

ICT Integration for Educating Children with Special Needs: A Review

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Abstract—The digital revolution in India began during covid-19. Before that people were not very aware about digital lives. At present, in almost every sector like education, banking, communication, marketing, entertainment etc. information and communication technology or ICT equipment is immensely used for making task easy and comfortable. In the inclusive classroom it has proven to be a boon for special need children. Because in an inclusive classroom teachers face many problems due to individual differences. These individual differences may be in terms of physical, mental, emotional, social, cultural, economic etc. To manage such diversity, a teacher can make use of various tools of information and communication technology such as electronic note taker, handheld magnifiers, handheld digital recorder, adaptive calculators, screen reader, electronic dictionaries etc. The present study is secondary data based and the findings reveal that ICT used in education have positive effect on learners' academic achievement.

Index Terms—Information and communication technology, Children with special needs, Inclusive classroom

I. INTRODUCTION

Information and Communication Technology or (ICT) tools are powerful instruments in the modern education system. They are especially helpful for teachers in inclusive classrooms. In an inclusive classroom, teachers have to face many difficulties with a variety of students with respect to their socio-economic status, physical, mental, emotional, cultural, etc. He/she has to deal students with physically challenged, mentally retarded, gifted, slow learners, as well as students with learning disabilities. Students belonging to all these categories are called CWSN. They differ physically, mentally, emotionally and intellectually from other

students of the class (Sharma et al., 2024). In such a diverse situation, many classroom problems can easily be solved by using ICT special tools or gadgets. It can minimise the problems of both teachers and students with special needs. A study by Puspawati (2021) reported that deaf students can learn easily with the help of videos or visual graphics from specific online platforms. Some other assistive technologies that help CWSN include touch control devices, alternative keyboards and mouse, speech-to-text word recognition tools, etc. These technologies help students with learning and physical disabilities to actively participate in an inclusive classroom (Rout, 2016). In spite of the immense importance of using ICT in the regular classroom, a number of challenges have been identified that hinder its proper implementation. The first and foremost challenge is the lack of adequate infrastructure facilities for supporting the use of ICT in the classroom. The second challenge is the inadequate skills among teachers and students in handling such tools. Besides these, financial constraints as well as the location of the schools pose serious problems in using ICT. Thus, the education of CWSN using ICT can be made possible after overcoming such problems.

II. OBJECTIVES OF THE STUDY

- 1) To find out how ICT -integrated teaching helps in educating children with special needs?
- 2) To find the challenges in implementing ICT -integrated teaching.
- 3) To frame suggestive measures for effective implementation of ICT integrated teaching.

Operational definitions of the study:

ICT-integrated Teaching: ICT integration in teaching and learning implies the use of digital equipment like computers, projectors, the internet and ICT-specific gadgets to develop the learning ability of the learners.

Children with Special Needs: CWSN implies learners who need adapted teaching methods, modified curriculum, and support services because of physical, emotional, intellectual, behavioural, or learning challenges.

Need and significance of the study

ICT tools, have been used in almost every aspect of our lives. In the present era, a person becomes handicapped without digital access. It has made our lives easier and more comfortable. Things can easily be done with the use of ICT. It has gained immense importance in the field of education after coming the concept of E-Inclusion. E-Inclusion means the extent to which ICT contribute to equalising and promoting involvement of society at all levels. Certain assistive technologies such as computer screen magnification, descriptive video devices, screen readers, Braille note takers, text telephones, electronic speech devices, electronic math worksheets, etc., help children with visual, hearing, and speech impairments as well as learning difficulties. These types of assistive devices not only help students but also help teachers in providing equal access to education.

Thus, the study is significant for children with special needs, teachers, teacher education institutes, policy makers, educational planners and researchers, as it provides a broad in sighting of the role of technology in fostering inclusive education.

Statement of the problem:

Being influenced by the above-mentioned need and significance of the study, the investigator titled the study “ICT Integration for Educating Children with Special Needs: A Review of Related Literature”

Delimitations of the study

The study is delimited to using ICT special gadgets like electronic note-takers (Braille), audio books, MP3 players, handheld magnifiers, handheld digital recorders, etc., for educating CWSN in an inclusive classroom.

III. METHODOLOGY

The study adopts a qualitative review of secondary literature. To gather information for the research objectives, the researcher has gone through various books, peer reviewed journal articles of both national and international level related to ICT integrated teaching for educating CWSN. The literature was grouped into two themes that match the objectives (I &II). Content analysis was used to examine and interpret the data.

IV. REVIEW OF RELATED LITERATURE

Theme1: Benefits of ICT- integrated teaching for children with special needs.

Objective 1: To find out how ICT -integrated teaching helps in educating children with special needs.

Ashindoitang & Igo (2024) examined the use of ICT gadgets in educating students with learning disabilities. A descriptive co- relational design has been adopted by the investigator. A total sample of the study was 94 primary and junior secondary school students and 28 teachers. The study findings reveal that, as the calculated t value (8.708) is greater than the tabulated Z value of 1.96 at the 0.05 level of significance, the hypothesis is rejected, and it can be summarised that the use of gadgets such as talking calculators, portable note-taking devices, electronic dictionaries, eyeglasses, etc. in the classroom affects the academic achievement of the disable students.

Sharma et al. (2024) directed a study examining the importance of ICT in educating persons with disabilities. The authors have mainly focused on the use of ICT special gadgets and software such as Electronic Note Taker, Handheld Magnifiers, Text-to-Speech Assistive, Audio books, Handheld digital recorder, Google Lens App, Google Go Mobile App, Read-Along App, Diksha App, FM Systems, GHOTIT, Proof-Reading software, Math Tools, etc., for edutaining CWSN. The study findings reveal that innovative educational techniques and ICT are proven to be a boon for edutaining children with special needs. It makes their learning easy, effective, long-lasting, and joyful.

Sulaimani & Babadook (2023) persuaded a study in Saudi Arabia to examine the special educators' perception towards using assistive technology for intellectually disable students. The researchers employed semi-structured interviews to gather data and were processed using qualitative methods. The study findings revealed that the use of assistive technology in the classroom enhances students' learning and engagement.

Al-Shammari (2008) conducted a study to examine the usefulness of technology use in teaching special need children. It was found that, the use of assistive and adaptive technology help teachers in teaching special need children. It was also recommended to be aware about technology by all administrators, teachers and parents of students with special needs. Hasselbring & Glaser (2000) directed a study to examine how computer-assisted teaching helps students with special needs in regular classrooms. The study findings highlight that use of adaptive and assistive technologies help students with severe disabilities such as speech, visual, hearing and physical impairments. It was also noted that effective use of technology is limited due to inadequate teacher training and the high cost of technological resources. Further, it was recommended that adequate teacher preparation and financial resources be provided for its wider implementation.

Theme2: The challenges in Implementing ICT - integrated teaching.

Objective 2: To find the challenges in implementing ICT -supported teaching.

Puspawati & Juharoh (2021) made a qualitative research design to examine the challenges in implementing ICT for teaching children with special needs. The researcher collected data from three school teachers who teach hearing-impaired students through interviews. The study findings reveal that the first and foremost problem faced by teachers was improper facilities that support the use of ICT in the classroom. The participants reported that even though school policy encouraged the use of ICT in their teaching and learning process, the school was unable to provide adequate facilities such as computers, Wi-Fi connection and supporting software. Further, they reported that due to a poor

Wi-Fi connection, they could not access the internet connection for supporting teaching and learning through internet-based media. Besides these, teachers were not skilled in using ICT-specific tools and needed training. It was also recommended that teachers receive training to improve their confidence and competencies in integrating ICT into their teaching. These study findings were supported by the findings of Arif et al. (2023), where it was found that although ICT makes the class more effective through student engagement, teachers find it difficult to integrate ICT in their teaching due to inadequate internet connection and electricity.

Senjam & Bascaran (2021) had gone through a study to understand the obstacles confronted by students with visual impairments in using assistive technology. The researcher employed a cross-sectional study among randomly selected 250 visually impaired students from 10 selected schools in Delhi. The study findings reveal that the non-availability of assistive technology and financial constraints were the most common barriers faced by students with visual impairment. The lack of trainers pose another significant problems for such students. These study findings were supported by findings of Wong & Cohen (2015), where it was mentioned that resource limitations and lack of pre-service training and professional development were the major constraints in implementing assistive technology for teaching students with visual impairment.

Cagily et al. (2019) conducted a study to comprehend the experiences and perceptions of special education teachers with educational technology. The study was conducted with 27 teachers, held in six different schools in Ankara, Turkey. Semi-structured interview schedules were employed by the investigators to collect data and were processed by content analysis approach. The study findings reveal that limited technology in the schools' hampers teachers from teaching special needs children. It was also recommended to train teachers and parents about the use of these new technologies so that they can guide their special children at school and home.

Rout (2016) wrote an article to find out the importance of assistive technologies for educating

visually impaired students. The study reported that visually impaired students face lots of problems in accessing contemporary education due to a lack of assistive technologies such as specialised software, input devices and hardware. However, it was also mentioned that effective use of technology was hindered due to inadequate teacher training, lack of awareness, improper infrastructure and high cost. Further, the study suggested that institutions provide facilities to fulfil individual learners' needs and for teachers to get proper training in assistive technologies. It was also suggested that proper collaboration among teachers, parents, administrators, students with disabilities and their peers is needed for developing a techno-friendly and inclusive learning environment.

V. FINDINGS AND DISCUSSION

The review of related literature shows that ICT integration in teaching and learning helps teachers educate children with special needs. For instance, ICT special gadgets such as Electronic Note Taker, Handheld Magnifiers, Text-to-Speech Assistive Technology, Adaptive Calculator, Group Hearing Aids, Sound Discrimination Toys, etc., help students with visual and hearing impairments as well as with learning difficulties. In spite of the enormous help provided by Information and Communication Technology, a number of challenges hinder its proper implementation in the classroom. The studies by Cagily et al. (2019), Rout (2016), Senjam & Bascaran (2021), as well as Puspawati & Juharoh (2021) have clearly noted the challenges faced by teachers and students in using ICT. Some of them are: limited technology in schools, lack of special educators, lack of awareness among parents, unskilled teachers, financial constraints to build proper infrastructure that supports the use of ICT, lack of collaboration among teachers, students, parents and administrators, etc. To achieve the goal of educating children with special needs in the regular classroom through digital access, these kinds of hindrances must be removed.

Suggestive measures for effective implementation of ICT based teaching:

Based on the review of secondary literature the following measures can be suggested-

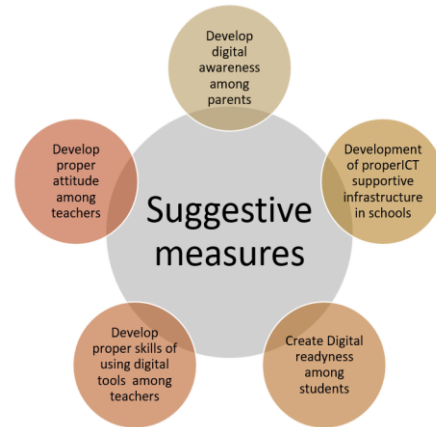


Figure 1: Suggestive measures

Educational Implications of the study:

- ICT promotes individualised learning by providing learning materials and activities according to the needs of the students.
- Teachers can make lessons interesting by using various educational software such as the Google Lens app, read-along app, Diksha app, etc.
- Assistive technologies such as electronic note takers, screen readers, and text-to-speech software help learners with visual impairment. Further, digital hearing systems, speech-to-text applications and other communication technologies help students with hearing impairment and increase their participation in classroom activities.
- Assistive technologies can decrease learners' dependence on others and develop independent learning habits.
- ICT integration can create an inclusive learning environment by removing learning barriers and welcome special need children to participate in different classroom activities.

Suggestions for further research:

- Future research may involve an empirical study that is primarily data-based and can validate the findings for generalisation. The following studies are suggested for further research, as well as filling the research gap-
- Effect of ICT-integrated teaching on the academic achievement of CWSN.
- Challenges in implementing ICT-based education in rural and urban schools

- Effect of using ICT special apps on the learning outcomes of CWSN
- Role of ICT-based teacher training programme in improving teachers' competencies for inclusive classrooms
- Teachers' attitude towards using assistive devices in inclusive classrooms.
- Problems faced by teachers in providing ICT-supported teaching
- Role of parents in supporting ICT-oriented learning among children with special needs.

VI. CONCLUSION

From the above discussion, it can be concluded that ICT use in education has a positive effect on learners' achievement. It not only helps teachers but is proven to be a boon for special need children. By using these assistive technologies, they can learn things more easily and quickly on their own. This in turn helps in developing self-confidence and reliance among them. Thus, proper integration of ICT and assistive technologies can bring accessibility, independence, individualised learning and inclusion in the teaching-learning process.

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