

The A.S.S.I.S.T. Framework: A Structured Adaptive Swimming Teaching Model for Special Needs Children

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ABSTRACT:

Adaptive swimming instruction for learners with special educational needs requires structured pedagogical guidance that supports teacher competence, decision making, and confidence in real teaching environments. While prior research has demonstrated that the AquaExplorers module improves special education teachers' knowledge and self-confidence in swimming activity management, there remains a need to translate these gains into an operational instructional framework. This study presents the A.S.S.I.S.T. framework, an Adaptive Swimming Support and Instructional Teaching model developed by synthesising empirical findings from two mixed-method and intervention studies on AquaExplorers implementation. The framework integrates six instructional domains: assessing student needs, setting learning objectives, structuring ability-based activities, identifying swimming aids, simplifying instructions, and tracking progress. Conceptual analysis was conducted by mapping recurring instructional themes, teacher reflections, and observed pedagogical shifts reported in the AquaExplorers research to structured teaching components. The resulting framework provides a practical decision pathway that connects teacher knowledge acquisition to classroom action. The A.S.S.I.S.T. framework extends prior intervention findings by offering a transferable instructional structure that supports inclusive aquatic pedagogy, reduces instructional uncertainty, and strengthens teacher agency. The model has implications for professional development, curriculum design, and adaptive physical education training programmes.

Keywords: Adaptive swimming instruction; special needs children; teaching framework; teacher development; inclusive education.

1. Introduction

Aquatic activities do present a significant opportunities for physical development, sensory regulation, and social participation among learners

with special educational needs. However, teachers often express uncertainty and apprehension when it comes to planning and delivering aquatic instruction, mainly due to safety concerns,

communication barriers, and a shortage of structured pedagogical frameworks. Many educators turn to improvisation instead of systematic planning, undermining instructional effectiveness and diminishing both teacher confidence and student outcomes (Rehman, 2025; , Sylman, 2025; Syniov et al., 2025). The complex interplay between pedagogy and safety in aquatic environments necessitates actionable models to facilitate effective instruction while ensuring the well-being of all participants.

Recent intervention research surrounding the AquaExplorers module demonstrates tangible improvements in special education teachers' proficiency in swimming activity management and their confidence in delivering inclusive water-based instruction (Samsudin et al., 2025 ; Dey, 2025). These findings correlate with established educational theories suggesting that structured professional development facilitates a shift from reactive to intentional instructional design (Azad, 2023; Fauzee, 2026). However, empirical gains necessitate additional context to be effective. Teachers require continuous guidance encompassing assessment, planning, and reflective practice to properly engage students during aquatic activities (Dewra, 2025; Tran et al. 2025). In response to these needs, the A.S.S.I.S.T. framework—an Adaptive Swimming Support and Instructional Teaching model—has been conceptualized. Building on AquaExplorers research, this framework synthesizes empirical evidence into a coherent instructional sequence, aiming to support teachers in planning, implementing, and evaluating adaptive aquatic learning experiences (Samsudin et al., 2025).

Complementing this model is research emphasizing the importance of sensory-rich environments, where engaging with water can enhance cognitive, social, and emotional development (Omoush & Mehigan, 2023). The research on the impact of outdoor play on social-emotional engagement among early learners indicates that inclusive practices in various settings, including aquatic ones, foster better developmental outcomes (Wasosa, 2025). Furthermore, strategies specifically designed for children with disabilities can promote greater

social participation and engagement during physical activities, aligning with the UN-CRPD's goals for inclusive sports (Klenk et al., 2023). The A.S.S.I.S.T. framework draws on these principles to enhance inclusivity in aquatic pedagogy, promoting broader educational goals aligned with universal design principles (Tobondo, 2025). Integrating the A.S.S.I.S.T. framework into swimming education not only promises to improve teacher confidence and instructional effectiveness but also cultivates an environment where learners with special educational needs can thrive. The implications of this work extend to advocating for continued research and adaptation of instructional strategies ensuring they remain responsive to the evolving needs of educational landscapes (Nurfitasari et al., 2024).

2. Methodology

Design: This study adopted a Design and Development Research (DDR) approach to develop the A.S.S.I.S.T. framework with a focus on enhancing decision-making in adaptive aquatic teaching. The core objective was not to re-evaluate the AquaExplorers intervention but to systematically translate previously established outcomes—specifically, improvements in teachers' knowledge and self-confidence—into a structured instructional model that supports educators in aquatic settings. The framework was constructed using empirical synthesis from two published implementation studies on the AquaExplorers Module on special education teachers.)

Participants/Sample: To maintain robust methodological rigor, an audit trail was established to ensure transparency throughout the extraction and coding processes. Findings from quantitative analyses were triangulated with qualitative reflections, bolstering the credibility of the findings (Samsudin et al., 2025; Samsudin, 2025). This approach is consistent with best practices in educational research, emphasizing the necessity of integrating multiple data sources to enrich findings (Biemans et al., 2010; Ofori-Okyere et al., 2022).

Instruments: In the current study, the materials analyzed included quantitative results, descriptions of training procedures, teacher reflections, and

documented instructional shifts from the earlier research. This multi-dimensional approach contributed valuable insights that were instrumental in developing the A.S.S.I.S.T. framework.

Procedure: The development of the A.S.S.I.S.T. framework followed a structured four-stage procedure:

1. **Extraction of Relevant Findings:** Insights were meticulously extracted from both studies using a structured matrix that concentrated on five critical areas: intervention structure, quantitative outcomes, qualitative indicators, practical teaching elements, and implications for practice. Only findings that directly pertained to instructional practice and teacher learning were selected. This selection ensured that the framework was grounded in relevant, actionable insights from the existing literature (Samsudin et al., 2025; Samsudin, 2025).
2. **Directed Content Analysis:** A directed content analysis was conducted to identify recurring instructional themes from the extracted data. Key teacher actions—such as assessing learner needs, simplifying instructions, and monitoring progress—were systematically categorized into broader instructional themes. This aligns with research suggesting that clear categorization of effective teaching practices can help facilitate development (Beck et al., 2018; Greenblatt & Shader, 2004).
3. **Organizing Instructional Categories:** The instructional categories were organised into a logical and progressive teaching sequence to ensure coherence and clarity in instructional delivery. Each category was intentionally designed to represent explicit teacher actions that can be applied in professional training contexts and implemented naturally within the flow of a lesson. This sequencing reflects established principles in instructional design that emphasise alignment between learning objectives, teaching activities, and assessment, as well as the importance of planning instruction in a systematic and outcome-oriented manner. Educational design models

highlight the value of structuring teaching around learner analysis, goal clarification, activity planning, and evaluation to enhance instructional effectiveness and professional competence. By arranging the instructional domains into a coherent progression, the framework supports clarity in decision making while maintaining adaptability within dynamic teaching environments (Biggs & Tang, 2011; Molenda, 2003; Wiggins & McTighe, 2005).

4. **Internal Refinement:** The final step involved a rigorous review process aimed at enhancing clarity and coherence among the established domains. Each domain was critically analyzed for alignment with the intervention outcomes reported in the previous studies while avoiding redundant overlaps. This attention to detail in design contributes to the overall rigor of educational frameworks, ensuring their applicability in diverse teaching environments (Samsudin et al., 2025; Samsudin, 2025).

Data Analysis: Given that this study involved secondary analysis of previously published findings, new data were not collected, and thus no additional ethical approvals were necessary. The original studies were conducted following institutional research standards and reported aggregated data (Samsudin et al., 2025; Samsudin, 2025). It is crucial to note that while the A.S.S.I.S.T. framework offers a structured instructional pathway based on regional studies in Penang, the necessity for further validation through expert review and implementation studies remains evident to enhance its applicability across diverse contexts (Biemans et al., 2010; Ofori-Okyere et al., 2022; Bai et al., 2019).

3. Results

The empirical synthesis of findings from the two AquaExplorers implementation studies provided the foundation for constructing the A.S.S.I.S.T. framework as an operational instructional model for adaptive swimming teaching. In the quantitative study examining teachers' knowledge in swimming activity management, statistically significant improvements were reported following structured exposure to the AquaExplorers training sessions, particularly in areas related to safety procedures,

progression planning, and activity adaptation (Samsudin, 2025). Similarly, the mixed-methods study on teacher self-confidence demonstrated significant pre–post gains, supported by qualitative interview data indicating reduced anxiety, clearer lesson sequencing, and increased instructional agency among participating teachers (Samsudin et al., 2025). Teachers described moving from uncertainty and improvisation toward more intentional planning and structured delivery of swimming activities. To extend these empirical findings, a conceptual analysis was conducted by systematically mapping recurring instructional themes, teacher reflections, and documented pedagogical shifts reported in both studies to structured teaching components. For example, improvements in knowledge of progression planning were translated into the domain of structuring activities based on abilities, while reported gains in safety awareness and learner profiling informed the domain of assessing student needs (Samsudin, 2025). Qualitative reflections describing clearer goal setting and improved communication strategies were mapped to setting learning objectives and simplifying instructions (Samsudin et al., 2025). Repeated references to deliberate lesson planning and reflective adjustment informed the domains of identifying swimming aids and tracking progress. Cross-analysis of quantitative outcome gains and qualitative behavioural shifts identified six recurring instructional mechanisms central to improved teaching competence. These were consolidated into the six interrelated domains of the A.S.S.I.S.T. framework. The results indicate that teacher development was not limited to increased theoretical understanding but involved the emergence of a structured decision-making pathway during aquatic instruction. Teachers

demonstrated stronger alignment between learner assessment, task progression, communication strategies, and ongoing monitoring. Collectively, the integration of statistical evidence and qualitative insights supports the A.S.S.I.S.T. framework as a coherent pedagogical translation of empirically validated improvements in teacher knowledge and confidence into a practical, cyclical instructional model that strengthens safety, instructional clarity, and inclusive aquatic pedagogy.

The A.S.S.I.S.T. framework is directly derived from the empirical findings reported in the two AquaExplorers implementation studies, which examined teachers' knowledge development and instructional self-confidence in adaptive aquatic contexts. Rather than emerging as an abstract conceptual model, A.S.S.I.S.T. represents a structured translation of the pedagogical shifts documented across both studies into observable instructional actions. In the knowledge-focused study (Samsudin, 2025), teachers demonstrated statistically significant improvements in understanding aquatic safety procedures, progression planning, activity adaptation, and structured lesson sequencing after participating in the AquaExplorers training. These gains reflected clearer awareness of how to plan activities based on learner readiness and safety considerations. This evidence informed several core domains of the A.S.S.I.S.T. framework. The emphasis on learner profiling and safety awareness is operationalised in Assess Student Needs, while improved progression planning directly informs Structure Activities Based on Abilities. The reported increase in clarity regarding measurable task progression is translated into Set Learning Objectives.

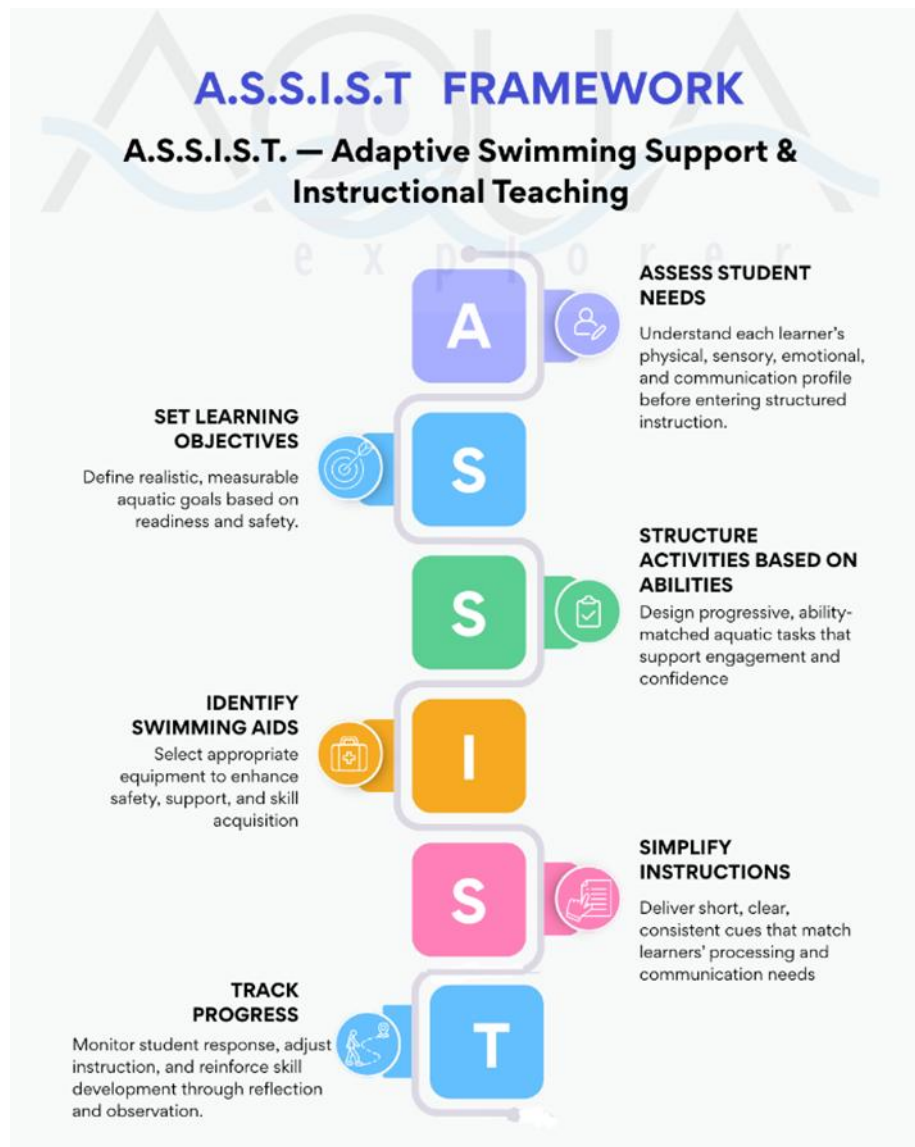


Figure 1: The A.S.S.I.S.T. Framework

The mixed-methods self-confidence study (Samsudin et al., 2025) provides complementary qualitative depth. Teachers reported reduced anxiety, improved communication strategies, clearer lesson organisation, and greater instructional agency following structured exposure to adaptive aquatic pedagogy. Interview findings highlighted movement from improvisational teaching toward intentional, sequential planning. These documented pedagogical shifts informed the domains of Simplify Instructions, where teachers described adopting clearer and more consistent cues, and Track Progress, where reflective adjustment and deliberate monitoring became part of routine practice. Increased confidence was closely linked to structured planning and purposeful use of teaching

aids, which is represented in Identify Swimming Aids within the framework. Conceptually, the A.S.S.I.S.T. model was developed through systematic mapping of recurring instructional themes, teacher reflections, and observed behavioural changes reported in both studies to structured teaching components. Quantitative improvements in knowledge and confidence were examined alongside qualitative descriptions of classroom practice to identify the mechanisms underlying instructional change. Six recurring mechanisms emerged: learner assessment, goal alignment, progression planning, equipment selection, communication clarity, and reflective monitoring. These were consolidated into the six interrelated domains presented in the framework.

Importantly, both studies indicate that teacher development extended beyond theoretical understanding. Participants described a shift toward a structured decision-making process during aquatic instruction. The A.S.S.I.S.T. framework captures this emergent pathway. It reflects how teachers move from assessing learner profiles to planning measurable goals, designing ability-matched tasks, selecting appropriate support aids, delivering concise cues, and adjusting instruction through observation. Thus, the A.S.S.I.S.T. framework is not an additional intervention separate from AquaExplorers. It is the pedagogical architecture that became visible through the empirical outcomes of those studies. It formalises the instructional structure that underpinned the reported gains in teacher knowledge and confidence. By converting documented professional growth into a cyclical instructional model, A.S.S.I.S.T. provides a transferable and structured guide for adaptive aquatic pedagogy grounded directly in validated research evidence.

4. Discussion

The A.S.S.I.S.T. framework represents a structured pedagogical translation of the AquaExplorers intervention outcomes into a coherent instructional model. Previous studies demonstrated measurable improvements in teachers' knowledge and self-confidence following structured aquatic training. However, outcome gains alone do not automatically ensure sustained changes in instructional behaviour. The present framework operationalises those gains by converting them into observable teaching actions arranged in a logical and repeatable sequence. In doing so, it bridges the gap between professional learning and classroom implementation.

One of the central contributions of the framework lies in its reduction of cognitive load during teaching. Adaptive aquatic instruction often requires teachers to process multiple variables simultaneously, including learner safety, communication differences, sensory sensitivities, and motor readiness. Without a structured guide, this complexity can lead to hesitation or inconsistent practice. The A.S.S.I.S.T. sequence provides a predictable decision pathway, beginning with assessment and progressing through planning,

delivery, and monitoring. This structure does not simplify the learner's needs, but it simplifies the teacher's decision process. By organising instructional thinking into six domains, the model supports clarity under dynamic teaching conditions. Importantly, the framework is not intended as a rigid checklist. Its design preserves teacher autonomy and professional judgement. Each domain invites adaptation based on learner variability rather than enforcing fixed procedures. For example, assessing student needs requires contextual sensitivity, while simplifying instructions depends on communication profiles and environmental demands. This balance between structure and flexibility aligns with inclusive education principles, which emphasise responsiveness, safety, and learner-centred adaptation.

The model therefore supports consistency without restricting creativity or situational awareness. The framework also addresses a persistent challenge in teacher professional development: translating theoretical knowledge into applied instructional practice. Training programmes frequently improve conceptual understanding, yet teachers may still struggle to organise this knowledge into concrete teaching steps. By articulating sequential domains such as structuring activities based on abilities and tracking progress, the A.S.S.I.S.T. model makes adaptive pedagogy visible and actionable. Teachers are provided with a scaffold that supports reflection, adjustment, and progression. Over time, repeated use of this structure may promote internalisation of adaptive strategies, strengthening both competence and confidence in inclusive aquatic settings. In this sense, the A.S.S.I.S.T. framework extends beyond a descriptive model. It offers a practical mechanism for sustaining instructional quality in adaptive aquatic education and provides a transferable structure for professional training contexts where safety, variability, and responsiveness are central concerns.

5. Conclusion

This study introduced the A.S.S.I.S.T. framework as a structured instructional model derived from empirical evidence generated through the AquaExplorers teacher development research. By

synthesising quantitative improvements in teacher knowledge and self-confidence with qualitative insights into instructional shifts, the study translated professional learning outcomes into a coherent, practice-oriented framework for adaptive aquatic education. The findings demonstrate that teacher development in aquatic contexts extends beyond content acquisition; it involves the formation of a systematic decision-making pathway that enhances clarity, safety, and responsiveness during instruction.

The A.S.S.I.S.T. framework consolidates six interrelated instructional domains into a cyclical structure that guides assessment, planning, delivery, and reflective monitoring. This model reduces instructional uncertainty while preserving teacher autonomy and professional judgement. By mapping recurring instructional themes and pedagogical

adjustments to observable teaching components, the framework bridges the gap between training and classroom implementation. It offers educators a structured yet adaptable pathway for addressing learner variability in aquatic environments, where safety and responsiveness are paramount. The study contributes to the broader discourse on professional development by demonstrating how intervention outcomes can be operationalised into transferable instructional frameworks. While grounded in regional implementation studies, the A.S.S.I.S.T. model provides a foundation for future validation across diverse educational settings. Further research may examine its longitudinal impact on instructional quality, teacher agency, and learner outcomes. Overall, the framework represents a practical and evidence-informed advancement in inclusive aquatic pedagogy.

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