Challenges of Edu 4.0 in Inclusive Education: A Qualitative Analysis with Quantified Qualitative Data

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Abstract. In recent years, there has been a growing emphasis on inclusive education that provides high-quality learning opportunities to all students, including those with special needs. This mechanism promotes learning diversity and equal opportunities for all children. This research aimed to explore the challenges of implementing Edu 4.0 in inclusive education settings using a qualitative research method. The study selected 29 teachers from inclusive education settings in five locations in Malaysia through purposive sampling. Semi-structured interviews were conducted with participants and qualitative data themes were identified and analyzed. The qualitative data were also quantified. Various aspects of this study led the researchers to underscore the importance of teacher training and curriculum enhancement through educational innovations and establishing robust support systems to improve the implementation of Edu 4.0 in inclusive classrooms. Recognising and remedying the interrelated issues faced by special needs students in inclusive classrooms, which encompass their academic, social, and emotional well-being, and creating strategies for intervention in inclusive education are essential for establishing true Edu 4.0 that benefits all students in inclusive education environments.

Keywords: challenges; Education 4.0; inclusive education; qualitative method; quantifying qualitative

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1. Introduction: Overview of Inclusive Education Policy and its Main Challenges

International recognition of inclusive education as an approach was solidified when the UN endorsed the Education for All concept at a conference in Thailand in 1990. Initially, the concept focused on enabling students with special education needs to spend most or all of their time alongside their non-disabled peers. Since then, inclusive education has evolved to encompass a broader spectrum of human diversity, including gender, ability, age, culture, language, and other human characteristics (Attah, 2020). Despite the global acceptance, challenges persist in implementing inclusive education (Ainscow, 2020). Inclusive education has become a crucial approach to ensuring education equality for all students, including those with disabilities and varied learning needs (Smith, 2018). Garuba (2013) emphasizes that inclusive education fosters a sense of belonging in special needs students and enhances communication between and the abilities of students with and without disabilities. The finding highlights the significant problem of inequality and exclusion that children with disabilities encounter in various areas of their lives, encompassing school, healthcare, and social engagement. Thus, it is evident that learners with disabilities struggle to obtain fair access to good-quality educational experiences (Singh et al., 2020).

Research reports that teacher attitudes are among the biggest obstacles facing the execution of inclusive classroom practices (Carrington et al., 2019). Teachers play a pivotal role in creating inclusive classrooms that respect cultural diversity. By addressing students' unique cultural backgrounds, educators can foster understanding, challenge stereotypes, and promote equitable learning (Gay, 2018). Teachers generally support the concept of inclusion, but its implementation in regular schools poses significant challenges. Teachers must enhance their teaching methods to accommodate the needs of students with special education requirements and maintain high teaching standards (Abegglen & Hessels, 2018).

Integrating inclusive education into education systems is hampered by a complex set of obstacles. Johnson (2021) identified insufficient resources, teacher readiness, societal attitudes, and systemic barriers as factors that collectively hinder the achievement of inclusive education goals. As a result, there is an urgent need to address these multifaceted challenges and chart a path toward a more inclusive education landscape (Brown., 2019). According to Mitiku et al. (2014), the challenges of inclusive education include inflexible school curricula, communication barriers, the absence of inclusive learning environments, misconceptions about inclusive education, and a shortage of teachers trained to work in inclusive settings. Also, the inclusion of children with special needs in classrooms presents a substantial challenge for both schools and societies, and it extends beyond their presence in the classroom, to active participation in the absence of discrimination (Jury et al., 2023). Thus, key strategies for successful inclusion involve customised pedagogical methods for individual students, strong partnerships between schools and parents, and the integration of technology to enhance educational and cognitive processes.

Based on the above inclusive education challenges, the present study posed the following two research questions:

1) What inclusive Education 4.0 (Edu 4.0) challenges are faced by teachers?
2) What are interventions suggested by teachers for the successful implementation of inclusive Edu 4.0?

2. Literature Review

2.1 Inclusive Teacher Training for an Inclusive Classroom

Teacher preparedness for inclusive education has been a challenge, with many educators reporting not having received sufficient training and resources to effectively meet diverse student needs (Forlin et al., 2017). Research indicates that teachers play a crucial role in student success. Considering the increasing global push for inclusive learning, teachers need to be well-prepared and confident about instructing various learners. However, many teachers who support inclusive education face challenges in its implementation due to a lack of understanding of the associated issues and the absence of relevant teaching methodologies (Ionescu & Vrăsmas, 2023).

When they work with students with disabilities, teachers need to utilize several approaches and resources that are tailored to the specific conditions and requirements of these students. Reports and research on inclusive education consistently highlight the teacher's role in contributing to student success (Ainscow, 2020). Therefore, teacher training in inclusive education is a crucial step toward fostering a successful inclusive learning environment.

2.2 Teacher Development in an Inclusive Classroom

Research advocates for professional learning methods that leverage the expertise of more experienced individuals so that they adopt new beliefs and become self-reliant problem-solvers in their unique teaching environments, to help students in inclusive classrooms gain a deeper understanding while they are learning subjects or carrying out activities (Bhroin & King, 2020). Studies also suggest that teachers would benefit from training in differentiated instruction, which would enable them to adapt their teaching approaches to accommodate the many needs of students (Tomlinson & Imbeau, 2014). Differentiated instruction enables teachers to modify content, assessments, and classroom activities. Also, it ensures that each student can effectively engage with curriculum activities.

Furthermore, teacher development should create collaborative environments in which educators can collectively plan, exchange ideas and resources, and have opportunities to observe each other in action (Messiou & Ainscow, 2015). Effective teamwork should be a central focus of teacher professional development, as it plays a pivotal role in creating individualized education plans and delivering comprehensive support to students with special needs. Collaborative efforts among teachers, special education professionals, therapists, and support staff are essential for the success of inclusive education (Salend, 2016).

2.3 Infrastructure in an Inclusive Classroom

Children with special requirements necessitate specialized services and interventions from their environment to help them overcome challenges in their daily activities and achieve their full developmental potential (Rezieka et al., 2021; Widyakusuma, 2021). It is crucial to provide children with the best possible stimulation, equipment, and educational support, from preschool to higher education, on par with that provided to typically developing children (Reni, 2021). Moreover, the learning process must be facilitated by adequate facilities, which encompass school infrastructure and classroom resources.

Azzahara et al. (2022) emphasize that children with special needs require facilities and infrastructure that are tailored to their specific requirements. These facilities and infrastructure are not only essential for the success of typically developing children but, are equally crucial for children with special needs, to support their education effectively. Therefore, effective management of specialized facilities and resources is essential for supporting the diverse needs of students with disabilities (Florian & Black-Hawkins, 2011). Providing facilities and infrastructure to implement inclusive education should be carefully considered and adapted to the characteristics and accessibility requirements of children with special needs (Sardista et al., 2020).

2.4 Challenges Facing Children with Special Needs in an Inclusive Classroom

Children with special needs showcase their distinct qualities while confronting a diverse set of challenges that call for our deep understanding and unwavering support. These remarkable children, who are celebrated for their diverse abilities and experiences, merit our wholehearted dedication to fostering inclusion and empowerment. As emphasized by Zahroh and Umam (2019), we should employ considerate and respectful language when referring to these children, and recognize the wide spectrum of their needs. Research by Anjum et al. (2021) highlights the multifaceted barriers that students with special needs encounter in conventional education environments. Overcoming these challenges necessitates a collaborative endeavour to combat negative attitudes, remove physical obstacles, promote adaptability in curriculum design, enhance teacher training, and address economic disparities. It is evident that integrating students with special needs in regular classrooms is a complex undertaking, yet one that is not only commendable but also indispensable.

The study conducted by Douglas et al. (2016) underscores the significance of acknowledging the uniqueness of teaching methods when dealing with children with special needs. Their distinctive requirements and potential should motivate us to modify our approaches, so that we can guarantee that each child receives the quality education they deserve. It is through such considerate and all-encompassing practices that we can genuinely affect the lives of these individuals.

2.5 Edu 4.0 Intervention Strategy

Incorporating children with special needs in the classroom poses a significant challenge for educational institutions and society at large. It goes beyond mere inclusion; it necessitates active participation in all activities and avoiding discrimination (Donath et al., 2023). Teachers serve as the primary mediators and

agents of inclusion in classrooms by offering the opportunity to learning challenges and academic prejudices. Utilizing pedagogical approaches is a fundamental aspect of integrating special needs students in classrooms as well as in normal classrooms. However, the pedagogical approaches require teachers to thoroughly understand their students – their capabilities and limitations. Better understanding of special needs students is critical for empowering them to develop autonomy in their daily lives (Neves et al., 2022).

Neves et al. (2022) established another crucial strategy that is fundamental in any educational process, namely fostering a strong partnership between schools and parents. Families serve as a cornerstone for school progress, by providing valuable insights for shaping pedagogical processes and playing a vital role in implementing school practices at home, thereby supporting their children's development in both settings. Family involvement in children's education is essential, regardless of school quality or preparedness. Schools should actively engage parents through various means, including meetings, events, and activities, to strengthen this partnership.

Moreover, the strategic incorporation of technological resources is vital. In today's digital age, children are increasingly tech-savvy and have the skills to handle cell phones, computers, tablets, and other digital tools (van Lieshout & Cardoso, 2022). Therefore, educators should introduce technology in classrooms through inclusive activities. In cases where schools lack sufficient resources, educational software offers a valuable solution to enhancing students' educational and cognitive processes and is accessible both at school and at home. Numerous applications exist to bolster the functional abilities of individuals with disabilities, and to foster independence and inclusion; it is commonly referred to as assistive technology (Lawrence et al., 2021). To strengthen the Edu 4.0 intervention in inclusive settings, this research investigated the difficulties encountered when implementing inclusive education and making it work strategically and effectively in the context of Edu 4.0.

3. Methodology

The study used a qualitative research method combined with a qualitative data analysis technique. The qualitative data analysis in this study was dominant, while quantitative data analysis provided secondary information or insightful data to enhance the qualitative results. The investigation highlights the importance of applying qualitative data to understand the challenges of Edu 4.0 in inclusive education settings, which allows teachers to leverage technological advancements in teaching and learning in inclusive education and to generate active participation by all students and, thereby, contribute to improving students' academic performance.

To investigate the challenges of Edu 4.0 in inclusive education, the researchers developed a qualitative instrument that encouraged study participants – inclusive education teachers – to share their deeply felt and unique experiences relating to the use of Edu 4.0 technology tools. Open-ended interview questions include the following: Is there adequate Edu 4.0 technology infrastructure in inclusive

classrooms to meet its requirements and what are the challenges facing special needs and other children in inclusive classrooms? The questions covered three major focus areas and 14 sub-focus areas and were validated by experts in education, whose comments and observations were used to refine the instrument.

The research was conducted at five locations in Malaysia: Kuala Lumpur, Selangor, Johor, Perak, and Sabah. It involved 29 experienced teachers who worked in inclusive classrooms, who were selected because of the importance of their role in the schools. Data were collected and examined carefully. Participants preferred to write down their responses, and no transcription issues were experienced. The data were organized manually to identify, analyze, and report recurring patterns and themes. Data were thoroughly reviewed to identify content, code categories, and themes relating to the challenges facing the implementation of Edu 4.0 in the inclusive education environment. This process involved comparing different responses and highlighting common and unique aspects of Edu 4.0 challenges in the inclusive education environment.

To ensure the reliability of the study, the research team and two education experts cross-checked the data content, the patterns labeled, and themes of the study by applying an interrater reliability technique. Thus, the internal consistency of the content analyzed was established. The researchers then quantified the qualitative data by using SPSS to do statistical analysis of percentages to compare results, reinforce the conclusions, and provide in-depth discussion of topics. Quantifying qualitative data is an important practice in the social sciences, including in education settings, as a way to enrich qualitative data and enhance the reliability of findings. Assigning numerical values or quantifying qualitative data reveals recurring patterns within the data, which enables researchers to make decisive decisions regarding their investigations (Braun & Clarke, 2006). Ethics considerations, such as informed consent, participant anonymity, and confidentiality were strictly followed in the research.

4. Results
4.1 Participants' Demographic Characteristics
An analysis of the participants' demographic characteristics reveals the location distribution. Selangor has the highest representation among the study participants, comprising 75.86%, followed by Kuala Lumpur at 13.79%, while other areas were represented by between 3% and 4% of participants each (Figure 1).
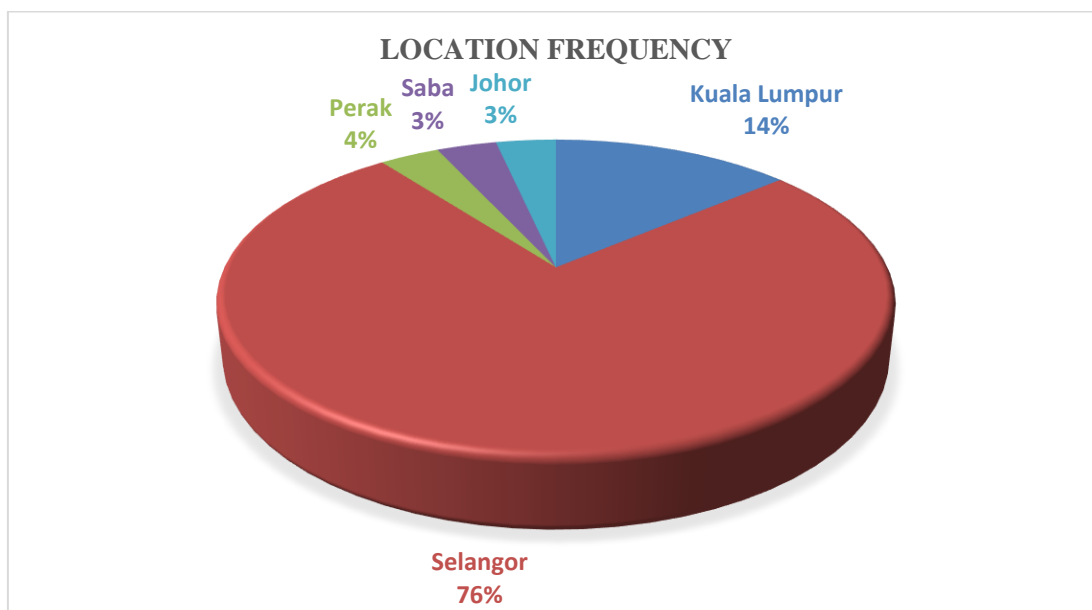
Figure 1: Participants' locations

Regarding participants' highest level of education, the majority had earned Bachelor's degrees (89.66%), and 10.34% had Master's degrees. Concerning their teaching experience in inclusive classrooms, the highest proportion (31.03%) had 6–10 years of experience, while only 3.45% had extensive experience, of 25−30 years. In terms of specialization, the majority of participants had backgrounds in teacher education (75.86%), followed by those in special education (13.79%). Other specializations, such as early childhood, religious education, and ICT-based education were less common, representing 3.45% of the participants (Figure 2).
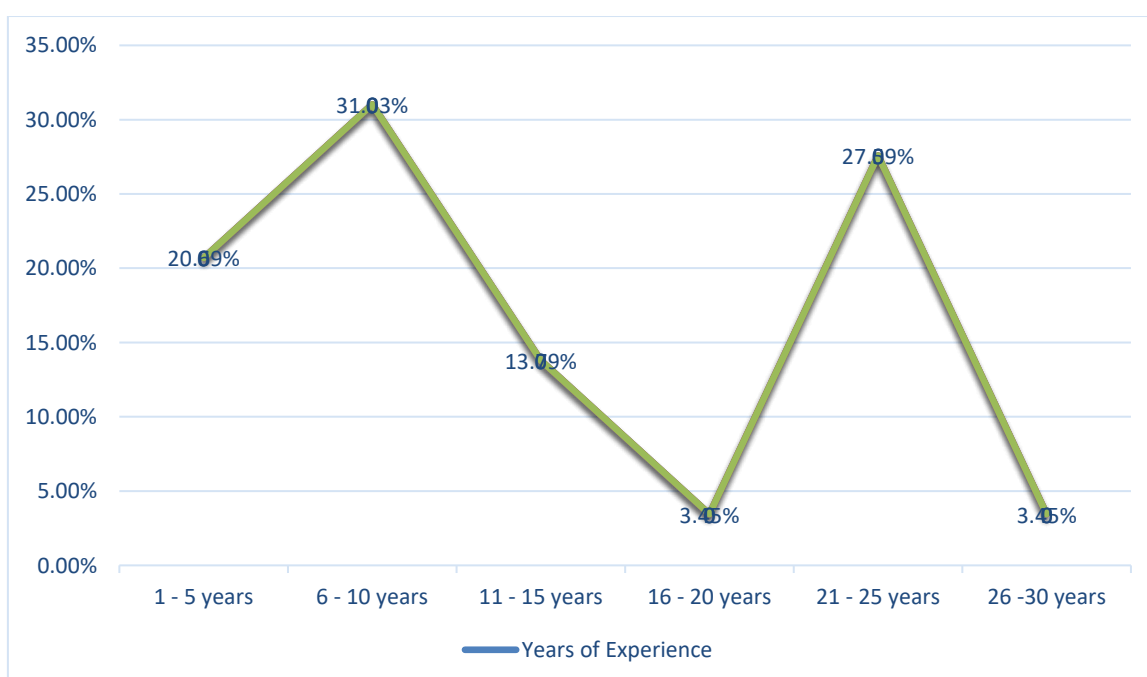
Figure 2: Participants' level of education

4.2 Challenges Facing Implementation of Inclusive Edu 4.0

4.2.1 *Theme 1: Pedagogical challenges*

In inclusive classrooms, teachers and students with special needs face daily pedagogical difficulties. The research identified eight challenging factors, including overcrowded classrooms for students with special needs, insufficient teaching resources, outdated instructional tools, challenges related to peer acceptance, and demanding subjects. Among these challenges, the most prominent was the shortage of special education graduates capable of instructing special needs students. This view was mentioned by 39.66% of participants while the issue of overcrowded classrooms for students with special needs was the least prevalent, and was mentioned by only 1.72% of participants (Table 1).

Table 1: Theme 1: Pedagogical challenges experienced in inclusive classrooms

Theme 1: Pedagogical challenges Subthemes	Case count	Percentage
Too few special education teachers to teach special needs students	23	39.66%
Increased workload	13	22.41%
Too many subjects	10	17.24%
Poor communication skills of special needs students	3	5.17%
Low peer (normal students) acceptance	3	5.17%

The study found a shortage of educational resources in inclusive classrooms, which hampered the learning progress of all children, whether they had special needs or not. In this regard, P1 claimed that there were a "*scarcity of tools and materials in inclusive classrooms*". It was mentioned that inclusive schools have outdated technological tools, which negatively affected the quality of education provided to all students. P1 also said: "*Not enough education [teaching] tools in the classroom, schools have old tech items, too crowded in one classroom, [and] not friendly to the special needs kids.*" This means overcrowded classrooms are particularly challenging for special needs children, which may make it difficult for them to receive adequate teacher attention and support. Effective communication in inclusive classrooms was emphasized as part of the challenges faced by the teachers: "*Lack of effective communication and acceptance are the problems*" (P3). An excessive number of subjects that had to be taught and learned caused challenges for both teachers and special needs students, as P10 explained:

> "*There are too many subjects for the students to focus on, and the teachers cannot teach according to the actual level of the students due to the high syllabus [large amount of content to cover]. The teacher is also dizzy [tried] to find [suitable] techniques and ideas to teach students to understand.*"

Furthermore, special needs students require more time to understand the concepts of learning, especially when software and tools are used: "*I teach and guide special needs children to use the software and tools [because] they catch up pretty slow, while normal children are faster to learn,*" P13 reported. In inclusive classrooms,

there are different levels of understanding among students. Special needs students are generally slower learners. This diversity in students' learning abilities makes it challenging for teachers to effectively cater to individual needs; special needs students need sufficient teacher attention and support to address their needs. According to P23, "*[t]oo many students to handle. Special needs students may require more one-to-one sessions to understand lessons better.*"

4.2.2 *Theme 2: ICT Infrastructure*
The lack of sufficient infrastructure in an inclusive classroom setting not only hampers the educational advancement of typical students in the Edu 4.0 era but also adds stress for special needs students. Therefore, the research pinpointed two ICT infrastructure problems: insufficient budget allocation for classroom facilities and a scarcity of specialized ICT rooms in most inclusive schools, especially in the research areas where this issue was prevalent (60%) (Table 2).

Table 2: Theme 2: ICT infrastructure

Theme 2: ICT infrastructure Subthemes	Case count	Percentage
Inadequate ICT infrastructure (budget)	6	40%
Provision of special ICT rooms	9	60%

According to the qualitative data, there was a shortage of Edu 4.0 ICT infrastructure in inclusive classrooms to obtain better academic performance: "*Not really, due to the tight budget of this centre, here, the inclusive classrooms are not fully equipped,*" P7 reported. Furthermore, only special rooms were suitable for the implementation of Edu 4.0 ICT infrastructure; in fact, there was no internet connection at some locations: "*There aren't enough types of equipment in the classes, the internet connection is not available but in some certain locations the internet somewhat limited [weak],*" P8 said.

4.3 Intervention Strategies for Implementing Inclusive Edu 4.0
4.3.1 *Theme 3: Teacher training*
The professional competence of teachers is a pivotal factor in molding the education of special needs students in inclusive classrooms. Equipping teachers with knowledge of Edu 4.0 innovations significantly contributes to facilitating learning for all students in inclusive education environments. The research highlighted two specific teacher training interventions, namely pedagogical methods (41.30%) and 21st-century classroom skills (58.70%; Table 3).

Table 3: Theme 3: Teacher training

Theme 3: Teacher training Subthemes	Case count	Percentage
Pedagogy of teaching	19	41.30%
21st-century classroom skills	27	58.70%

We found some Edu 4.0 training content prepared teachers for inclusive classrooms. The participants indicated irregularity in the extent to which teachers underwent this training. Also, almost all participants acknowledged having undergone some form of training in Edu 4.0 pedagogy that is designed to be implemented in inclusive classrooms, which indicates that efforts have been made to prepare teachers for modern pedagogical methods, though it is not sufficient. However, it is important to note that four participants reported not having received this training in pedagogy: "*There was a [some] training course for 21st-century learning but it was not enough for all teachers*" (P1).

4.3.2 *Theme 4: Edu 4.0 curriculum development*
Curriculum development stands out as a pivotal requirement for advancing education in the era of Edu 4.0. In this context, the study extracted three curriculum development concepts in the interviews, which are the piloting of Curriculum 4.0, experimenting with technology and software integration into Curriculum 4.0, and obtaining feedback from educators. Notably, of these concepts, piloting technology and software integration in Curriculum 4.0 received the greatest endorsement from participants (34.67%), followed closely by feedback from educators (33.33%), while the pilot testing of Curriculum 4.0 received the lowest rating in the participant responses. Most of the participants were involved in developing the Edu 4.0 curriculum using the latest technologies and software to teach students and enhance learning activities to achieve more effective inclusive educational practices. However, P3, P5, P10, P11, and P12 were not actively involved in developing the Edu 4.0 curriculum (Table 4).

Table 4: Edu 4.0 curriculum development

Theme 4: Edu 4.0 curriculum development Subthemes	Case count	Percentage
Pilot testing technology and software infusion in Curriculum 4.0	26	34.67%
Providing feedback	25	33.33%
Pilot testing curriculum 4.0	24	32%

4.3.3 *Theme 5: Pedagogical intervention*
Promoting effective teaching practices and training is a highly beneficial approach to addressing challenges in inclusive classrooms during the Edu 4.0 era. This category was explored through eight subtopics related to pedagogical interventions, which included training special needs students in ICT, reducing class size, providing teacher training, fostering character development for special

needs students, offering teacher behavioral therapy, and other aspects. The majority of participants recognized the importance of teacher training and behavioral therapy for enhancing their abilities as special education teachers (18.10%). However, a smaller number of participants favored online quizzes as home-based practices (6.90%) because they did not consider it to be an effective means of promoting teaching interventions (Table 5).

Table 5: Theme 5: Pedagogical intervention

Theme 5: Pedagogical intervention Subthemes	Case count	Percentage
ICT training for special needs students on learning materials	16	13.79%
Fewer learners per class	19	16.38%
Provision of facilities	8	6.90%
Providing pedagogical training	17	14.66%
Teacher training therapies and behavioral therapies	21	18.10%
Character development for special needs students	17	14.65%
Online quizzes as home practices	8	6.90%
Use of resource person	10	8.62%

P1 stated that interventions are needed to empower special needs children to accept the Edu 4.0 concept in a friendly manner: "*Class with special needs need user-friendly tools and equipment for teachers to implement simple activities.*" P2 suggested more Edu 4.0 interventions to empower special needs children to engage in Edu 4.0: "*We need more Edu 4.0 interventions.*" Furthermore, P9 called for additional Edu 4.0 interventions to empower special needs children and teachers to adapt the Edu 4.0: "*Sufficient skills for teachers and sufficient facilities [are needed in order for teachers] to know what [type of] interventions to give to students.*" Furthermore, it was reported that special needs children need a great deal of behavioural therapy to empower them to engage in the Edu 4.0 technologies: "*The children need lots of educational therapies and behavioural therapies. Mostly, special needs students need certain [or] appropriate methods to help them in their studies and living skills*" (P10).

4.3.4 *Theme 6: Management intervention*
Teachers having a favorable outlook on Edu 4.0 inclusive education is one part of the equation; the commitment of school management to embrace this approach is the other essential element. School administrators have the authority to present teacher workshops, seminars, and training, and they play a pivotal role in ensuring that the necessary infrastructure for inclusive education is available. In this context, we evaluated two aspects: the training of school leaders (69.23%) and providing teachers with exposure to Edu 4.0 innovations (30.77%) (Table 6).

Table 6: Theme 6: Management intervention

Theme 6: Management intervention Subthemes	Case count	Percentage
Training for school leaders	18	69.23%
Exposure to Edu 4.0 innovation for teachers	8	30.77%

4.3.5 *Theme 7: Parental intervention*

Parents play a crucial role in introducing special needs children to the concepts and skills of Edu 4.0. Doing so will contributes to learning advancement in school and at home. The study identified four areas where parental involvement is important: providing feedback to teachers regarding their child's learning progress at home, offering emotional support, supplying learning materials, and ensuring timely behavioral therapy for their children. Notably, of these interventions, the highest priority was given to supporting behavioral therapy (33.82%), followed by providing feedback to teachers on their child's progress at home (26.47%); providing learning materials had a relatively lower ranking in this category (16.18%; Table 7).

Table 7: Parental intervention

Theme 7: Parental intervention Subthemes	Case count	Percentage
Teacher support (feedback and scaffolding)	18	26.47%
Emotional support (motivation)	16	23.53%
Behavioral therapy support	23	33.82%
Learning materials	11	16.18%

Accordingly, P1 stated that parents could support special needs children to accept the ideas of Edu 4.0 innovation by acknowledging the limits of their children to provide adequate learning support to them: "*Parents know what the limit of their children [which crucial for schools and teachers] to plan relevant learning activities for special needs children at schools.*" P5 suggested that parents can support special needs children to accept the concept of Edu 4.0 innovations by enhancing their children's attendance and involvement in school programmes: "*Attendance, encouragement and involvement of special needs children [in school programs] is a key request.*" Also, parents can encourage special needs children to use Edu 4.0 technologies by promoting collaboration by teachers, parents, and special needs children, in order to achieve school goals and objectives: "*Collaboration between teachers and children on goals and objectives to be achieved [by the school is needed],*" P9 suggested. Indeed, parents can encourage special needs children to apply Edu 4.0 innovations by repeating certain educational practices or skills, to train their children to achieve better academic performance: "*Parents at home can repeat the proper behavioural methods and educational practices to drill [coach] them for more consistent results*" (P10).

4.3.6 *Theme 8: Stakeholder intervention*
Considering stakeholders, we examined various entities, including government agencies, non-governmental organizations dedicated to education development, inclusive school management, parents, teachers, and the general population. Stakeholders play a crucial role in inclusive school improvement, which could involve implementing strategies such as establishing a feasible social media platform dedicated to the integration of students with and without disabilities in the classroom, providing scholarships for special education teacher training, promoting peer acceptance, both at home and in the media, and establishing a parent–teacher association (PTA) for special needs students. Under this theme, the creation of a social media platform received the greatest support (35.29%), while establishing a PTA for special needs students was the least favored (17.65%; Table 8).

Table 8: Theme 8: Stakeholder intervention

Theme 8: Stakeholder intervention Subthemes	Case count	Percentage
Creation of social media platforms for discussion	12	35.29%
Teacher scholarship on special needs students	7	20.59%
Promotion of peer acceptance in media	9	26.47%
Creation of PTA for special needs students	6	17.65%

According to the results of this study, parents, teachers, and other education stakeholders must collaborate to promote Edu 4.0 pedagogy in inclusive education, and to generate suggestions for implementation. "*School stakeholders must collaborate with each other and provide suggestions*" (P5). P6 suggested that parents, teachers, and other education stakeholders need to be serious about promoting Edu 4.0 pedagogy in inclusive education, and suggested ways to achieve this goal: "*Give full help and support, either in terms of energy, sponsorship, skills and promotion.*" Similarly, other stakeholders can promote Edu 4.0 pedagogy in inclusive education by organizing events: "*Collaboration that can be held at school, for example, cooperation in organizing Edu 4.0 programs*" (P9). Lastly, school stakeholders can promote Edu 4.0 innovation in inclusive education settings by encouraging children to strive, by themselves, to achieve their dreams: "*Encourage the children to achieve their dreams in the future.*"

5. Discussion
Inclusive education acknowledges the diverse learning requirements of students and strives to establish an environment that fosters their overall growth (Hamenoo & Dayan, 2021). It recognizes that students with special needs possess unique strengths that can contribute to society, if they receive appropriate support. Inclusive education promotes social integration and empathy, and prepares students to operate in a diverse and all-encompassing society. This study investigated the challenges associated with implementing inclusive Edu 4.0, with a particular focus on the pedagogical training and professional development of teachers in inclusive classrooms. Some participants reported that they had been

adequately trained in 21st-century education tools, while others did not have this confidence. This finding is consistent with that of Ozel et al. (2016), who argue that teacher preparation programs that emphasize positive attitudes toward inclusive education, along with developing the necessary knowledge and skills, produce more receptive teachers for students with special needs.

Many participants in this study actively participated in enhancing the Edu 4.0 curriculum, by leveraging the latest technologies and software to improve inclusive classrooms, according to school administration guidelines. Regarding infrastructure, some participants reported having access to satisfactory Edu 4.0 ICT infrastructure, as also found in Azzahara et al. (2022) and Reni (2021). Meeting the specific needs of children with special needs through tailored facilities and infrastructure is essential. However, our study also revealed challenges faced by special needs students in inclusive classrooms, including limited educational resources, communication difficulties, language barriers, low peer acceptance, a shortage of specialized teachers, and limited exposure to educational innovations. These challenges align with the research of Anjum et al. (2021) and Kavitha (2022). The research of Anjum et al. (2021) reports on the complex obstacles that students with special needs encounter in traditional education settings and underscores the necessity for collaborative efforts and intervention strategies to combat negative attitudes, remove physical barriers, and address economic disparities in inclusive education.

5.1 Required to Promote Participation of Special Needs Children in Inclusive Edu 4.0 Classrooms

A participant stressed the significance of ensuring a user-friendly environment in lessons for special needs students, which includes offering up-to-date ICT training for teachers on learning materials. Moreover, providing the essential tools and equipment for educators to facilitate simple activities is crucial to support the interventions needed to empower special needs children in the context of Edu 4.0. Another participant highlighted the importance of reducing class sizes in inclusive classrooms. Additionally, it was recommended to integrate physical exercise in interventions aimed at effectively involving special needs children in Edu 4.0. The importance of teachers possessing the required skills and facilities, as evidenced by the findings of Jury et al. (2023), including providing facilities and pedagogical training, so that they can comprehend and implement the necessary interventions for students, as discussed by Hollings (2022), was also acknowledged.

Another approach that was suggested involves granting special needs students access to a range of educational therapies and behavioral interventions. Numerous participants emphasized the importance of using suitable techniques to guide special needs students to progress in achieving education and life skills. Furthermore, some participants underscored the value of instilling self-assurance and promoting character development in students, as suggested by Neves et al. (2022). Character development should be nurtured to equip special needs children for their future careers and social interactions, and to align them for the challenges brought by Edu 4.0.

Further, to prepare classrooms for Edu 4.0 and to enable teachers to effectively integrate it into children's learning, several interventions were suggested, which confirm those of Aas (2022). Suggestions include improving IT infrastructure, reducing class sizes, providing ongoing teacher training, installing advanced equipment that promotes education, enhancing IT utilization and hands-on activities, encouraging practice, promoting exposure to inclusive education, offering user-friendly gadgets and apps, implementing educational and behavioral therapies, ensuring access to facilities and equipment, providing exposure to relevant programs, and conducting online quizzes through ICT for practice, both in the classroom and at home. These interventions aim to empower typical children to embrace Edu 4.0.

5.2 Interventions Needed to Empower Inclusive Classroom Teachers to Adopt Edu 4.0 Innovations

Most of the participants emphasized the significance of offering professional training for all teachers, rather than limiting it to specific individuals or high-ranking administrators. This observation aligns with the research conducted by You et al. (2019). We found that teachers with more extensive training experience held stronger beliefs in the positive impact of inclusive education on the social development of both students with disabilities and their non-disabled peers. Additionally, our research highlights the importance of presenting workshops and enhancing communication skills as crucial measures to enable teachers in inclusive classrooms to embrace the innovations of Edu 4.0, as supported by Donath et al. (2023). Workshops and seminars can provide teachers with valuable skills that facilitate learning in inclusive education settings. Moreover, it is suggested that teachers should have more exposure to programs related to Edu 4.0 innovations.

5.3 Parental Support for Special Needs Children to Recognize the Ideas of Edu 4.0

From the participants' perspective, parents must support their special needs children to embrace the principles of Edu 4.0. Providing support would require parents to understand the boundaries of their children's learning abilities to provide additional and suitable Edu 4.0 assistance for Special Needs Children. Parents should consistently express their support for their children's needs and actively participate in school activities. This aligns with the findings of Hutchinson and Specht (2020), who report that acceptance and involvement are essential for successful inclusive educational systems. Building a supportive family community encourages students to feel motivated by caring adults who are genuinely invested in their education success. Moreover, a participant stressed the importance of parents encouraging their children to participate in the activities of inclusive classrooms. Another contributor highlighted the need for parents to collaborate with both teachers and their children to establish and work toward achieving education goals and objectives, in line with the findings of Neves et al. (2022). Schools should proactively involve parents, in various ways, such as meetings, events, or activities to strengthen the partnership. The collaboration between schools and parents involves reinforcing appropriate behaviour and education methods at home, to achieve more consistent outcomes. Financial support, emotional encouragement, and motivation by parents are also essential.

Additionally, if parents could provide electronic devices, such as computers, tablets, or phones, it would help their children to learn new concepts.

5.4 Collaboration of Parents, Teachers, and Other Education Stakeholders to Promote Edu 4.0 Pedagogy in Inclusive Education

Parents, educators, school leaders, representatives of parastatals, and other individuals involved in education must collaborate to promote the Edu 4.0 teaching approach in inclusive education by gaining a clear understanding of the objectives of Edu 4.0. They should work together consistently, engage in discussions, and reach agreements through social media platforms and others, while also providing comprehensive support in terms of energy, financial resources, expertise, and advocacy. These findings correspond with that of research conducted by Al-Mahdy and Emam (2018) and the work of Hollings (2021) who emphasizes the importance of all stakeholders sharing responsibility for a commitment to inclusive education and ensuring the success of every child, not only academically, but also emotionally and socially. This commitment would involve holding school meetings, jointly organizing programs, referring to the input of experts to provide teaching resources and facilities, exposing students to various opportunities, and nurturing their aspirations for future careers. Additionally, stakeholders can utilize social media to promote programs involving inclusive classrooms and explain the benefits of implementing the Edu 4.0 teaching approach.

6. Conclusion

This study reviewed the literature on and examined the obstacles special needs children face in inclusive classrooms, the training and professional development needed by teachers, the role of infrastructure in facilitating inclusion, and intervention strategies that could address challenges in inclusive education settings. The research identified the difficulties encountered by special needs students, including a lack of peer acceptance, a cumbersome curriculum, language barriers, teacher accountability issues, and insufficient infrastructure. Empirically, the study addresses the challenges facing the implementation of inclusive Edu 4.0, which has the goal of creating a more inclusive learning environment. The study sheds light on some hindrances that impede the implementation of inclusive education policies, and suggests evidence-based strategies for advancing inclusivity in education. The study also identified various intervention approaches, such as collaborative efforts by stakeholders in inclusive education. It is recommended that the Malaysian Ministry of Education and other stakeholders consider these intervention strategies as potential solutions, to promote inclusive educational environments generally and inclusive Edu 4.0 specifically, to benefit all students, whether they have disabilities or not.

A limitation of this study may be the qualitative research method used to collect and analyze data. Therefore, it is recommended that other researchers reconsider the scope of this study by applying a mixed-method approach with more advanced quantitative approaches, such as principal component analysis and structural equation modeling, to generate more insightful research output and to improve inclusive education settings locally and internationally.

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