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Research Article:

Effects of AquaExplorers Module on Special Education Teachers' Knowledge in Aquatic Activity Management

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ABSTRACT

Aquatic activities are frequently included in Special Education programs in Penang; however, there is an absence of dedicated modules and training to support Special Education teachers in effectively leading these activities. This shortfall is caused by the lack of expertise among teachers, which can adversely affect their students' comprehension and progress in water-based lessons. This study aimed to explore the impact of the AquaExplorers Module on improving the knowledge of Special Education teachers in Penang regarding aquatic activities for children with special needs. A quantitative approach was adopted, engaging 120 Special Education teachers in the AquaExplorers Module 10 interactions for aquatic activities implementation. A pre-post-test using questionnaires was conducted to evaluate the change in teachers' knowledge before and after the training. The paired *t*-test results revealed a significant difference ($p < 0.05$) between the pre- and post-test scores, indicating an enhancement in teachers' knowledge levels.

Keywords: Special Education, teachers, aquatic activities, modules, knowledge

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INTRODUCTION

The placement of students with special needs is guided by the principle of providing a free appropriate public education in the least restrictive environment, as required by the Individuals with Disabilities Education Act (IDEA) (Katsiyannis et al., 1996). This principle aims to tailor educational services to meet the unique needs of students with disabilities while fostering their social participation in mainstream school settings. Studies have shown that inclusive placements offer significant benefits, including enhanced academic achievement, socioemotional growth and overall well-being for students with special needs (Sallin, 2021). To support their integration into inclusive classrooms, various teaching strategies, including Learning Outside the Classroom (LOC), have been employed.

Introduced by the Ministry of Education Malaysia in 2000, Learning Outside the Classroom (LOC) is an educational approach that integrates structured, hands-on experiences beyond the conventional classroom setting. Encompassing activities such as field trips, outdoor learning and experiential programmes, LOC enhances student engagement by bridging theoretical knowledge with real-world applications, fostering deeper understanding and practical skills. According to the Ministry of Education Malaysia's guidelines (Ministry of Education Malaysia, 2005), these student-centred activities create a progressive learning environment that supports contextual understanding and encourages socialisation (Sulaiman et al., 2011). In Penang, LOC activities organised by Special Education classes often include land-based activities such as horse riding and bowling, as well as aquatic activities like swimming (Penang State Education Department, 2020). These experiences are especially beneficial for students with special needs, as they promote cognitive development, enhance motor skills, improve coordination and build self-confidence. Additionally, they provide valuable opportunities for social interaction, helping students develop communication skills and a sense of inclusion in a supportive and engaging environment. However, due to limitations in teacher qualifications and confidence, aquatic activities are typically overseen by certified external professionals (Penang State Education Department, 2020). While this highlights teachers' competency in conducting aquatic activities, there is a lack of research on the specific challenges teachers face, the effectiveness of existing training programmes, and the potential impact of targeted professional development in equipping them with the necessary skills. Addressing this gap will provide valuable insights into how to better support teachers in leading inclusive and effective aquatic learning experiences for students with special needs. Gaining knowledge and building self-confidence by Special Education teachers is essential, as it directly impacts the quality of learning experiences they provide and positively affects student self-esteem (Kharani, 2019). Research indicates that enhancing teacher competency relies on expanding professional knowledge and skills, engaging in collaborative learning communities and acquiring teaching experience (Nolan & Molla, 2017). Competency levels among teachers greatly influence their ability to manage challenging behaviors in students with special educational needs, with experience playing a crucial role (Byrd & Alexander, 2020). A lack of experience can present challenges

in conducting water activities for these students, underscoring the importance of teacher knowledge and a supportive school environment (Chao et al., 2017).

STRATEGIES FOR NAVIGATING WATER ACTIVITIES IN SPECIAL EDUCATION

Currently, there are no specific guidelines for conducting water activities for students with special educational needs in Malaysia's Special Education classes. As a result, Special Education teachers often take students to the pool for unstructured play under supervision, rather than facilitating structured learning experiences. This has raised concerns among parents of Special Education students in Penang regarding the effectiveness and educational value of these activities (Penang State Education Department, 2020). Addressing this issue is essential to ensuring that students with special needs receive meaningful learning opportunities aligned with Sustainable Development Goal 4 (SDG 4): Quality Education (UNICEF, 2020). Inclusive education plays a vital role in guaranteeing that every child has access to equitable learning experiences (UNESCO, 2017), while the 2030 Agenda for Sustainable Development emphasises the importance of inclusive education for all (United Nations, 2015). The World Bank (2019) highlights the need to address the learning crisis for children with disabilities as a key factor in global educational development. To bridge this gap, structured aquatic education frameworks such as the Halliwick Concept can be introduced as a potential solution. Halliwick provides a systematic approach to developing water confidence, motor skills and independence in aquatic environments for individuals with disabilities. By incorporating Halliwick principles, Special Education teachers can facilitate structured, inclusive and developmentally appropriate aquatic learning experiences, enhancing both the quality and effectiveness of these activities while addressing the concerns raised by parents and educators.

Previous research indicates that the 10-point Halliwick model has been widely adopted in water activity programmes for individuals with disabilities in various countries, demonstrating positive effects on multiple aspects of their lives. Developed in 1949 by James and Phyl McMillan, the Halliwick concept focuses on teaching swimming to people with disabilities, helping them gain control over their bodies, improve perceptual-motor development and enhance social interactions (Rohn et al., 2021). The Halliwick method specifically aims to teach aquatic independence to individuals with special needs, taking into account the unique properties of the aquatic environment (Tirosh et al., 2008). This approach has proven effective in aiding children with cerebral palsy to transition from supine to sitting positions and has shown positive outcomes in enhancing balance and movement control (Chandolias et al., 2022). Moreover, the Halliwick concept has been key in fostering aquatic independence and improving motor skills in children with disabilities, which in turn boosts their self-esteem, self-efficacy and confidence (Vaščáková et al., 2015).

The 10-point Halliwick Concept is a structured approach to teaching swimming and water independence to individuals with disabilities. It emphasises mental adaptation, balance control and movement coordination through 10 progressive stages. The first three points—Mental Adjustment, Disengagement and Transversal Rotation Control—focus on getting comfortable in water, reducing fear and learning how to adjust body position. The next three points—Sagittal Rotation Control, Longitudinal Rotation Control and Combined Rotation Control—develop stability and balance by mastering movements in different planes. The final four points—Upthrust (buoyancy awareness), Balance in Stillness, Turbulent Gliding and Simple Progression—prepare individuals for independent movement, propulsion and swimming skills. The AquaExplorers Module integrates this framework by guiding special needs students through structured, experiential aquatic activities, helping them overcome sensory and motor challenges while promoting water confidence and independence. Additionally, effective water activities require high self-confidence from the Special Education teachers who conduct them. Providing adequate exposure through relevant modules and short courses can significantly help these teachers enhance their own confidence (Chunsuwan et al., 2019).

THEORIES, BENEFITS AND RISK MANAGEMENT IN WATER ACTIVITIES IN SPECIAL EDUCATION

Constructivism emphasises fostering self-confidence, celebrating success and valuing effort as key elements in Special Needs education (Lenjani, 2016). Effective strategies such as summarising instructions, integrating social activities and utilising visual aids enhance learning experiences by clarifying information, encouraging social interaction and making lessons more accessible (Jamero, 2019). The AquaExplorers Module, grounded in Constructivist Theory, builds on students' prior water activity experiences, enabling them to connect new concepts to existing knowledge through structured training. This module creates an interactive learning environment where students explore, experiment and progress at their own pace, promoting deeper engagement and meaningful learning. Additionally, the module aligns with Experiential Learning Theory, which emphasises learning through direct experience (Dewey, 1963). By actively participating in water activities, students reflect on and apply their knowledge in real-world settings, reinforcing retention and skill development (Blair, 2016; Dorfsman & Horenczyk, 2018).

This experiential, student-centred approach fosters self-directed learning, critical thinking and problem-solving skills, benefiting both students and teachers (Munge et al., 2018). Teachers, through firsthand experience, gain deeper insights into their students' needs, improving inclusive and adaptive learning environments. In structured swimming programmes, this approach offers significant physical and psychological benefits for special needs students, including reduced asthma symptoms (Rosimini, 2003) and character development (Neely & Holt, 2014; Hutzler et al., 1998; Pan, 2010; Jorgić et al., 2012; Fiorilli et al., 2016; Murphy & Hennebach, 2020; Silva et al., 2020; Son, 2020; Suarez-Villadat et al., 2020). By integrating experiential learning principles, swimming

programmes ensure both students and teachers continue to grow through meaningful, transformative experiences.

Despite its numerous benefits, implementing swimming programmes in Special Education faces significant challenges due to the limited knowledge, skills and training of teachers (Penang State Education Department, 2023). Based on the statistics, only 4 out of 616 Special Education teachers in Penang have knowledge of basic swimming skills, confidence and the ability to conduct water activities, while 0 out of 616 Special Education teachers in Penang hold a water rescue certification. This is a major concern, as 62.5% of Special Education classes in Penang conduct water activities as a yearly event (Penang State Education Department, 2023). Many Special Education classes already conduct water activities without adequately trained staff, compromising both student safety and programme effectiveness. Without teachers equipped with both pedagogical knowledge and practical swimming expertise, these programs risk becoming ineffective or hazardous. Addressing this gap requires comprehensive professional development initiatives to ensure teachers can safely and confidently facilitate water activities.

To enhance teacher competency and student safety, certifications in lifesaving and water rescue, such as the Bronze Medallion from the Lifesaving Society Malaysia, should be mandated. Training and hands-on experience are crucial for boosting teachers' confidence when working with students with special educational needs (Lacruz-Pérez et al., 2021; Byrd & Alexander, 2020). Structured water activity programmes supported by comprehensive modules, such as the AquaExplorers Module, play a vital role in equipping teachers with the necessary knowledge and skills (Shariza, 2017). By strengthening teacher confidence and instructional quality, these programmes maximise the benefits of swimming activities, ensuring safer and more effective learning experiences for special needs students.

SPECIAL EDUCATION TEACHER'S KNOWLEDGE IN WATER ACTIVITIES

Knowledge, a crucial driver of community development, is defined as expertise acquired through experience or education (Bolisani & Bratianu, 2018; Carayannis & Campbell, 2019). In this study, Special Education teachers utilise the AquaExplorers Module for Special Education, with their knowledge in managing water activities serving as a key success measure. After completing the module and conducting practical sessions with students on the third day of training, their competency in delivering effective and quality water activities is assessed. High knowledge levels contribute to better student engagement and learning outcomes. However, insufficient training can lower teacher confidence, particularly in managing challenging behaviours (Moore et al., 2019). Addressing this requires additional education and structured training, particularly for newly employed teachers unfamiliar with special needs instruction (Horner et al., 2020). Strong school leadership and comprehensive teacher education further support teacher confidence and

competency (Chao et al., 2017). Since many teachers lack exposure to water activities during training (Young, 2018), developing specialised training modules enhances their preparedness and effectiveness in conducting these activities for students with special educational needs (Chunsuwan et al., 2019).

Aim, Objective and Hypothesis

The objective of this study was to identify the effects of the AquaExplorers Module implementation on Special Education teachers' knowledge of water activities. The aim was to evaluate whether the module effectively enhanced their competency in conducting water activities for students with special educational needs. Based on this objective, a null hypothesis was formulated, stating that there was no significant difference in the level of knowledge of Special Education teachers in conducting water activities after using the AquaExplorers Module.

METHODOLOGY

This study employed a quantitative approach to evaluate the effectiveness of the AquaExplorers Module. The analysis of pre- and post-questionnaire scores provided empirical evidence of its impact on enhancing Special Education teachers' knowledge of water activities.

AquaExplorers Module

The AquaExplorers Module consists of 10 structured intervention sessions designed to equip Special Education teachers with essential water activity skills (Samsudin & Ahmad, 2022). These sessions cover key techniques, including Water Confidence, Bobbing and Bubbling, Floating in various positions (pencil, mushroom, jellyfish, prone and supine), Push and Glide, Flutter Kick, Front Crawl arm movements, Front Crawl combination movements, Water Treading (Frog Kick, Egg-Beater Kick with sculling) and small water games at the end of each session. Each session follows a detailed lesson plan format, integrating clear objectives, key focus points, step-by-step activities, records and teaching aids to enhance usability and effectiveness.

The module was developed using the Halliwick Method, originally introduced by James and Phyl McMillan in 1949, which focuses on teaching aquatic independence to individuals with special needs by utilising the unique properties of water (Tirosh et al., 2008). This approach, emphasising water freedom, balance and independence, aligns with the AquaExplorers Module's objectives of fostering water confidence and developing aquatic skills among students with diverse abilities. The module follows a progressive structure, starting with fundamental water adaptation skills such as floating, breath control and safe water entry before progressing to more advanced techniques like propulsion and swimming

strokes. By emphasising individual progress, group learning and social interaction, the module creates an inclusive environment where students can overcome water anxiety, build physical competence and enhance peer engagement through structured water games.

To refine the module, the Expert Recommendation Method (Poncette et al., 2020) was employed, incorporating detailed feedback from four appointed experts through e-mail, Google Meet and phone consultations. Each component was meticulously designed based on curriculum analysis and tailored to the needs of Special Education teachers, ensuring practical applicability. This well-documented implementation process supports teachers in conducting safe, engaging and effective water activities for students with special educational needs.

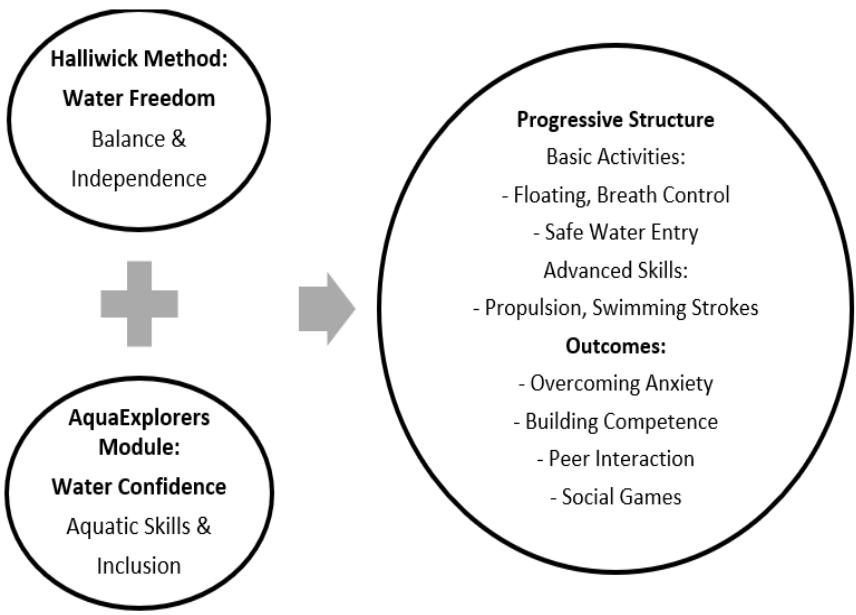

Figure 1. Halliwick Method and AquaExplorers Module connections

The study employed a mixed-methods design, utilising purposive sampling to select 120 Special Education teachers from 616 Special Education teachers in Penang (Penang State Education Department, 2023). These teachers, representing 30 Special Education classes, were recruited through the Special Education Sector of the Penang State Education Department with support from Universiti Sains Malaysia. All participants were certified Special Education teachers with prior experience in conducting water activity programmes. Invitations were also extended to administrators from *Kementerian Pendidikan Malaysia*, *Jabatan Pendidikan Negeri* and *Pejabat Pendidikan Daerah*, and

individual schools, and informed consent was obtained before participation. The study measured teachers' knowledge in managing water activities before and after implementing the AquaExplorers Module through both quantitative (questionnaires, SPSS analysis) and qualitative (interviews, NVivo analysis) approaches. Since no existing instruments aligned precisely with the study's objectives, the researcher developed customised questionnaires and interview protocols, guided by document analysis (Shariza, 2017) and expert survey methods (Ikart, 2019).

The knowledge assessment tool was designed to measure Special Education teachers' competencies in conducting water activities, understanding of safety protocols, ability to implement structured interventions and confidence in teaching aquatic skills to students with special educational needs. The questionnaire covered theoretical knowledge, practical skills, instructional strategies and risk management in water-based learning. Its content was validated by four experts—A panel of experts reviewed the module to ensure alignment with the study's objectives. The panel comprised a Physical Education Lecturer with 30 years of experience in teaching Physical Education, a Special Education Lecturer with five years of experience in a public university, an Excellent Special Education Teacher from Penang with 17 years of experience in Special Education classrooms, and a Certified Special Needs Swimming Coach with three years of experience. Their collective expertise provided valuable insights to refine and enhance the module's effectiveness. A pilot test with 17 Special Education teachers assessed its reliability, yielding a Cronbach's Alpha of 0.86, indicating strong internal consistency (Saper et al., 2016; Idris & Shaari, 2017; Zahir et al., 2019). The interview instrument followed the same validation process, with semi-structured open-ended questions designed to explore teachers' knowledge acquisition and perceptions of the module's usability. Both instruments underwent content validation using a coefficient index and Cohen's Kappa analysis, confirming moderate to good validity (Ali & Saud, 2013; Alwi & Shaari, 2017; Khalid et al., 2020; Hanif et al., 2020; Othman & Kassim, 2018). The Cohen's Kappa analysis among these experts yielded a value of 0.460. According to Landis and Koch (1977), this value is considered moderate, while Cicchetti et al. (1985) and Fleiss and Cohen (1973) classify it as good.

Quantitative data were analysed using SPSS, where a paired *t*-test compared pre- and post-intervention questionnaire scores to assess the AquaExplorers Module's impact. This analysis provided empirical evidence of the module's effectiveness in enhancing teachers' knowledge and instructional capabilities in managing water activities for students with special educational needs.

PROTOCOL AND PROCEDURES

The study commenced with the researcher obtaining necessary approvals from Universiti Sains Malaysia, the Ethics Committee, and the Ministry of Education Malaysia. All study procedures and instruments were subsequently introduced to key stakeholders, including

the Head of the Special Education Unit at the Penang State Education Department and the Special Education teachers from the participating schools. Data collection involved 120 Special Education teachers and data were gathered both before and after the intervention. Prior to starting the research, the procedure was clearly explained to the participants.

The data collection process for this intervention study involved pre- and post-intervention assessments through Google Form questionnaires, accessible via QR codes provided at the registration desk. Pre-intervention data captured participants' initial knowledge, confidence and preparedness in conducting water activities, while post-intervention data measured knowledge gains during the intervention. Quantitative analysis was conducted on responses from all 120 participants, while qualitative insights were gathered through semi-structured interviews with 10 randomly selected participants, complementing the statistical findings. The intervention took place at the Universiti Sains Malaysia swimming pool, structured into four three-day training series, totaling 12 days. Each series involved 30 different participants from various schools, ensuring a broad representation of Special Education teachers. Most participants had minimal swimming experience, requiring repeated demonstrations and instructions to support their learning. Though not trained as swimming instructors, these teachers were responsible for conducting water activities in their schools, highlighting the critical need for structured training.

The three-day course, running from 8:00 a.m. to 5:00 p.m., combined theoretical instruction with hands-on practice, following the AquaExplorers Module's 10 interactive sessions. Activities included bobbing, floating techniques, flutter kicks, push and glide exercises, and small water games, progressively building water confidence and instructional competence. On the third day, participants conducted practical sessions with their own students, with parental consent obtained. Afterward, they completed the post-course questionnaire, and 10 participants participated in interviews to provide deeper insights into their experiences, challenges and perceptions of the module's effectiveness. The qualitative data, analysed using NVivo, helped identify strengths, areas for improvement and real-world applicability, offering a comprehensive evaluation of the module's impact on Special Education teachers' competencies in water-based instruction.

RESULTS

Quantitative Analysis: Pre-Test

To evaluate the participants' knowledge of water activities before implementing the AquaExplorers Module, a pre-test questionnaire was administered. The questionnaire consisted of structured items designed to assess teachers' understanding of key aquatic skills necessary for conducting effective water activities for students with special educational needs. Each item focused on fundamental aquatic skills, requiring participants to demonstrate their knowledge in specific areas.

The questionnaire included items such as leg movement activities ("What are the correct techniques for teaching basic leg movements in water activities?"), floating techniques ("What are the different floating positions, such as prone, supine, pencil, mushroom and jellyfish float, and how do they benefit students?"), and push and glide activities ("What are the essential steps in teaching push and glide techniques to improve water adaptation?"). Additionally, participants were assessed on their overall knowledge of water confidence ("What are the key principles in developing water confidence for students with special needs?"), bobbing and bubbling activities ("What are the correct methods for teaching breath control through bobbing and bubbling exercises?"), and walking, bending and running activities in water ("How can movement-based activities such as walking, bending, and running in water enhance motor skills and adaptation?").

Further questions evaluated their knowledge of front crawl hand movement activities ("What are the correct front crawl arm movements and how should they be taught to beginners?"), water treading techniques ("What are the different water treading techniques, such as frog kick and egg-beater kick, and their application in water activities?") and small water game activities ("What types of small water games are effective for engaging students and developing their aquatic skills?"). Finally, the questionnaire assessed their ability to manage water activities without difficulty ("What are the essential strategies for organising and supervising safe and structured water activities for students with special needs?"). The results from the pre-test provide insights into the participants' initial knowledge levels before engaging with the AquaExplorers Module.

Table 1 shows the results for the pre-test.

Table 1. Mean scale and standard deviation values of knowledge based on water activities before the implementation of the AquaExplorers module for 120 participants (n = 120)

Activity	Mean scale	SD
Leg movement activities	1.11	0.31
Float activities	1.35	0.51
Push and glide activities	1.18	0.39
Overall water self-confidence	1.23	0.42
Bobbing and bubbling activities	1.82	0.39
Walking, bending and running activities	1.82	0.39
Frontcrawl hand movement activities	1.24	0.43
Water treading activities	1.00	0.00
Small game activities in water	1.85	0.36
Manage water activites without difficulty	1.08	0.28

Note: Scale indicator: 1 = very low; 2 = low; 3 = not sure; 4 = high; 5 = very high

Table 1 presents the mean scale values and standard deviations of Special Education teachers' knowledge of various water activities before the implementation of the AquaExplorers Module. The results indicate that overall knowledge levels were generally very low among participants. The lowest mean value was recorded for water treading activities (M = 1.00, SD = 0.00), indicating that all participants had extremely limited or no prior knowledge in this area. Similarly, managing water activities without difficulty (M = 1.08, SD = 0.28), leg movement activities (M = 1.11, SD = 0.31), and push and glide activities (M = 1.18, SD = 0.39) also had mean values close to the lowest scale, reflecting minimal familiarity with these essential aquatic skills. The relatively small standard deviations for these activities suggest that most participants had consistently low knowledge levels in these areas.

Knowledge of floating activities (M = 1.35, SD = 0.51) and front crawl hand movement activities (M = 1.24, SD = 0.43) was slightly higher but still categorised as very low, suggesting that teachers had only a limited understanding of these techniques. The standard deviations for these activities were slightly higher than others, indicating some variability in knowledge levels among participants.

In contrast, bobbing and bubbling activities (M = 1.82, SD = 0.39) and walking, bending and running activities in water (M = 1.82, SD = 0.39) had mean values closer to the "Low" scale, indicating that while knowledge was still limited, participants demonstrated slightly better understanding in these areas compared to other activities. The standard deviations for these activities indicate moderate variation in responses, suggesting that some participants had slightly more knowledge than others.

The highest mean value was observed for small game activities in water (M = 1.85, SD = 0.36). While this indicates a relatively better understanding compared to other activities, it still falls within the low knowledge category. The standard deviation suggests some variation in responses, implying that while some teachers had some prior knowledge, others still lacked familiarity with small water games. Overall, the mean values and standard deviations suggest that before the implementation of the AquaExplorers Module, Special Education teachers had very limited knowledge across most water activities, with minimal variation in responses for the majority of the assessed skills.

Quantitative Analysis: Post-Test

The post-test questionnaire used the same set of questions as the pre-test to evaluate changes in participants' knowledge after the implementation of the AquaExplorers Module. This assessment aimed to measure improvements in Special Education teachers' understanding of key aquatic skills, including leg movement activities, floating techniques, push and glide techniques, water confidence, bobbing and bubbling activities, walking and running in water, front crawl hand movements, water treading techniques, small water games and managing water activities.

By comparing the post-test results with the pre-test findings, the analysis provided insights into the effectiveness of the AquaExplorers Module in enhancing teachers' knowledge and competency in conducting water activities for students with special educational needs. The results from the post-test were summarised in Table 2.

Table 2. The mean scale and standard deviation value of knowledge based on water activities after AquaExplorers Module implementation for 120 participants (n = 120)

Activity	Mean scale	SD
Leg movement activities	4.47	0.50
Floating activities	4.67	0.47
Push and glide activities	5.00	0.00
Overall water self-confidence	4.88	0.33
Bobbing and bubbling activites	4.86	0.35
Walking, bending and running activities	4.29	0.46
Frontcrawl hand movement activities	5.00	0.00
Water treading activities	4.13	0.34
Small game activities in water	4.79	0.41
Managing water activities without difficulty	4.96	0.20

Note: Scales indicator: 1 = Very Low; 2 = Low; 3 = Not Sure; 4 = High; 5 = Very High

Table 2 presents the mean scale values and standard deviations of Special Education teachers' knowledge regarding various water activities after the implementation of the AquaExplorers Module. The results indicate a significant improvement in the knowledge levels of the participants across all assessed activities, with most scores falling within the "High" to "Very High" categories. The standard deviations further highlight the consistency of these improvements among participants.

Push and glide activities and front crawl hand movement activities recorded the highest mean values (M = 5.00, SD = 0.00), indicating that all participants had acquired a very high level of knowledge in these specific areas with no variability in responses. Managing water activities without difficulty also scored near the top (M = 4.96, SD = 0.20), reflecting a substantial increase in teachers' understanding and ability to conduct water activities effectively. Floating activities (M = 4.67, SD = 0.47), bobbing and bubbling activities (mean = 4.86, SD = 0.35), and small game activities in water (M = 4.79, SD = 0.41) also showed very high mean values, indicating strong knowledge acquisition in these areas following the module's implementation. The standard deviations suggest slight variability, indicating that while most participants gained strong knowledge, a small portion had slightly lower scores.

Leg movement activities (M = 4.47, SD = 0.50) and walking, bending and running activities (M = 4.29, SD = 0.46) were rated in the "High" category, suggesting that teachers had a solid understanding of these skills, although their mean values were slightly lower compared to other activities. The moderate standard deviations for these activities suggest some variation in knowledge levels among participants. Water treading activities had the lowest mean value among the assessed skills (M = 4.13, SD = 0.34), but still fell within the "High" category. While this suggests that teachers had acquired good knowledge in this area, the slightly lower score and moderate standard deviation indicate that some participants may still have found this skill more challenging compared to others. Overall, the data demonstrate that after the implementation of the AquaExplorers Module, Special Education teachers' knowledge of conducting water activities significantly increased across all assessed activities. The consistently high mean values and relatively low standard deviations indicate that the module was effective in enhancing teachers' expertise in managing and instructing water activities for students with special educational needs.

Comparison on the Pre- and Post-Tests

To evaluate the effectiveness of the AquaExplorers Module in enhancing Special Education teachers' knowledge of water activities, a paired *t*-test was conducted. This statistical test was used to compare pre- and post-test scores, determining whether there was a significant difference in teachers' knowledge levels before and after the module's implementation. By analysing the mean scores and statistical significance, the test provided empirical evidence of the module's impact on improving teachers' understanding and instructional capabilities in conducting water activities for students with special educational needs. The results are presented in Table 3.

Table 3. Statistical analysis showing mean, SD, *t*-statistic and *p*-value for knowledge

	Test	Mean	SD	*t*-statistic	*p*-value
Knowledge	Pre	1.37	0.09	–250.250	<0.001
	Post	4.70	0.10		

Table 3 presents the statistical analysis of the knowledge factor, showing the mean, standard deviation, *t*-statistic and *p*-value for the pre- and post-intervention assessments. The mean knowledge score before the implementation of the AquaExplorers Module was 1.37 with a standard deviation of 0.09, indicating very low knowledge levels among Special Education teachers regarding water activities.

Following the implementation of the module, the mean knowledge score increased significantly (M = 4.70, SD = 0.10), indicating a substantial improvement in teachers' knowledge of water activities. The results of the paired *t*-test indicated a statistically significant increase, $t(xx) = -250.25$, $p < 0.001$.

These results demonstrate that the AquaExplorers Module had a pronounced positive effect on the knowledge levels of Special Education teachers, enhancing their understanding and capability in conducting water activities with their students. Based on these findings, the null hypothesis of this study, which is there are no significant difference in the level of knowledge of Special Education teachers in conducting water activities after using the AquaExplorers Module for students with special educational needs, is rejected.

DISCUSSIONS AND RECOMMENDATIONS

The study identified that Special Education teachers possess inadequate knowledge in managing water activities for students with special needs. Byrd and Alexander (2020) similarly observed that teachers often lack confidence in teaching new skills without proper training, highlighting the necessity for continuous professional development. This finding emphasises the crucial role of ongoing education and the application of experiential learning in module development, as Special Education teachers can acquire knowledge and skills through hands-on experiences and practical exercises. The successful implementation of the AquaExplorers Module validates this approach.

Special Education teachers are more comfortable teaching skills that align with their existing expertise, as their knowledge and experience significantly influence their instructional decisions (Lacruz-Pérez et al., 2021; Byrd & Alexander, 2020). Research indicates that training and experience enhance teachers' ability to manage students with special educational needs, while professional growth is further supported through practical experience, collaborative learning communities and professional development (Nolan & Molla, 2017). This study found that teachers initially had very low knowledge levels before the intervention but demonstrated notable improvement through their engagement with students and participation in the training. The enhancement in their teaching skills was attributed to experience, professional insights and collaborative learning with peers (Byrd & Alexander, 2020). Knowledge, though abstract, plays a crucial role in economic, community and political development (Bolisani & Bratianu, 2018; Carayannis & Campbell, 2019). In special education, teachers feel more confident teaching skills within their existing expertise, as their knowledge and experience influence instructional decisions (Moore et al., 2017). Research confirms that educational programs and professional development courses enhance their skills, while training and experience significantly improve their ability to manage students with special educational needs (Byrd & Alexander, 2020; Lacruz-Pérez et al., 2021). Given these findings, the researcher supports the development of a module based on Constructivist Theory, which expands teachers' cognitive structures and strengthens their expertise in conducting water activities. The integration of Experiential Theory further supports their learning, ensuring they gain hands-on experience to effectively manage water activities for students with special educational needs.

This study measured the impact of the AquaExplorers Module on Special Education teachers' knowledge in conducting water activities, building on prior research showing that training significantly enhances teachers' expertise (Lacruz-Pérez et al., 2021; Bjornsson et al., 2019). Post-intervention data analysis revealed a significant shift toward positive responses, with most participants scoring in the "High" and "Very High" categories, demonstrating the module's effectiveness. These findings confirm a statistically significant difference between pre- and post-knowledge levels, leading to the rejection of the first null hypothesis. The results align with Constructivist Theory, which posits that knowledge expands through structured learning experiences and Experiential Theory, which emphasises learning through direct experience. While the module successfully increased teachers' theoretical knowledge, it does not directly measure their practical application skills. However, the researcher believes that the knowledge gained through experience reinforces the module's value, providing Special Education teachers with essential guidelines and expertise to implement effective water activities (Lacruz-Pérez et al., 2021; Bjornsson et al., 2019).

The findings of this study significantly contribute to the existing body of knowledge by highlighting the practical impact of the AquaExplorers Module on enhancing teachers' skills and confidence in conducting water activities for special needs students. The provision of structured resources, such as detailed lesson plans, visual aids and step-by-step instructions, not only minimised preparation time but also empowered teachers to feel more prepared and less stressed. This addresses a key gap in prior studies, which often focus on theoretical knowledge transfer without considering the importance of practical tools for real-world implementation. Additionally, the hands-on training sessions offered through the module allowed teachers to refine their skills in a supportive environment, reinforcing the importance of experiential learning—a dimension often overlooked in conventional professional development programmes.

For future research, it is recommended to explore the impact of the AquaExplorers Module on students with special educational needs. This study could investigate the module's effects on various aspects such as emotions, communication, social interactions and gross and fine motor skills in students with special educational needs. Researchers could assess whether the module has a significant influence on these areas and could conduct separate studies focusing on specific variables, such as the impact on motor skills, communication skills, social skills and emotional management. Future research could also examine the effects of the AquaExplorers Module beyond the knowledge of Special Education teachers, including aspects like teacher-student communication, student management skills, emotional control and instruction delivery skills. Since the module is utilised by Special Education teachers, various facets of the teachers' roles could be studied to identify significant impacts on their professional practice. It is further suggested that the selected research variables should align with the core competencies required in the career of a Special Education Teacher. Key aspects like teacher communication with students, student management skills and

emotional regulation are fundamental to the role of a Special Education teacher and should be considered when designing future studies.

CONCLUSION

In conclusion, the AquaExplorers Module proves to be a valuable tool in equipping Special Education teachers with the necessary knowledge to conduct aquatic activities confidently and competently. These findings support the continued use and potential expansion of the module as an integral part of Special Education training, ultimately contributing to better educational outcomes for students with special needs in aquatic settings.

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