and discussion with teachers and classmates through an online platform. They were able to resolve their doubts and gain conceptual clarity.

To meet the third objective of the present research researchers analyzed the qualitative as well as quantitative data to find out the factors influencing integration of pedagogy and technology in all the four types of schools. Table 3 shows various factors influencing integration of pedagogy and technology in four different types of schools. The data shows infrastructural facility to support integration of pedagogy and technology is only available with Type-4 schools. It is under developed in Type-2 and Type-3 schools and not at all available in Type-1 schools. In the first three types of school classrooms are not equipped for online mode of learning. But Type-4 schools, classrooms support online learning. Separate computer laboratories are not available in Type-1 school but available in rest of the three types of schools. Cooperative supportive environment to facilitate online learning not available in Type-1 school, available in Type-2 and Type-3 schools and very well developed and cooperative work culture exist in Type-4 schools. Adaptability of teachers to online mode of learning is lacking in Type-1 schools, gradually improving in

Type-2 and Type- 3 schools and very well developed in Type-4 schools.

Figure 3 depicts that all the five factors found to positively influence integration of pedagogy and technology in secondary science classrooms are not available in Type-1 schools. For Type-2 school infrastructural facility poorly developed, digitalized classroom, not available, cooperative environment and adaptability of teachers is developing but less than Type-4 schools. For Type-3 schools' infrastructural facility is more than Type-2 school but less than Type-4 schools, separate computer labs available, cooperative environment and teachers' adaptability better than Type-2 schools. All the five factors identified to promote online mode of learning during COVID-19 are available.

According to the research, the first two categories of schools do not have any infrastructure to enable the combination of pedagogy and technology. The third type of schools has infrastructure support but cannot be efficiently exploited for teaching and learning objectives. The fourth group of schools has enough infrastructure to support digital learning. In addition, during the initial lockdown, online learning was carried out on a daily basis. The findings also suggest that owing to a lack of infrastructure in the first three categories of schools, instructors' flexibility and acceptability of integrating technology with pedagogy is limited. Nonetheless, instructors in the fourth group are well acclimated and comfortable with technology and may easily conduct online lessons during the first period of COVID-19 lockdown.

As per the fourth objective, various opportunities and challenges are there for all the four types of schools to continue with online mode of education during COVID-19 pandemic. As mentioned in Table 4 the opportunities for Type-1 schools are they could continue education with alternate modes like Television portals, YouTube videos, Radio and Telephonic contact with teachers. For Type-4 schools they could continue education Continued education in a safe environment from home, got an opportunity for multiple presentation, explanation and exploration for both students and teachers. Some of the challenges faced by Type-1 schools are they lag behind in course completion, students learn by self-study with little guidance from teachers. There are similar challenges for Type-2 and Type-3 schools. Some of the major challenges before Type-4 schools are, increased screen time for both teachers and students, lack of out-door activities for students and increased work pressure on teachers, lack of face-to-face interaction and in campus activity.

These results show that the first three types of schools may continue instruction via the use of mass media technology, but interactive lessons cannot be held owing to a lack of comprehensive digitalization equipment in schools. Nonetheless, the fourth group of institutions is prepared to confront the obstacles posed by COVID-19 circumstances and continue with online interactive sessions.

Figure 4 presents a graphical presentation of opportunities and challenges for all the four types of schools. Here Type-4 schools show maximum opportunities well as challenges. Opportunities are facilities available to continue education but challenges are heath issues arises due to long exposure to screen time, increasing work pressure on teachers leading to stress.

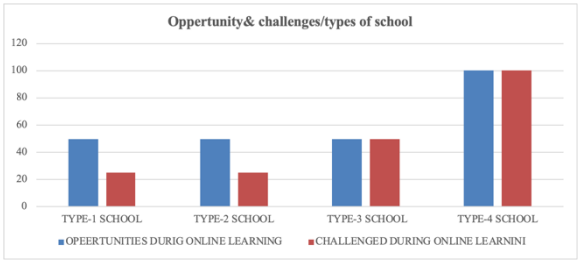

Figure 4 - Depicts opportunities and challenges of online mode of learning versus types of schools.

5. Major findings

The purpose of the research is to find out how successfully technological integration have been implemented in Indian secondary science classes, during the first phase of lock down in COVID-19 pandemic. Here researchers chosen four different types of schools that vary in their digital facilities, medium of teaching, school organization etc. The finding of the study reveals that all the teachers from all the four different kinds of school are having the perception that technology in today's time is an inevitable tool and highly essential to continue education. As some schools due to lack of technological support during COVID-19 pandemic could not continue their education for an indefinite period of time. Teachers from all types of schools also mentioned that technological support brings conceptual clarity in difficult concepts. The second major finding is that according to students view due to lack of technology integration they were bound to go for self-study, they could not attend online classes in majority of schools. So, students from all the types of school mention that technology is highly essential for them to continue education. As per the third objective the factors influencing successful integration of technology are, trained teachers, supportive infrastructure in schools, cooperative and positive working environment and adaptability of teachers to technology integration. The fourth major finding is that some alternate resources like Radio, Television, Telephonic contacts etc. are available for first three types of schools to continue education during COVID-19. At the same time Type-4 schools have complete digitalization facility to continue online safe education. The challenges before Type-1, Type-2 and Type-3

schools are lack of technological resources, trained teachers to continue education. Whereas for Type- 4 schools the challenges are to manage screen time for students and teachers, health hazards due to increased stress, and work overload, missing outdoor games, campus activities and face to face interactions.

6. Conclusions

At present time the world is going through 4th generation industrial revolution. The 4th generation industrial revolution signifies a flood of tools, technologies, gadgets supported with and run by Artificial Intelligence (AI). Use of such technologies in various fields largely replace human labour. The field of education is not an exception to be influenced and guided by fourth generation industrial revolution. Online assessments, blended mode of learning, asynchronous career advancement programs are a few examples to mention use of technology in the field of education. Technology is also greatly influencing school education system. On the outbreak of COVID-19 pandemic school education system has gone through a tough test of time to prove its preparedness to adapt technology and face challenges of the upcoming time. The present work selected four different types of school from Indian system and analyzed their preparedness to continue education with the help of technological tools during the time of pandemic COVID-19.The findings of the study reveal that, out of the four different types of schools chosen for the study, Type-4 schools which are English medium privately managed schools, following CBSE curriculum are completely digitally equipped to immediately start online blended mode of learning during first lock down in COVID-19. They possess infrastructural facilities, trained teachers, and a cooperative school environment to support online learning. As a result, students and teachers of these schools can safely learn and teach from home during COVID-19. The other two types of school like Type-3 and Type-2 schools, which are Government managed English medium Kendriya Vidyalayas (KVs) and privately managed Odia medium schools are not sufficiently supported with technological facilities and trained teachers to immediately carry out online mode of learning. But these schools are not totally devoid of technological facilities. During COVID-19 they could evolve themselves to continue technology supported learning. But there are another Types of schools like Type-1 school which are state government run vernacular schools and these schools are totally devoid of technological support to continue education. Students from these types of schools are worst sufferers of first lockdown during COVID-19. Their education came to a complete stand still during this time. The only source of learning for them are Television, Radio, YouTube etc. This scenario clearly depicts a sharp digital divide in Indian society. The Indian education system is not completely far away from adapting technological advances in classrooms. At the same time, it is not fully prepared to provide technological support to education at all levels. Now in the light of 4th generation industrial revolution education system is going to be changed to adapt technological interventions in education. So, the educators and teachers need to be fully prepared to accept, learn and adapt the upcoming technological advancements.

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