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Examining the Influence of Gamification on the Enjoyment, Engagement, and Motivation of Secondary School Students: A Case Study of Vevox

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Abstract

This paper attempts to investigate the impact of a game-based learning using an application "VEVOX" on learners' enjoyment, engagement, and motivation. Using a quantitative method, a total of 80 participants from Secondary School completed a questionnaire on the impact of gamification approach on learners' enjoyment, engagement, and motivation. Data was collected and analyzed using SPSS. Overall, the results indicate that "VEVOX" impacts learners' enjoyment, engagement, and motivation positively. Furthermore, the findings imply that gamification for learning should consider that pupils are not identical, but have different perspectives; not all learners are necessarily fascinated in the same element with similar degrees, also the nature of game-based learning should be kept under this impression instead of forcing things on learners.

Keywords: Engagement, Enjoyment, Game-based learning, Gamification, Motivation, Vevox.

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Introduction

As the ultimate aim of every school is to provide students with indispensable knowledge and experience alike to prepare them for the job market, such efforts won't necessarily be efficacious or fruitful. According to statistics, dropout rates are very high in Morocco (Ichou & Fathi, 2022). Besides, Moroccan students' level is extremely low with reference to the mastery of different languages (Bouziane, 2018). Thus, one of the underlying factors for this matter in question is that education seems to address learners' needs and lacks at the expense of their wants. Likewise, the World Bank report (2011) mentioned that the failure of education in Morocco is due to the quality of education per se, while it calls for reform and recommends stakeholders to reconsider media of instruction (Zerrour, 2013). Put simply, ways of transmitting knowledge to students have not changed for a long-time; methods of teaching are outdated, and assessment techniques are consistent which hinders improvement of education in Morocco.

Having a new generation taught with old paradigms, students feel insufficiently engaged or motivated. The current generation (Y generation) of students are not detached from ICT which is part of their daily lives and practices. Mobile technologies accompany them on a daily basis. They use their mobile phone to network with each other, to work in groups to finish tasks, or play games more than their previous generation (X generation). With digital natives, the power of classroom games gained popularity, and research per se stresses the importance of game-based learning and claims that it enhances chances to acquire knowledge and raises students' interest. This interest in games influences not exclusively youngsters, but, also teachers, researcher, and parents are passionate about it (Kirriemuir & McFarlane, 2004). Undoubtedly, games promote learners' attention and boost their engagement more successfully than old teaching and assessment methods.

Literature Review

Gamification in Education

The neologism gamification is named by Nick Pelling in 2002 (Marczewski, 2013) then it has become ubiquitous in different spheres since 2010 (Deterding et al., 2011). Gamification is a process of applying game element in a non-game environment so that players can feel involved and motivated while finding solutions to difficulties encountered. In the literature, gamification includes game elements (rules that make up the game) such as points, badges, levels that offer different ways for students to perform desired educational activities (Majuri et al., 2018; Koivisto & Hamari, 2019; Bai et al., 2020). In other words, game elements exhibit learner participation and performance (Simões et al., 2013). Recent studies demonstrated that classroom teaching and learning associated with game elements are a way to automatically trigger students' minds to deal with problem-solving tasks without thinking of it as a weighty burden to bear (Majuri et al., 2018; Koivisto & Hamari, 2019; Bai et al., 2020). Put differently, to address students' evasion, lack of motivation, and lack of engagement in the learning context, some research has been implementing educational games to perform desired learning activities (Legaki et al., 2020; Oliveira et al., 2022).

Enjoyment

A mark of distinction of gamification is that games involve evident enjoyment. Thus, the more the individual feel enjoyed, the more he or she becomes motivated, satisfied and productive (PeThan et al., 2014). The concept of enjoyment is termed as the pleasure one gets from enjoying something, and pleasure is a feeling of being happy and satisfied (Oxford dictionary). Enjoyment is a kernel part of enthusiasm. Incorporating games with learning would enthusiastically promote students' readiness to take part in classroom activities and feel energetic rather than exhausted or uncomfortable. Von Ahn and Dabbish (2008) argue that points, levels and leaderboards are highly essential to increase enjoyment in human computation tasks and seem to be an effective way for promoting performance quantity.

Engagement

A prevalent issue education has been trying to settle is students' lack of engagement especially the adolescent cohort considering that they are rebellions and obstinate. Indeed, it looks easy to push learners to memorize by heart, while it is hard making learning meaningful, discoverable, and effortless. Since primary school, the method of teaching has been the same; consequently, they feel bored and demotivated. Being asked to listen to the teacher, to copy and memorize the lesson by heart to get it back in the day of the exam becomes monotonous. Nevertheless, knowing that they love being attached to their mobile phones, students would feel more engaged (Groh, 2012) and interested in discovering knowledge by doing things. The majority of students are kinesthetic tactile, so they obtain information by manipulating or touching materials. Dewey (1938), in this sense, emphasized the importance of hand on approach. Students feel exhausted with pen and paper, they wanted to try something easy, new, and that fits their interests, hence the best way to cater to their wants is through implementing technology inside the classroom and incorporate it with activities performed in the classroom. Students especially adolescents like to go with the flow and be challenged so that time goes by very quickly. Creating a mixture between learning and enjoyment would lead to engagement and motivation.

Motivation

Gamification can fulfill students psychological need for self-esteem through recognition. By virtue, all human beings, not exclusively students appreciate having their efforts acknowledged by others. Acknowledgment fuels their pride and self-confidence, and considerable pride paves the way for the willingness to undertake more responsibility towards their learning by participating in course tasks and improve their skills and knowledge alike (Landers & Landers, 2014). Speaking of feedback, it is a powerful tool to either motivate or demotivate students. Future performances are determined by the quality of earlier feedback. Gamification elements such as points, leaderboards, and badges can raise students' interest and boost their self-efficacy on performance and reinforce their efforts by rewarding the desired target behavior. Most importantly is the fact that learners' extrinsic motivation is gradually shifting towards intrinsic motivation and the desire to learn grow without waiting for concrete real rewarding objects. In fact, ample studies (Deterding, 2014; Francisco-Aparicio et al., 2013; Pe-Than

et al., 2014; Peng et al., 2012) proved that intrinsic motivation satisfies players innate psychological needs for autonomy and competence.

Purpose of the Study

Education has always been a key factor in the development of countries around the world. Morocco is one of the countries that has been through many reforms unsuccessfully. Based on research, Moroccan students' educational level has witnessed an enormous regression in the past few years (Saoudi et al., 2020). Despite all the reforms undertaken by the public authorities, the performance of the educational system in Morocco is still very low (Ibourk & Amaghouss, 2014). Without a shadow of a doubt, the failure of an educational system can be attributed to bringing students' needs and lacks into focus while seemingly ignore their wants and wishes. Students do not feel themselves part of decision-making because in their mind teachers force-fed content into their brains. Owing to traditional teaching methods teachers employ espousing outdated textbooks ('Ticket 2 English': second-year baccalaureate Moroccan students' textbook, as an example, has not been exposed to change for more than a decade), students are triggered by feelings of disengagement, lack of motivation, and failure to enjoy what they learn. An effective way to engage students, especially the adolescent cohort knowing that they are utterly impossible to detach from technological devices, is to allow them to use their mobile phones so that they can gain knowledge. Learning for them has become monotonous and stressful; meanwhile cutting-edge technology is a means to entertain their brains. Therefore, designing learning by maintaining an integration between the curriculum and students' wants unquestionably would lead to desired outcomes. In light of this, this research aims to address the following question:

1- To what extent the application VEVOX is needed in an EFL classroom?
2- To what extent the application VEVOX impacts students' enjoyment, engagement, and motivation?

Method

Participants

The study was conducted among Moroccan students, specifically focusing on 80 pupils from two different majors, namely Earth and Life Sciences (SVT) and Physics (PC), in the 2nd year of their baccalaureate program. These students were enrolled at Al Ahd Al Jadid Secondary School in the Taounat region. The sample comprised three classes, with one class consisting of 26 students and the other two classes having 27 students each. In terms of gender distribution, there were 39 females and 41 males in the sample.

The majority of these students' parents had limited formal education and were primarily employed as either farmworkers or in the military, earning low incomes. However, there was a small subset of parents who had received tertiary education and held positions as teachers, vice school principals, or worked in other sectors, enjoying comparatively better incomes.

Research Model

The research utilized a quantitative methodology along with a quasi-experimental research design. The primary objective of this study was to assess the impact of implementing Vevox (which served as the independent variable) on the levels of enjoyment, engagement, and motivation among secondary school students (considered as the dependent variables).

Measuring Tool

The study employed a questionnaire to investigate the impact of the VEVOX platform, used for formative assessment, on students' enjoyment, engagement, and motivation. This self-completion questionnaire was developed by the researchers based on prior research and a literature review (see the appendix). Before distributing the questionnaire to the 80 participants, it was initially shared with a group of 10 students to ensure the validity and reliability of the measurement tool. Once the data were collected, they were coded and entered into a computer using Statistical Package for the Social Sciences Software (SPSS) version 25. The analysis of the data involved quantitative procedures, primarily descriptive statistics such as frequencies and percentages.

The Implementation of the Mobile Phone Application VEVOX in the Classroom

VEVOX is an interactive software teacher can use to design engaging sessions through live polling, quizzes, and Q&As. Teachers create sessions through VEVOX dashboard using their computers while students use the session ID to connect via their smartphones or tablets. The application is a real fun and helps support learning. It is distinct owing to its anonymity of the participants as it helps remove fear and judgment and increases participation alike. It is a tool to gauge learners' understanding and spot areas of weaknesses for immediate remedy. The application is considered as a game and is presented to students under the same impression.

The first thing teachers need to do is to log into their dashboard at https://login.vevox.com/$_{1}$, click on sign up$_{2}$ (see Figure 1) in case they do not have an account yet, then they have to click on get a free account$_{3}$ (see Figure 2) where they will be asked to enter their e-mail and a password$_{4}$. Immediately after creating an account (see Figure 3), they need to create a session$_{5}$ (see Figure 4) and give it a name$_{6}$ and click create$_{7}$. Soon afterwards, a notice at the top of the page will remind teachers that the session is inactive and that they have to click start session$_{8}$ (see Figure 5) and provide students with the session ID$_{9}$. However, before activating the session, teachers need to create one$_{10}$ (students already know what they are revising, in this example, it is revision of a combination of lessons of function); the teacher choses the question type$_{11}$ (such as multichoice), the question title$_{12}$ (such as “I am afraid I can’t, I have an important meeting,” expresses), while the choices$_{13}$ are displayed below (e.g., giving opinion, declining a request, or lack of understanding). The teacher decides beforehand the correct answer$_{14}$ and clicks create (see Figure 6).

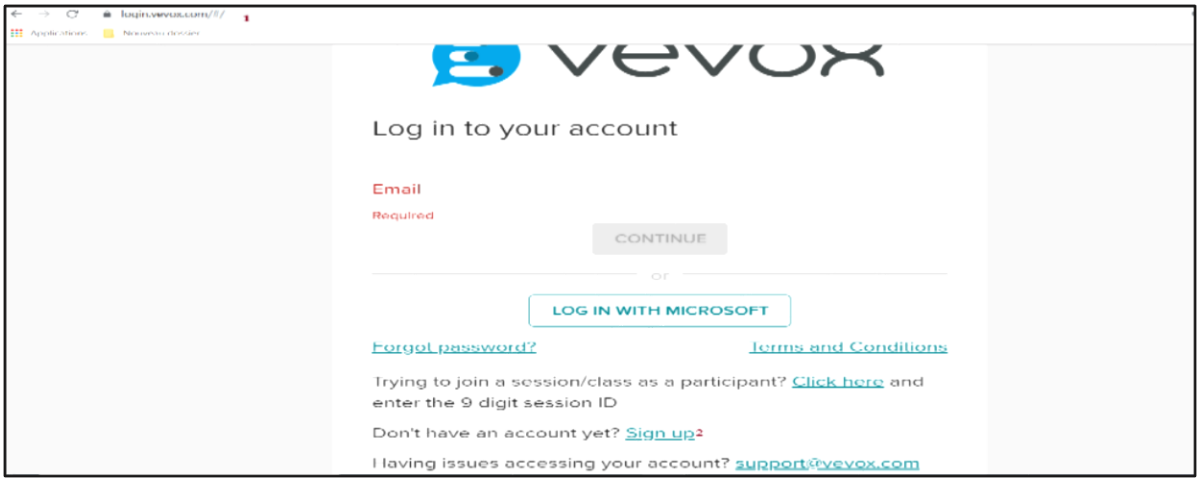

Figure 1. Log in to Vevox

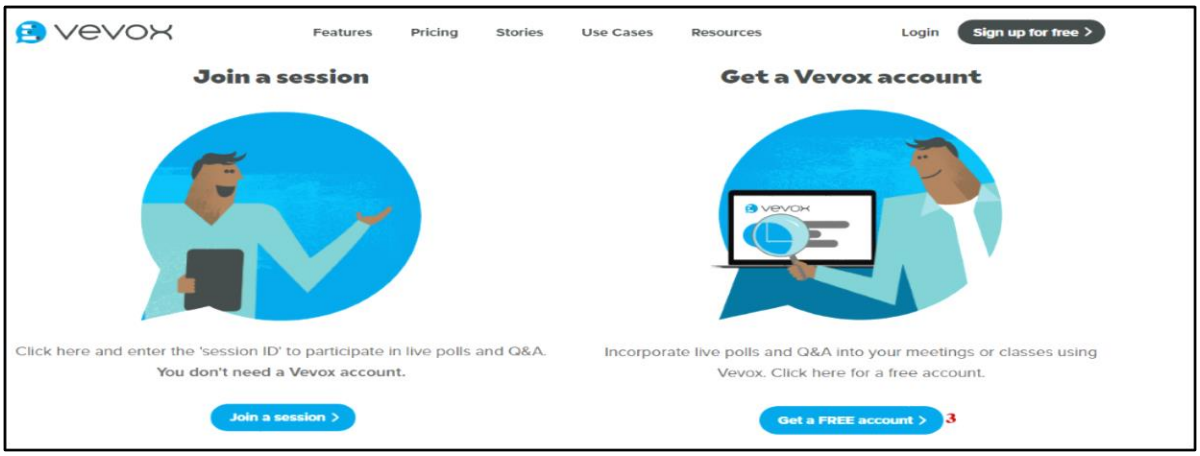

Figure 2. Getting a Free Account

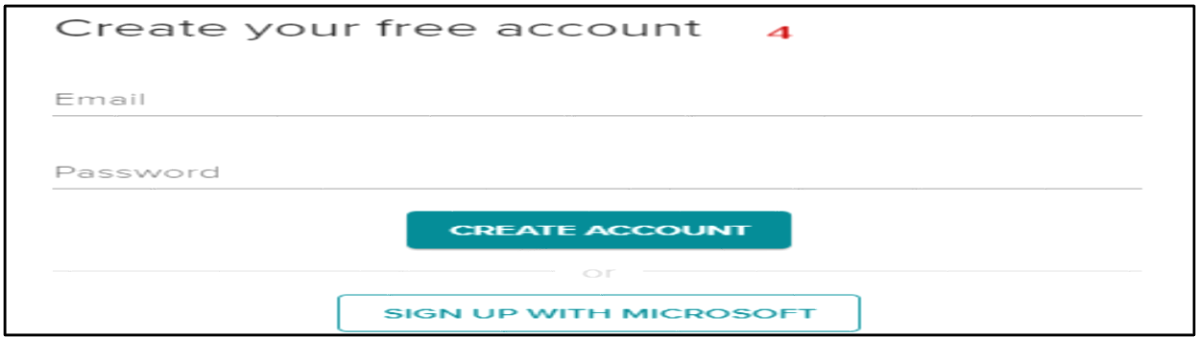

Figure 3. Creating an Account

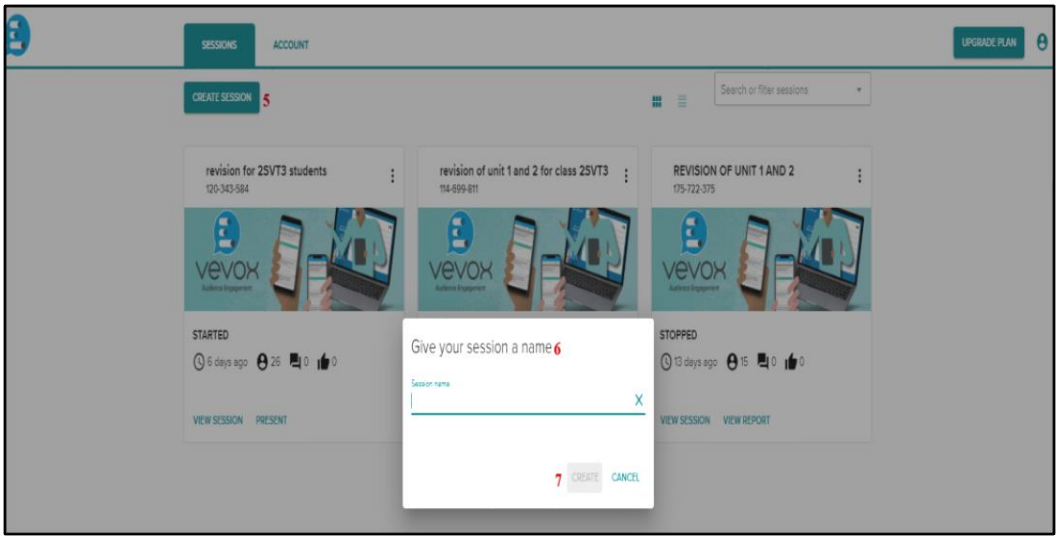

Figure 4. Creating a Session

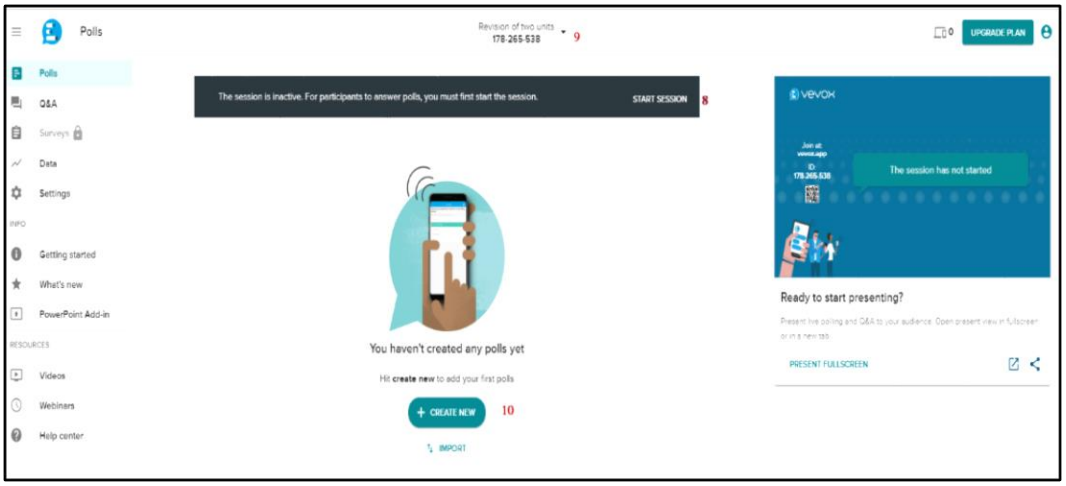

Figure 5. Starting a Session

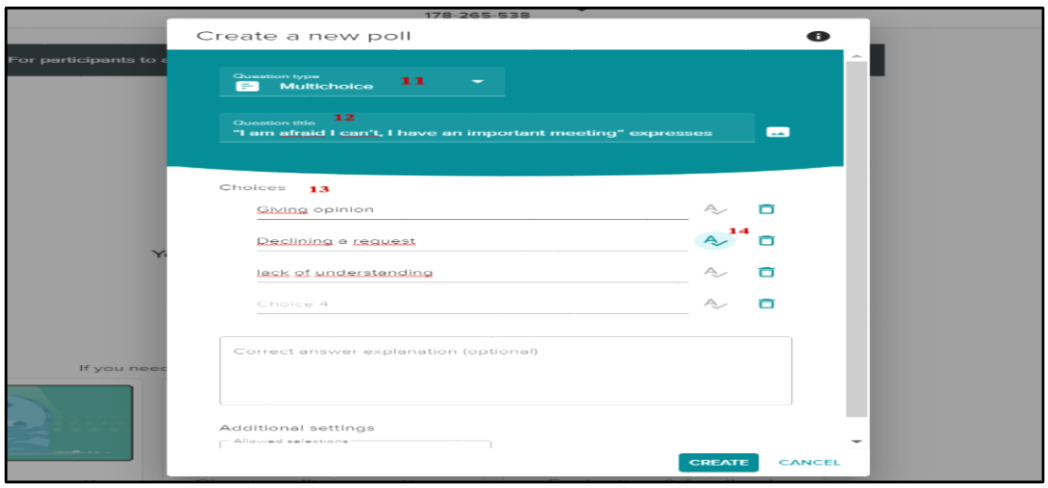

Figure 6. Create a Poll

For students to join a session, it is better to download the application on their mobile phones. Still, they can use the online/ web version. When the teacher activates the session, students need to open their application and enter the ID session. Questions appear immediately in their mobile phone screen after having the teacher hit the button open poll. Students make their minds and click the convenient answer for them, if they changed their minds, they can click cancel to alter their response.

When the teacher notices that all the participants give their responses[15] (see Figure 7), he or she can stop the poll and clicks show results[16] to show the percentage for each choice[17]. Afterwards, instant remedial work take part. Teachers and students proceed in the same way until they finish all the questions. At the end, the teacher hits the button display leaderboard[18]; a sort of feedback which enables students to have an idea about their performance.

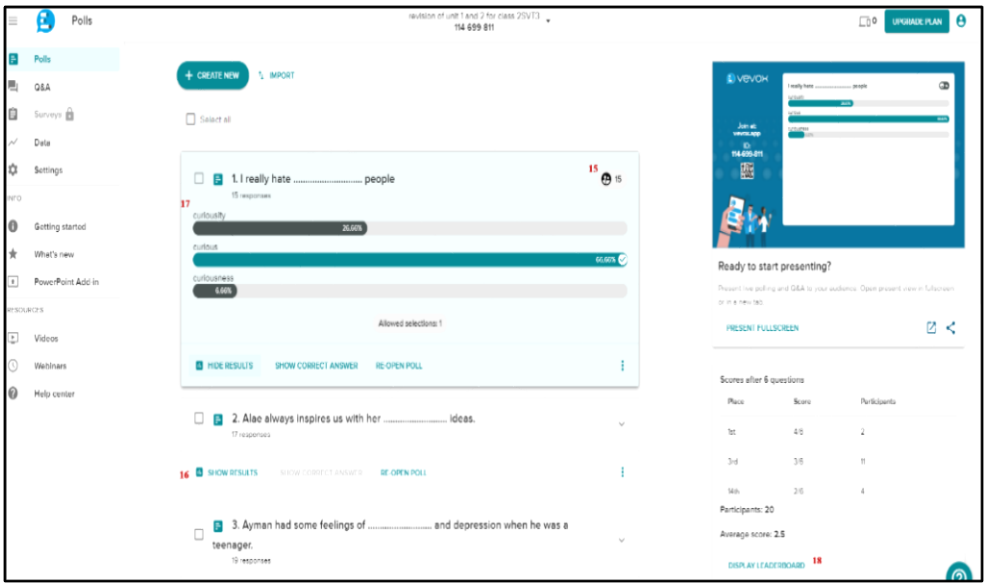

Figure 7. Number of Participants

Results

In this section, we present results that the researcher collected in order to investigate the impact of a mobile application named VEVOX along three dimensions: on students' enjoyment, engagement, and motivation. The tables below represent students' attitudes towards the application Vevox.

Enjoyment

Table 1. Learning through VEVOX is Incredibly Fun

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	77	96,3	96,3	96,3
	Neutral	2	2,5	2,5	98,8
	Disagree	1	1,3	1,3	100,0
	Total	80	100,0	100,0	

Table 2. I Feel Happy When I Play with the Game

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	72	90,0	90,0	90,0
	Neutral	6	7,5	7,5	97,5
	Disagree	2	2,5	2,5	100,0
	Total	80	100,0	100,0	

Table 3. I think it Makes Me More Productive Rather than Bored

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	62	77,5	77,5	77,5
	Neutral	8	10,0	10,0	87,5
	Disagree	10	12,5	12,5	100,0
	Total	80	100,0	100,0	

Table 4. I Feel Less Energetic and Exhausted When I Play with It

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	34	42,5	42,5	42,5
	Neutral	13	16,3	16,3	58,8
	Disagree	33	41,3	41,3	100,0
	Total	80	100,0	100,0	

Table 5. I Do Not Feel Comfortable Playing It

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	51	63,7	63,7	63,7
	Neutral	3	3,8	3,8	67,5
	Disagree	26	32,5	32,5	100,0
	Total	80	100,0	100,0	

To investigate the participants degree of enjoyment, they were asked five questions. Responses were as follows: 96,3% of the respondents agreed that learning through VEVOX is incredibly fun, 1,3% disagree, while 2,5% were neutral. Respondents were asked about their feeling during the game, the majority (90%) expressed their happiness, only 2,5% were not happy, and 7,5% opted for neutral. To gauge whether or not VEVOX was able to make learners active and productive, they were asked to either agree or disagree with the statement provided.

The results showed that 77.5% agreed with the statement, 12,5% disagreed, meanwhile 10% could not decide. To check if VEVOX has an impact on their energy or not, they were asked to either agree or disagree with the statement provided, results showed that 42,5% felt less energetic and rather exhausted while playing the game. Meanwhile, 41,3% disagree with them, and 16,3% opted for neutral. Based on the findings, 63,8% of the participants did not feel comfortable playing the game, 32,5% felt comfortable, 3,8% opted for neutral.

Engagement

Table 6. I Want to Discover All the Questions in The Game

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	75	93,8	93,8	93,8
	Maybe	3	3,8	3,8	97,5
	No	2	2,5	2,5	100,0
	Total	80	100,0	100,0	

Table 7. Time Passes Quickly When I Play with It

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	74	92,5	92,5	92,5
	Neutral	4	5,0	5,0	97,5
	Disagree	2	2,5	2,5	100,0
	Total	80	100,0	100,0	

Table 8. I Would Love to Complete All the Question in The Game

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	70	87,5	87,5	87,5
	Neutral	5	6,3	6,3	93,8
	Disagree	5	6,3	6,3	100,0
	Total	80	100,0	100,0	

Table 9. I Feel Bored, I do not Want to Complete the Activity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	31	38,8	38,8	38,8
	Maybe	7	8,8	8,8	47,5
	No	42	52,5	52,5	100,0
	Total	80	100,0	100,0	

Table 10. It Was Really Significant to Revise Lessons Using this Game

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	69	86,3	86,3	86,3
	Neutral	7	8,8	8,8	95,0
	Disagree	4	5,0	5,0	100,0
	Total	80	100,0	100,0	

To develop awareness about students' engagement, participants we invited the participants to answer five questions. First, while 93,8% expressed their desire to discover all the questions in the game, only 2,5% did not want to, and 3,8% opted for maybe. Second, 92,5% voted that time passed quickly when they were playing the game, merely 2,5% claimed the opposite, and 5% were neutral. 87,5% wanted to complete all the questions of the game, 6,3% did not want to, and the other 6,3% were neutral. Again, participants were asked to describe their feeling about the activity, 38,8% felt bored and did not want to complete it. Nonetheless, 52,5% did not feel bored

and wanted to complete the activity, while 8,8% opted for maybe. Furthermore, 86,3% found that revising lessons using VEVOX is really significant, 8,8% were neutral, meanwhile 5% disagreed.

Motivation

Table 11. This Activity is Highly Interesting

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	76	95,0	95,0	95,0
	Neutral	2	2,5	2,5	97,5
	Disagree	2	2,5	2,5	100,0
	Total	80	100,0	100,0	

Table 12. I Did My Best to Finish the Activity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	68	85,0	85,0	85,0
	Maybe	7	8,8	8,8	93,8
	No	5	6,3	6,3	100,0
	Total	80	100,0	100,0	

Table 13. I Did Not Invest Much Effort in the Game

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	50	62,5	62,5	62,5
	Maybe	16	20,0	20,0	82,5
	No	14	17,5	17,5	100,0
	Total	80	100,0	100,0	

Table 14. I Allocated Less Energy for The Activity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	54	67,5	67,5	67,5
	Maybe	16	20,0	20,0	87,5
	No	10	12,5	12,5	100,0
	Total	80	100,0	100,0	

To measure students' level of motivation in gamification, participants were asked to react to four questions. For them, 95% found that the activity was interesting, merely 2,5% disagreed, and the other 2,5% were neutral. To check their level of motivation, participants were asked if they did their best to finish the activity, 85% of them opted for yes, 6,3% chose no as a convenient answer to them, while 8,8% could not make their mind and they chose maybe. In addition to this, 62,5% stated that they did not invest much effort in the game, while 17,5% claimed the opposite, 20% were not sure and they chose maybe. Further, the majority (67,5%) allocated less energy for the activity, 12,5% did the opposite. Meanwhile, 20% opted for maybe.

Discussion

Our motivation for the present study was to investigate the impact of game-based learning using the application VEVOX on 2nd year baccalaureate students' enjoyment, engagement, and motivation. In line with previous research on the potential of gamification to promote learners' enjoyment, engagement, and motivation (e.g., Koivisto & Hamari, 2019; PeThan et al., 2014; Groh, 2012) the findings demonstrated that gamification using VEVOX has a positive impact on learners. To address issues presented by many researchers (Ichou & Fathi, 2022; Bouziane, 2018; Zerrour, 2013) in the field, this paper is meant to find a solution to issues of students' evasion, lack of engagement, and low motivation in classroom activities. Accordingly, gamification is not only the best way to promote students' interest in education, but also the convenient option to cater to their wants and wishes as well as hone their ICT skills.

According to the findings, participants expressed their enthusiasm and passion towards the application, for the majority claimed it was an enjoyable experience as it contributed in making them happy and more constructive and productive rather than bored or impotent. However, many students claimed being less energetic and exhausted when playing with the game, 38.8% claimed feeling bored and uninterested in completing the game which can be interpreted as due to their lack of readiness to get exposed to a new mode of learning, as some of the participants did not have a mobile phone or data connection. These are some of the assumptions made by the researcher observer of the participants. Though most of them can't detach from their mobile phones, there is still a small number of them coming from disadvantaged backgrounds who seem unable to accept the world changes; they prefer to remain in their comfort zone; they are advocators of lecturing, and pen and paper-based assessment. Even though, it does not make them involved in classroom activities, still it keeps them away from embarrassment and protect their self-esteem. Similarly, Kahveci (2010) was interested in investigating students' motivation towards the use of technology; consequently, the researcher found that some students have less confidence and a negative attitude toward the use of technology.

In accordance with Groh's (2012) study, the implementation of ICT in the classroom contributes to students' engagement. In this paper, it was crystal clear that the participants' engagement was extremely high, they were eager to discover and complete all the questions in the game; they could not feel the time as it passed quickly and the majority express their interest in revising lessons using the game or the application implemented. Actually, technology was able to engage unengaged learners, attention of reluctant students can be raised and enhanced via personal related things involving their mobile phones. Likewise, participants demonstrated their motivation to play and learn through the VEVOX application; they found it interesting, engaging, and easy since it did not require them much effort and energy (Simões et al., 2013), above all, it was able to contribute in developing their learning outcomes.

Conclusion

In an attempt to address issues of students' drop out of school, disengagement, lack of motivation and outdated medium of instructions, this paper is meant for testing the effect of gamification on students' attitudes with three

dimensions; students' enjoyment, engagement, and motivation. Generally, the findings were favorable; the mobile application VEVOX facilitated the process of learning for learners, contributed in engaging and motivating them. Consequently, the application is recommended in the classroom. However, the researcher needs to consider certain important elements which are not all learners are similar; some may feel comfortable using their mobile phones trying novel experiences, while others may not. Furthermore, coercing learners into using a mobile phone and have a data connection to do the activity would lead the practitioner to the initial dilemma.

Recommendations

The findings imply that gamification for learning should consider that pupils are not identical, but have different perspectives; not all learners are necessarily fascinated in the same element with similar degrees, also the nature of game-based learning should be kept under this impression instead of forcing things on learners.

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Appendix

	Statements	Agree/ Yes	Neutral/ Maybe	Disagree/ No
1	Learning through VEVOX is incredibly fun			
2	I feel happy when I play with the game			
3	I think it makes me more productive rather than bored			
4	I feel less energitic and exhausted when I play with it			
5	I do not feel comfortable playing it			
6	I want to discover all the questions in the game			
7	Time passes quickly when I play with it			
8	I would love to complete all the question in the game			
9	I feel bored, I do not want to complete the activity			
10	It was really significant to revise lessons using this game			
11	This activity is highly interesting			
12	I did my best to finish the activity			
13	I did not invest much effort in the game			
14	I allocated less energy for the activity			

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A Systematic Review on Assessment Practices in Inclusive Schools in India: Barriers and Opportunities

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Abstract

Assessments are integral to the educational process, fostering student development and expediting the teaching-learning continuum. They not only guide teachers in shaping students' learning trajectories but also aid in the selection of Teaching-Learning Materials (TLM), procedural decisions, diagnosing children's needs, and overall administrative system enhancement. Inclusive education relies heavily on assessment techniques as vital tools providing valuable insights into students' progress and learning requirements. This information enables teachers to ensure proper educational placements and make informed decisions. This paper employs a systematic literature review method (SLR) using PRISMA techniques to explore tools and techniques in inclusive schools, along with barriers and opportunities in implementing assessment practices. The findings underscore the availability of diverse assessment tools in schools, yet reveal a deficiency in teachers' training on proper implementation. General educators, compared to special educators, exhibit lower levels of training, skills, and updates. The implementation of various assessment techniques positively impacts students by providing appropriate facilities and services. The study recommends the necessity for additional teacher training programs and updates to the curriculum.

Keywords: Inclusive education, Barriers, Opportunities, Assessment practices

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Introduction

In the phenomenal world, God is the supreme. He created the world beautifully and mysteriously and filled with all sorts of creatures, each with its own unique culture and taste; he created the plants, sky, human beings and various species full of beauty and uniqueness. So the whole world is like a beautiful, inclusive place full of diversity. There are people of all colours, shapes, sizes, and abilities. All individuals come from different cultures, languages and belief systems. Still, despite these differences, we all live in an inclusive world where we all deserve to be treated with respect, dignity, and equality. That is why UN Agenda 2030 for SDG has given importance to making a better society by making global citizenship and practising inclusiveness in every sphere of society.

Inclusion is a generic term that aims to eliminate exclusionary practices from society by changing individuals' attitudes, value systems, and belief systems. So, in translating the objectives into action, Inclusive education will play a catalytic role. Generally, Inclusive education is an umbrella term and an updated version of the teaching method with learning difficulties and all normal children in the same classroom with the same school or campus (Sharma et al., 2021). Angelides et al. (2006) define Inclusive education as a practice of increasing learners' participation and acceptance of the differences in the school as a whole. They also highlighted that inclusive education is all about all students having the right to attend school in the neighborhood. This suggests that this approach does not just apply to enrolling students with disabilities and special needs in regular classrooms. However, it is equally concerned with the circumstances allowing all children to receive an adequate education. Thus, adopting inclusive education practices entails modifying the curriculum in schools to take into account each student's individuality and thereby enhancing their presence, access, participation, and achievement in learning society (Booth, 2006). So, we need proper identification and assessment to properly place special education children in the inclusive setup. It has been said that without proper assessment and identification, there will be no special or inclusive education. Hence, inclusive or special education begins with assessments and ends with assessments without proper assessments.

It is challenging on the part of professionals or teachers to identify children with special needs and provide unique opportunities and services. In order to make Inclusion a reality, assessment procedures must be creative in order to encourage the participation of all students. However, in the case of India, most of the instructor training programs do not have a set up on capacity assessment techniques, a more significant proportion of the schools in India are not sufficiently planned, teachers are also not capable, and they did not get any bolster benefits from their classrooms. As per the survey results, most special needs students need inclusive education. (Sharma et al., 2021) also investigated that regular assessment and improper assessment are very few in India. The selection of assessment tools and techniques is essential for inclusive school teachers because assessments play a vital role in inclusive education. For this purpose, if a child is misdiagnosed due to the wrong use of assessment tools, the right services will not be provided to the child, which will again increase the rate of disability. So, the present study focuses on and explores the different tools and techniques adopted in inclusive schools and the barriers to inclusive assessment practices in Indian schools.

Research Questions

1. What tools and techniques are used in inclusive education to assess and identify the special educational needs of students?
2. What does the teacher face the problems in the implementation of tools and techniques for identifying the special education needs of students?
3. What problems does the teacher face in evaluating and assessing the performance of learners.?
4. What benefits and opportunities are available after implementing the assessment tools and techniques in inclusive schools?

Review of Related Literature/Studies on Barriers to Assessments Practices

Due to the development of research, various new theories, principles, and techniques are emerging daily, leading to the development of society as a whole. With the development of society, various traditional blind belief systems, values, and old theories have been changed. Due to the evolution of various concepts, special education terms changed to inclusive education, which opened a common platform for all children. Besides that, various tools, techniques, methods of teaching, and various aspects of education are also changing. So, in the present study, we will explore the assessment techniques and tools available for assessing and identifying special needs students and find out the problems and benefits after implementing the tools and techniques. Various researchers conducted some studies on the assessment practices of inclusive schools. Adzanku et al. (2022) studied assessment practices among inclusive school teachers. The findings revealed that most teachers need more knowledge and should have used appropriate assessment techniques to assess children with special needs. It was found that the curriculum available for teachers during pre-service and in-service training programs for identifying and assessing disabled students was not enough and appropriate (Adewumi & Mosito, 2019; Pit-ten Cate et al., 2018). The study revealed that teachers who take part in more in-service training have favourable views toward students with disabilities and inclusive education. Therefore, teachers must participate in professional development activities such as conferences, in-service training, seminars, lectures, and presentations, mentorship programs and supervision, peer assessment, involvement in educational projects, and self-evaluation.

Dhala et al. (2021) studies found that the need for more trained teachers and the wrong attitude of teachers in India is a severe challenge for the proper implementation of inclusive assessment techniques in India. As a result, 94% of students need more proper facilities and education. Another researcher, Gutuza et al. (2015), found that in an inclusive education environment, there is a lack of cooperation and collaboration between the special educator and regular classroom teacher, which affects the assessment process and fails to implement the assessment practices effectively and to follow the grading system.

Pillai and Devamanokari (2023) conducted a study on Academic assessment by general educators in inclusive schools on special needs. The study's findings revealed that general education teachers faced problems in assessing written tests and oral exams for children with special needs in the inclusive setup, and there needs to be more holistic assessments.

Review of Related Studies on Opportunities on Benefits of Assessment Practices

Assessment plays a significant role in the students' learning; it is essential not only for record purposes but also to decide learners on advancements and provide appropriate services to special needs students. Several researchers conducted studies on opportunities and benefits of assessment practices in inclusive classrooms; Gunter et al. (2000) conducted an FGD with a group of 10 teachers in Upper Saddle River School on assessing special students' needs and found that self-assessment and peer assessment can be fun and morale busting in the inclusive classroom. It also creates independent thinking and builds self-confidence among special needs students. Adewuni and Mncube (2020) conducted a study on assessment strategies for the Inclusion of learners with special education needs. The findings revealed that most teachers adopt CCE and mediate by offering various instructions like scaffolding and differentiated instructions.

Wilson (1996) found that after using innovative assessment practices like videotapes, manual projects and assignments, the performance of special needs students has comparatively increased. Some researchers like Darling-Hammond (2013) also found that performance-based assessment is beneficial for identifying and assessing special needs students where children construct their own response; instead of selecting or identifying the correct response, teachers can observe students' performance on tasks reflecting real world or authentic requirements.

Most of the B. Ed. Teachers also said the activity-centered method is the best way to assess children with special needs. So, the above review of related literature concludes that assessment provides information about learners and appropriate facilities and services to both the teacher and learners. Various research has been conducted on the attitude of teachers towards assessment practices, implementation problems and barriers to assessment practices. However, the present study explores the different tools and techniques adopted in inclusive schools and the barriers to inclusive schools.

Purposes & Importance

The major purpose of the study is to explore what are the assessment tools and techniques adopted by the teacher in the inclusive education setup and what are the problems and opportunities available. Due to the recommendation of the Salamanca Committee (1994), various countries followed inclusive education practices for providing a new learning platform to disadvantaged group people (Forlin, 2006). Besides that, there are lots of theories, principles, tools, techniques, and methods developed in the field of inclusive education, which is giving new shape to the entire education system. This study can help administrators, teachers, curriculum planners and policymakers to better understand the problems, challenges, and opportunities in the implementation of assessment practices.
This study will also benefit the special educator, medical practitioner and policymakers to provide better assessment practices and launch various innovative tools and techniques. It will help the policymakers to allocate resources and adopt new policies, programs, etc.

Assessment Practices Inclusive Education in India

Generally, assessment is a dynamic term that aims not only to provide information towards the next step of learning, but it can also use selection, administration, monitoring standards, diagnosing and decision-making processes. While we talk about assessment in inclusive education, a lot of questions come to our mind. Like,

- Why will disability students be assessed?
- Who uses the assessment information?
- Who carries out the assessment, and who else is involved?
- What domain of learning will be assessed?
- How are pupils assessed?
- Against what are the assessment results compared?

Different countries have different purposes towards assessment practices. Some countries may have aimed to apply the information to compare pupils' achievement and monitor overall educational standards. All countries have more specific assessment procedures for individual pupils to identify the exact nature of special needs and inform the teaching and learning. Assessment is primarily used to enhance learning for all students, especially those with various learning requirements. Teachers are aware that every student is unique. They have advantages and particular requirements that can affect learning. Various assessment methods will be employed to keep students informed throughout the teaching-learning cycle for designing the personalised learning plans for students' programs, tracking students' progress, making changes to the curriculum and assessing students' progress in light of program objectives and student achievements, besides the major purpose of assessment discussed in the following points.

1. Assessments helps to identify the special need students.
2. Assessment to inform teaching and learning.
3. Assessment helps to measure and compare student's achievement.
4. To monitor overall educational standards.

Assessment is primarily used to enhance learning for all students, especially those with various learning requirements. Teachers know that every student is unique and has advantages and particular requirements that can affect learning. Various assessment methods will be employed to keep students informed throughout the teaching-learning cycle for designing the personalised learning plans for student's programs, tracking students' progress, making changes to the curriculum and assessing students' progress in light of program objectives and student achievements.

Types of Assessment Procedure used in Inclusive schools in India

1. Performance Based Assessment
2. Ecological Assessment

3. Rating scale and checklist
4. Portfolio assessment
5. Teacher-made assessment.
6. Observation

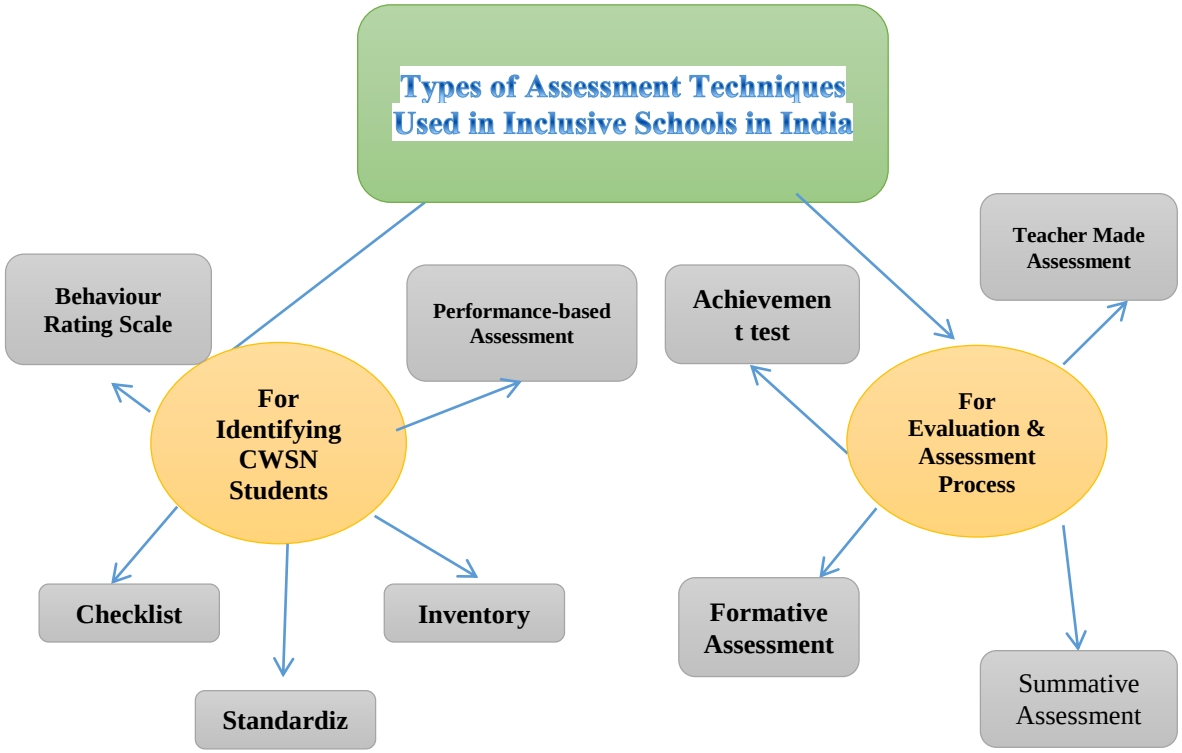

Figure 1. Types of Assessment Techniques Used in Inclusive Schools

Method

Design of the Study

In this study, to find out the results of the previous research question, the researcher employed the systematic literature review method (SLR) (Mohamed Shaffril et al., 2021) by following the PRISMA technique, which includes three essential stages search, eligibility, data collection and extraction (Moher et al., 2015). The researcher has gone through some systematic stages to conduct this study, like in the first stage, research questions raised by the researcher. In the second phase, the researcher collected the relevant articles that have been published and are significant for the current topic. After this, exclusion and inclusion norms were applied to downloaded papers for selection according to the needs of the research questions. In the next stage, the result is extracted from selected papers by going through it thoroughly. In the last stage, the extracted results have been synthesized meaningfully regarding the need for research questions. The following steps comprehensively define the strategy of the present paper.

Research Questions

The study explores the barriers and opportunities of assessment practice in inclusive schools in India. Therefore, to find this, the researcher raised the following questions.

Searching Relevant works

At this stage, the relevant research articles are searched using the research mentioned above questions and making keywords from them. The search also includes keywords related to the research questions' terms. Google Scholar and Scopus were used to search for relevant articles published between 2000 and 2022 using the keywords mentioned above and their variants with Boolean operators like: “Inclusive assessment” or "Assessment practices in inclusive schools" AND "Barriers" or "Problems" AND "Assessment Techniques" or "Identification Methods "Special schools" or "Inclusive Schools". The total number of articles, around 70 to 80, from the search varied according to the keyword and research questions.

Sorting and selecting the relevant articles

From these 70 to 80 articles based on the above keywords, only 9 articles for the barriers in the implementation of assessment practices and 6 articles for the opportunities and facilities after implementation of assessment techniques in inclusive schools have been selected to find out the solutions of the research questions by following the inclusions and exclusions criteria.

Table 1. For Selection of Articles Based on Inclusion and Exclusion Criteria

Criteria	Inclusion	Exclusion
Study Type	Empirical	Not Empirical
Language	English	Not English
Publication Year	2000-2023	Below range
Main Focus	Assessment techniques in Inclusive schools	Inclusive assessment practices
Education Type	Inclusive Education	Other than inclusive education

The above-mentioned inclusion and exclusion parameters have been used to resolve the research questions. The researcher has reviewed each article to determine if it meets the requirements of the research questions.

Interpreting the Result

There are 15 articles on inclusive assessment practices, only nine articles on the barriers to implementing assessment practices, and six articles on the opportunities and facilities after implementing assessment techniques in inclusive schools. The following Table No. 2 reports the review in a comprehensive way about its title, method, and results.

Reporting the Review

Table 2. Shows the Related Studies on Assessment Practices in Inclusive Education

	Topic	Author and Year	Findings
1	Inclusive Education In India – Challenge And Opportunities	Christian PM&Asok A(2021)	There are vast numbers of training programs necessary for teachers. Shortage of human and cloth assets, bad attitudes of instructors and networks, non-disabled friends, and their dad and mom hinder inclusive practices.
2	Assessment Practices among Inclusive School Teachers: A Case from Basic Schools in the Volta Region of Ghana.	Adzanku, Jacob & Attia, Isaac & Agbetorwoka, Ambrose (2022)	The findings revealed that most teachers need more knowledge and should have used appropriate assessment techniques in assessing learners with special educational needs in the schools.
3	Assessment for Inclusion: rethinking inclusive assessment in higher education	Niemmenien Ha.(2022)	The result of the study revealed the change in the existing assessment system and the need for proper implementation of policies and programs.
4		Mereuko & Saeed (2022)	The results found that the curriculum available for teachers during pre-service and in-service training programs for identifying and assessing disability students was not enough and appropriated
5	Academic assessment by general educators in inclusive schools on special needs	Pillai AG & Devamanokari K	The findings of the study revealed that general education teachers faced problems in assessing written tests and oral exams for children with special needs in the inclusive setup, and there needs to be more holistic assessments.
6	Assessment of Children with Special Needs: Issues and Challenges	Sultan & Najar (2020)	The result shows that there is a lack of proper training of teachers to teach in inclusive educational settings and a lack of proper exceptional education teacher support in dealing with children with special needs
7	Specific learning disabilities: Issues that remain unanswered	Kohli, A., Sharma, S., & Padhy, S. K	The result shows that most assessment tools used for assessing children with learning disabilities lack well-established norms for all subsets. Also, the available assessment tools have yet to include all the age groups, which makes assessment difficult, especially for higher classes.

Results

The results show the findings of the collected articles regarding barriers to inclusive school assessment practices. Maximum studies highlighted that significant barriers in inclusive school are the teacher and government; if the government regularly conduct training program and various activities for the development of assessment practices and if the teacher adopts various new skills and techniques for better assessment practices, then disabled students will get appropriate services and facilities. This study highlighted that in comparison to normal teachers, special educators are more skilled, updated, and well-trained with various assessment techniques. The study results are discussed in the following based on research questions.

1. What tools and techniques are used in inclusive education to assess and identify the special educational needs of students?
2. What does the teacher face the problems in the implementation of tools and techniques for identifying the special education needs of students?
3.What problems does the teacher face in evaluating and assessing?

Each student has some innate qualities and needs which will help the child create an identity. So, the role of each teacher is to identify and assess the needs of learners effectively. After the revolution in the field of special education, inclusive education term emerged, which aims not only to provide education to all children but also to provide proper services and identify /assess them properly. Now, various countries need to give more emphasis on making an inclusive society by creating various policies and programs and organizing various activities. Besides, various new techniques, tools, and devices are available for assessing and identifying them, but still, students need to get benefits properly. Nowadays, various problems and issues need to be addressed to successful inclusive practices. The following points discussed the barriers and challenges of assessment practices of inclusive schools.

Barriers and Challenges

- ✓ Lack of Proper training and skills
- ✓ Negative attitudes
- ✓ Lack of proper knowledge about assessment techniques.
- ✓ Lack of policy and programs
- ✓ Lack of collaboration and support

Table 2. Shows the Related Studies Opportunities of Assessment Practices in Inclusive Education

Si no	Title	Author and Year	Findings
1	Assessment Strategies Adapted for Implementing Inclusion of Learners with Special Education Needs in Selected Primary Schools in the Amathole West District, South	Adewuni MT & Mncube V. (2020)	The findings revealed that most teachers adopt CCE and mediate by offering various instructions like scaffolding and differentiated instruction.
2	Assessment practices among inclusive school teachers. A case study from Basic school in the Volta Region of Gana.	Welson & King (1996)	The study found that after the use of innovative assessment practices like the use of videotapes, manual projects and assignments, the performance of special needs students has comparatively increased
3	Assessment for Inclusion: rethinking contemporary strategies in assessment design	Tai et al. (2023)	The study found that performance-based assessment is very helpful for identifying and assessing special needs students where children construct their responses; instead of selecting or identifying correct responses, teachers can observe students' performance on tasks reflecting real-world or authentic requirements.
4	Inclusion and learning assessment: Policy and practice	Hegarty, Seamus (2020)	The result shows that self-assessment and peer assessment can be fun and morale-busting in the inclusive classroom. It also creates independent thinking and builds self-confidence among special needs students.

Opportunities

- ✓ CCE AND various differentiated instructions play a significant role in the assessment process.
- ✓ With the adoption of various new tools, devices and techniques, students' performance and interest comparatively increased.
- ✓ Perfomance-based assessment creates a better learning platform where the teacher directly observes the student's behaviour and assesses them appropriately.
- ✓ Peer Assessment and self-assessment also help the children boost their morale and create a fun environment in the inclusive classroom.

Discussion

In the present study, good and practical assessment practices enhance the academic atmosphere of inclusive schools. Due to the innovation of various theories, principles, techniques and tools, the. The breadth of inclusive education is also increasing (Gutuza et al., 2015). Assessment is collecting information about the student's achievement and performance in the class. It is the process that reveals a student's progress, i.e., what the student has understood, knows, and is capable of doing. Assessing children with special needs is challenging, especially for regular classroom teachers. So, inclusive school includes changes in the content and teaching strategies to educate all children under one roof. It also makes teachers adapt various strategies to assess the diverse learners in their classes (Sultan & Najar 2020). It also found that most assessment tools used for assessing children with learning disabilities lack well-established norms for all subsets. Also, the available assessment tools have yet to

include all the age groups, making assessment difficult, especially for higher classes (Ross et al., 2018), supported by **(**Pillai & Devamanokari, 2023; Sultan & Najar, 2020).

Conclusions

The study "Assessment Practices in Inclusive Schools in India: Barriers and Opportunities**"** concludes that most studies conducted abroad and in India are less numbers of study was conducted as now inclusive education is a recent program in the Indian context, so there are lots of things that need to be appropriately implemented. Various studies revealed that most regular teachers are less trained and skilled in comparison to special educators; they need to learn how to properly and effectively implement the various new tools and techniques in the field of assessment. Many studies also said that teachers have insufficient knowledge and do not use appropriate assessment techniques in assessing learners with special educational needs in the schools. Some studies also found that the need for more trained teachers and the wrong attitude of teachers in India is a severe challenge for the proper implementation of inclusive assessment techniques in India. As a result, 94% of students need more proper facilities and education. So a huge number of awareness and training programs should be provided to the teachers and also the curriculum should be modified according to the needs and demands of society.

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Awareness on Assistive Technology among Pre-Service Teachers to Promote Inclusive Education

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Abstract

This research investigates the awareness of Assistive Technology among preservice teachers in the context of promoting inclusive education. A quantitative survey method was employed using a Guttman scale, validated by experts. The sample consisted of 222 preservice teachers from five B.Ed. colleges in Kasargod District, Kerala. The survey questionnaire, comprising 35 items, assessed awareness of different domains of Assistive Technology. Preliminary results demonstrated good internal consistency of the used instrument. The analysis of the collected data involved descriptive statistics, percentage analysis, and t-tests using SPSS 15.0 and MS Excel. The study found that the awareness of Assistive Technology among preservice teachers was at a moderate level, with no significant variations based on gender, pedagogy subject, or locality. The study also explored factors affecting awareness, finding that while preservice teachers were aware of these tools, their implementation in classrooms remained limited. This research contributes to the understanding of preservice teachers' awareness of Assistive Technology in an Indian context. It underscores the need for comprehensive training to bridge the gap between knowledge and effective utilization of Assistive Technology to support inclusive education. Future efforts should focus on enhancing the practical implementation of Assistive Technology in educational settings.

Keywords: Assistive technology, Inclusive education (IE), Pre-service teachers, Awareness

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Introduction

Inclusive Education is only achievable in a flexible education system that recognizes and responds to the demands of various learners. Inclusion is a value, not an experiment to be tested (Anjali & Vanitha, 2020a). Though the word Inclusion is predominantly resonating in the institutesduring the time of the admissions and later which is disappearing slowly. This would create a gap between the students (Foundation Open Society, 2019) and sometimes, there will be a chance of creating an exclusion within the class. To avoid this kind of ambiguity in the teaching-learning process, teachers' roles in the inclusive classroom must be clear. In a classroom, teacher beliefs guide action. Thus, the vital success of inclusive education depends on teachers' attitudes**.** As a result, addressing teachers' beliefs has to be done in the initial stages of their training (Ritter et al., 2019). So, these requisites have to be conceived by the Pre-Service teachers effectively. Only then they can manage any ambiguous situation they encounter in a classroom (Beth et al., 2020). As the experience grows, there would be apparent change, but the base must be formed with minimal requirements such as Assistive Technologies (Jude & Simms, 2009).

Assistive Technology refers to any tool which fosters the independence of a differently-abled person. Assistive Technology can refer to anything, from something extremely basic and inexpensive, like pencil grips or text highlighters, to something more complex, like a computer station with a speech-to-text tool (Edyburn, 2004, 2017). Assistive Technology is one thing that could help teachers to make the classroom inclusive, and the findings of the study published by (WHO, 2023) mentioned the Preservice teachers must have fundamental technology abilities, as well as ways to facilitate inclusive educational practises. Inclusion of assistive and instructional technology in preservice teacher preparation programmes will improve academic, social, and employment prospects for people with disabilities (WHO, 2023). In a study (Anjali & Vanitha, 2021) found out that Visual assistive instructional technology is very useful for teaching daily living skills like personal hygiene to students with intellectual disability. So, tailor teaching strategies for the diverse learners will help for their equity in the classroom and thus reduces the functional barriers and improves the learning outcomes of diverse learners as expected (Ahmad, 2014; Anjali & Vanitha, 2020a; Gundewar, 2020). However, a study (Anjali & Vanitha, 2020b) says that very few of the teachers in buds school in Kasargod are employing Assistive Technology, and most of them rely on traditional teaching-learning methods for students with special needs. It is also mentioned that low/No use of AT adversely affects the learning outcomes of Intellectually disabled students.

In this context, knowing the foundation, which is awareness on Assistive Technology, is much needed. Assistive Technology has a vital role in promoting inclusive education (Minimol, 2019; Venkatesha, 2017). It can help students with special needs to engage in classroom discussions along with their peers. By providing diverse suitable tools for each learner, Assistive Technology gives good room for the teacher to make an effective inclusive classroom environment (Castelo, 2020). For instance, Screen readers help visually impaired students, audio aids help the hearing impaired, and other devices like computers, prostheses, etc., helps for physically challenged students in coping up with the other learners in the class. Prospective Teachers who are familiar with Assistive Technology have better knowledge to fulfill the needs of all their students, establish more inclusive classrooms, and promote equity (American University, 2020; Lee & Templeton, 2008; Policy, 2020).

However, research that examined Pre-Service teachers' knowledge of Assistive Technology—which would support inclusive education—revealed that Pre-Service teachers had a modest degree of knowledge about the technology (Ahmed, 2016; Shakunthala, 2017). There should be additional possibilities in teacher preparation programs for preservice teachers to gain subject-matter expertise, student-matter expertise, and differentiated instruction abilities (Sandholtz, 2011). An illustration of how Assistive Technology can be applied in inclusive classrooms is provided here: screen reading and content reading software can be utilized by a dyslexic student to hear the words in a book or on a computer screen read aloud. This will enable students to comprehend the material more clearly and keep up with their peers (Ahmed, 2016) and (Shakunthala, 2017) a researcher discovered a substantial positive link between instructor understanding of Assistive Technology and student academic progress. In this context it is important to examine how much is the awareness level among the Pre-Service teachers on Assistive Technology in Kasargod district.

The Aim of the Study

The purpose of this study is to comprehensively investigate the level of awareness among pre-service teachers in Kasaragod district regarding Assistive Technology, with a specific focus on its role in promoting inclusive education (IE). Inclusive education is a critical aspect of modern educational systems, aiming to ensure access to quality education. A study revealed that the Pre-service teachers' awareness is not to the mark as they are expected at this Assistive Technology (Bhatia, n.d.). This study seeks to evaluate the extent to which pre-service teachers in this district are knowledgeable about Assistive Technology and its potential for fostering inclusive education. Furthermore, the study aims to discern variations in awareness levels among pre-service teachers concerning Assistive Technology, considering different background variables such as age, gender, educational background, and teaching experience (Shawwa & Mohammad, 2023). This approach allows for a more nuanced understanding of the factors that may influence a teacher's familiarity with Assistive Technology in the context of inclusive education.

Ultimately, the study seeks to uncover any significant differences in mean awareness scores among pre-service teachers based on their background variables. By doing so, it aims to provide insights that can inform educational institutions, policymakers, and teacher training programs on the need for targeted interventions and training to enhance pre-service teachers' awareness of Assistive Technology, thereby contributing to the advancement of inclusive education in Kasaragod district and potentially beyond.

Hypothesis

Null Hypothesis (H0): There are no significant differences in mean awareness scores regarding Assistive Technology among pre-service teachers based on their background variables, including age, gender, educational background, and teaching experience.

Alternative Hypothesis (H1): Significant differences exist in mean awareness scores regarding Assistive Technology among pre-service teachers based on their background variables, including age, gender, educational background, and teaching experience.

This study aims to test whether background variables have an impact on the awareness levels of pre-service teachers concerning Assistive Technology and its role in promoting inclusive education. The null hypothesis suggests that there are no such differences, while the alternative hypothesis posits that variations do exist.

Method

Research Model

Since the investigator wanted to examine the awareness of Assistive Technology among preservice teachers, a Quantitative survey method has been adopted for the present study. The sample chosen is unidimensional and the questions used in the scale are reproducible questions which are arranged in an ordinal manner (Bhat, n.d.). The investigator had adopted Guttman scale (EngelhardJr, 2005) a survey method for the present study and was validated by the experts. A pilot study had been conducted to assure the internal validity.

Sample

The population of the present study consists of preservice teachers in Kasargod District of Kerala. The investigator selected sample in two stages. Since, the study was basically concentrating on the Kasargod district. The first stage 5 B.Ed. Colleges were selected which are in the farthest vicinity with each other by using convenient sampling technique. Since, the investigator used the Google form to collect the data, the data were collected from all those 498 preservice teachers from the above-mentioned colleges. In the second stage investigator used simple random sampling. Randomization had done by assigning a sequential number to the data, then by using a random number generator convert the sample from 498 to 222 Pre-Service teachers. All the sample collected are of approximately 23-26b year age. The sample distribution among the different background variables are shown Table 1.

Table 1. Table Showing the Number of Sample Based on Different Background Variables

Sl.No.	Background Variables	Categories	No.
1.	Gender	Male	19
		Female	203
2.	Pedagogy subject	Arts	104
		Science	118
3.	Locality	Urban	88
		Rural	135

Measuring Tools

Since, the basic aim of this study is to know whether the preservice teachers are aware of Assistive Technological tools are not. Investigator used a survey questionnaire which consists of Dichotomous responses Yes or No (Guttman scale). The internal consistency was measured by Cronbach's alpha which was found to be 0.884. The

noted responses were analyzed by using the technique of visual binning to find the Percentage analysis, t-test was used to compare the means of different variables. After a pilot study the Investigator had deleted 15 items out of 50 to make the tool consistent. Finally, the Awareness on Assistive Technology Tool consists of 35 items, which measures the different domains of preservice teachers awareness.

Data Analysis

The data were analysed in five different steps which include The analysis consists of the Distribution of samples by finding their mean, median, and mode. Finding the solutions for the research questions. First, the data were screened to identify missing values and outliers and to ensure that the data is suitable for further analysis. Second, the reliability statistics for all used instruments were calculated. Third, descriptive statistics were calculated by different independent variables. Fourth, the percentage analysis was done for each of the variables, using the visual binning in SPSS. The fifth t-test was used to compare the mean scores of different variables. SPSS15.0, and MS Excel sheet for the full statistical analyses. The reliability of the used instrument was examined by calculating Cronbach's alpha whose value was found to be 0.884 which reflects the good internal consistency of the used instruments (George & Mallery, 2003).

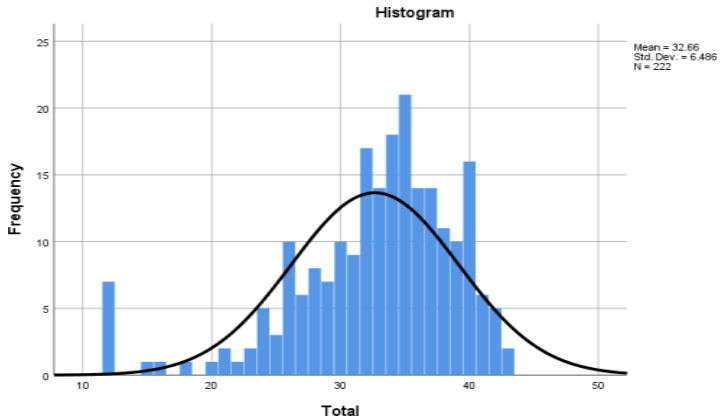

Figure 1. Sample Distribution Paretochart. Note: This chart shows the transparent distribution of the sample based on their mean scores. The curve above shows the normal distribution of samples collected.

Substantiating the above chart (Figure 1), the Table 2 provides data for a clear understanding of the chart. The Mean, Median, and Mode of the collected samples were found and noted in the Table 2.

Table 2. Table Denoting the Mean, Median and Mode along with Skewness, Kurtosis and Standard Deviation of the Sample

Sl. No.	Variable	M	Md	Mode	Sd	Skewness	Kurtosis
1	Awareness on Assistive Technology	32.66	34.0	35	6.488	-1.189	1.763

To know the nature of distribution, the important statistical constants of selection for the total sample were analyzed. For the awareness scale, the results obtained for Mean, Median, and Mode are 32.66, 34.0, and 35 respectively. The value of the mean, median, and mode indicates the distribution of scores of the sample is nearly equal to normal. Though the Mean < Median < Mode, as the sample taken is large enough the ±1 Standard deviation was considered and standard error of skewness value was found to be 0.163. The kurtosis value is 1.763 which is less than 3 platykurtica.

Table 3. Table Denoting the Homogeneity of Variance of the Data

Test of Homogeneity of Variance					
		Levene Statistic	df1	df2	Sig.
total	Based on Mean	3.320	1	219	.070
	Based on Median	2.746	1	219	.099
	Based on Median and with adjusted df	2.746	1	169.414	.099
	Based on trimmed mean	2.800	1	219	.096

From the Table 3 it is clearly seen that the p-value at any point is greater than 0.05 so the data is distributed holds the homogeneity.

Results

First Research Question is "What is the level of awareness on Assistive Technology among Pre-Service teachers to promote inclusive education?" To achieve this objective and to explore the solution for research question, Percentage analysis was done using the binning technique from SPSS and found the percentage at different levels as shown Table 4. After the analysis of data, the evident results were obtained and given as follows.

Table 4. The Percentage of Awareness on Assistive Technology among Pre-Service teachers at Different Levels

Sl.No.	Awareness level on Assistive Technology	Frequency	Percentage
1.	Low	23	10.4
2.	Moderate	180	81.0
3.	High	19	8.6
4.	Total	222	100

Table 4 shows the percentage at different levels namely Low, Moderate, and High of awareness on Assistive Technology among preservice teachers to promote inclusive education. To achieve objective 2 and

research question 2 percentage analysis for each background variable was done and the results for the same were noted down in the Table 5.

Table 5. Table Showing the Level of the Awareness on Assistive Technology Based on the Background Variables

Sl.No.	Background Variables	Categories	No.	Low		Moderate		High	
				N	%	N	%	N	%
1.	Gender	Male	19	2	10.5	14	73.7	3	15.8
		Female	203	16	7.9	165	81.3	22	10.8
2.	Pedagogy subject	Arts	104	19	18.3	67	64.4	18	17.3
		Science	118	16	13.6	86	72.9	16	13.6
3.	Locality	Urban	88	16	18.2	55	62.5	17	19.3
		Rural	135	16	11.9	100	74.6	18	13.4

The above Table 5 shows the different percentages of awareness among the Pre-Service teacher samples based on the background variables. It shows that the awareness level among preservice teachers on the Assistive Technology for the promotion of inclusive education is Moderate irrespective of background variables namely Gender, Pedagogy subject chosen, and Locality of the institute in the district of Kasaragod, Kerala.

Along with that, the researcher also intended to find out a few more things based on the review of the literature. The other hypothesis of the research is that there is an insignificance in the mean score between the mean scores of awareness on Assistive Technology among Pre-Service teachers to promote inclusive education concerning gender. To analyze the significant difference in terms of understanding between males and females for the total sample, the researcher used a t-test. The results are shown in the following Table 6.

Table 6. Table Shows the Mean Comparison between Male and Female

Gender	N	Mean	Std. Deviation	t-value	Sig. (P-value)	Result
Female	203	24.41	6.855	0.630	0.533	Not Rejected
Male	19	23.37	7.625			

Table 6 showed that the t-value = 0.630 (P=0.533>0.05) which showed that the p-value and t-value were greater than the significant value. So, null hypothesis with reference to the Gender is Not Rejected. Therefore, there is

insignificance in the mean score between male and female Pre-Service teachers regarding Awareness on Assistive Technology for total sample.

The other hypothesis of the research is that there is insignificance in the mean score between the mean scores of awareness on Assistive Technology among Pre-Service teachers to promote inclusive education with reference to locale. To analyze the significance difference in terms of awareness between urban and Rural for the total sample, the researcher used a t-test. Table 7 which is given below illustrates the results.

Table 7. Table Showing Mean Comparisonbetween Rural and Urban Samples

Locality	N	Mean	Std. Deviation	t-value	Sig. (P-value)	Result
Rural	134	23.86	7.421	1.241	0.411	Not Rejected
Urban	88	25.03	6.028			

The table 7 showed that the t-value = 1.241 (P=0.411>0.05) which showed that the p-value and t-value were greater than the significant value. So, null hypothesis (H_{02}) stated that there is insignificance in the mean score between Pre-Service teachers' awareness of Assistive Technology for inclusive education with reference to the Locality is Not Rejected. Therefore, there is insignificance in the mean score between Urban and Rural Pre-Service teachers in terms of Awareness on Assistive Technology for the total sample.

The other hypothesis of the research is that there is insignificance in the mean score between the mean scores of awareness on Assistive Technology among Pre-Service teachers to promote inclusive education with reference to locale. To analyze thesignificant difference in terms ofawareness between Arts and Science forthe total sample, the researcher used a t-test.The Table 8 shows the results.

Table 8. Table Showing the Mean Comparison between Arts and Science Streams Sample

Pedagogy Subject	N	Mean	Std. Deviation	t-value	Sig. (P-value)	Result
Arts	118	32.47	7.299	0.458	0.132	Not Rejected
Science	104	32.88	5.445			

The table 8 showed that the t-value = 0.458 (P=0.132>0.05) which showed that the p-value and t-value were greater than the significant value. So, the null with reference to the Stream they chose is Not Rejected. Therefore, there is insignificance in the mean score between Arts and Science Pre-Service teachers regarding Awareness on Assistive Technology for the total sample.

Discussion

The Existing literature on Awareness on Assistive Technology among pre-service teachers were not much focused on their preliminary understanding and more over the literature did not focus into the Indian context as there were only very few. So, this study focused on this context. This study worked on the factors which may affect the awareness of the sample, like gender, locale as Ramakrishna (2020) could see the significant effect on the results by the impact of these variables. Similar to that investigator had tried to see those effects on the variables of this study but contrary to that investigator found no significant impact on these variables on the Awareness level of the preservice teachers. In support to the claims made by Shakunthala (2017) in a study undertaken to investigate the Academic Achievement of students based on the awareness level stated that majority of the assistive technological devices are available with the NGO's and as one of the domain of tool focused on the awareness on availability of devices clearly showed that here in this region also the preservice teachers are awareness of availability of the devices. One study focused on the roles of teachers(Jaiswal, 2021), competency of the teacher in the use of the assistive technology in the classroom (Onivehu Adams et al., 2017). So, considering all these factors a tool was made and the suitable citated results were discussed in relevance to the items.

Contrary to the statement given by Chukwuemeka & Samaila (2020) that teacher don't even know the different tech aids available as a assistive technology these study found a good percentage of evidence to say that more than 50 percent of the preservice teachers are aware of these things and there was a huge amount of acceptance of these Assistive tools as mentioned by Matia Prema & Jeyasudha (2020; Ramakrishna (2020).

However, results showing 67.5% of the sample are aware about the basics of Assistive technology, but the use of these tools are not to the satisfactory level as mentioned in Minimol (2019) & Chukwuemeka & Samaila, (2020) study. These tools are not contributing to the achievements of the children especially speaking about the special children as there was lack of implementation as emphasized by Rajeevan (2020) & Shakunthala (2017). As the study go through the responses for the item, similar results were seen in the study as well but studying a few items of this study it is seen that many of them were not completely confident about the tools, so they know the tools but not their importance in classroom situation. Preservice teachers & teachers were not familiar (only 39.6% were familiar) with the tools Onivehu Adams et al. (2017) as there was no availability of the these tools in many parts of Karnataka (Shakunthala, 2017) Kerala was also analogous to it says Minimol (2019). The reasons for preservice teachers awareness being at moderate level is evident through the results, that the concepts of Assistive technology were not clearly delivered neither practiced in their curriculum. However, this must be studied further in deep with the light on curriculum transaction.

The awareness of preservice teachers remain restricted to the domain of knowledge & understanding only, as the sample awareness on the implementation of the assistive aids and tools at evaluation phase of teaching is considerably very less (20.2%). The agreement to the role of experts as minimum shows the role confusions were also exists for preservice teachers as Jaiswal (2021) mentioned few roles of teachers for inclusive classroom. These issues were not dealt in any other studies prior. However, training them in a proper way would increase these percentage levels as suggested by Venkatesha (2017).

Conclusion

The study's findings have substantial implications for increasing the quality and efficacy of Pre-Service teacher education programmes in preparing them to utilise AT in inclusive classrooms. The study suggests that teacher education programs should integrate AT into their curricula and pedagogy, provide more opportunities for Pre-Service teachers to learn about variety of AT and utilise them effectively, and expose Pre-Service teachers to various resources and networks that can support them in accessing and using AT in their future practice. The study also recommends that teacher educators should model and mentor preservice teachers on how to use AT in their own teaching and provide feedback and guidance.

The study also contributes to the existing literature on AT and teacher education by providing summary into the current state of Pre-Service teachers' knowledge and attitudes on AT in a specific context. However, the study has some limitations that should be acknowledged, such as the small and limited sample size, the reliance on self-reported data, and the lack of objective measures of Pre-Service teachers' skills and performance on AT. Therefore, future research is needed to address these limitations and to explore further aspects of AT and teacher education, such as the impact of AT on students' learning outcomes, engagement, motivation, well-being, and psychosocial development in inclusive classrooms. Future research could also compare different models and methods of integrating AT into teacher education programs and evaluate their effectiveness and sustainability. By conducting more research and evaluation on AT and teacher education, we can enhance our understanding of how to prepare preservice teachers to use AT effectively and confidently in inclusive classrooms. Not focusing on the in particular roles of the teachers, and the implication of the knowledge into the practical situation were not dealt in this study which considered to be a limitation of this study.

Recommendations

In aligning with the study it is seen that educational institutions, policymakers, and teacher training programs on the need for targeted interventions and training to enhance pre-service teachers' awareness of Assistive Technology

- The study's findings highlight the importance of Assistive Technology (AT) for promoting inclusive education (IE) and satisfying the diverse needs of learners with disabilities.
- The study suggests that Pre-Service teachers need to improve their awareness and skills of adopting a suitable AT for the classroom and learn how to use it effectively in their teaching practice.
- The findings of the study suggest that training programs for teachers should give more scope for Pre-Service teachers to learn about different types of AT, their benefits, and challenges, and how to use them in the classroom.
- The study also implies that teacher educators should model the use of AT in their teaching and provide feedback and guidance to Pre-Service teachers.
- Through the study's findings, it is suggested that including the topics such as Universal Design for Learning (UDL), individualized education plans, and collaboration with other professionals and parents

(Van Laarhoven et al., 2012) in the curriculum would increase the awareness level among the preservice teachers.

- The findings of the study suggests that preservice teachers should be exposed to various resources and networks like AT Catalogue (*Assistive Technology Products for Information Access*, n.d.), AT Training Programs, AT user groups and organisations, AT websites and blogs that can support them in accessing and using AT in their future practice.

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