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Knowledge of Basic Swimming Movements among Fifth-Grade Students: A Descriptive Survey

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Abstract

Objectives: This study described fifth-grade students' knowledge of basic swimming movements at SD Negeri 166492 Tebing Tinggi and identified the distribution of knowledge levels.

Materials and Methods: A quantitative cross-sectional descriptive survey was conducted with all 29 fifth-grade students selected through total sampling. Knowledge was measured using a 28-item multiple-choice test covering swimming strokes, ethics in swimming instruction, and swimming facilities and equipment. Two of the original 30 items were removed during validation, and the retained instrument had a reported reliability coefficient of 0.959. Data were summarized using the mean, standard deviation, minimum, maximum, frequencies, percentages, and mean-standard-deviation category thresholds.

Results: Scores ranged from 10 to 24, with a mean of 19.72 and a standard deviation of 3.26. No student was classified as very high; 11 students (37.9%) were high, 10 (34.5%) moderate, 7 (24.1%) low, and 1 (3.4%) very low. Although the high category contained the largest number of students, the mean score fell within the moderate interval.

Conclusions: Students' theoretical knowledge was uneven and, on average, moderate. The relatively large high-knowledge group is encouraging, but 8 of 29 students remained in the low or very-low categories. Schools should strengthen concept-based and safety-oriented instruction, use visual or simulation resources where pool access is limited, and complement written tests with supervised in-water assessment when facilities and safety arrangements permit.

Keywords: aquatic education; elementary school; knowledge assessment; swimming movements; water safety

Introduction

Aquatic education is an important component of physical education because it combines movement learning with knowledge and behaviors that may help children participate safely in water environments. Contemporary scholarship frames this domain more broadly than the reproduction of competitive strokes. Aquatic literacy includes knowledge, confidence, judgment, and adaptable motor competence across tasks and environments (Mekkaoui et al., 2022; van Duijn et al., 2021). For primary-school students, theoretical knowledge can support recognition of movement principles, facilities, rules, and safe conduct, but it is not equivalent to demonstrated swimming competence.

The distinction between knowing and doing is especially important in swimming. Costa et al. (2020) found that children's perceived aquatic competence did not necessarily correspond to their actual performance. Similarly, a large school-based assessment by Sundan et al. (2025) classified 62.5% of 9- to 10-year-old children as swimming competent only after they completed six consecutive in-water tasks, including entry, front swimming, diving, floating, back swimming, and exit. These findings indicate that questionnaire-based knowledge should be interpreted as one dimension of aquatic learning rather than proof that a child can swim safely.

Access to instruction also shapes learning opportunities. Equipment, teaching environment, social support, and exposure to varied aquatic situations influence the acquisition and transfer of water skills (van Duijn et al., 2021). Where schools cannot access a pool, teachers may rely on classroom explanation, demonstrations, pictures, videos, and dry-land simulations. Such approaches can develop concepts and safety awareness; however, they cannot fully reproduce buoyancy, breathing control, propulsion, balance, and decision-making in water. This limitation makes it necessary to assess what students understand and to state clearly what the assessment does not measure.

At SD Negeri 166492 Tebing Tinggi, swimming content had primarily been delivered theoretically because the school lacked direct access to a swimming pool and faced practical constraints related to distance, transportation, instructional time, and supporting personnel. Preliminary observations suggested that students differed in their ability to explain basic swimming movements, ethics, and facilities. However, the original report did not provide a clear interpretation that

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distinguished the group mean from the most frequent category. The present study therefore aimed to describe the level and distribution of fifth-grade students' knowledge of basic swimming movements. The study provides a local diagnostic baseline for improving instruction under limited-facility conditions.

Materials and Methods

Study Design

This study used a quantitative, cross-sectional descriptive survey design. It measured students' current theoretical knowledge without manipulating instruction or testing causal relationships. Data were collected at SD Negeri 166492 Tebing Tinggi, Indonesia.

Study Participants

The population comprised all 29 fifth-grade students enrolled at the school, and all were included through total sampling. The source manuscript did not report participants' age, sex distribution, previous swimming lessons, swimming ability, or exposure to water environments. These characteristics should be retrieved from the original records and reported before submission because they may affect knowledge and the interpretation of findings.

Study Organization

Knowledge was assessed using a multiple-choice test initially containing 30 items. Following item validation, two items were removed and 28 items were retained. The test addressed three content domains: (1) basic swimming strokes and movement principles, (2) ethics and appropriate conduct during swimming instruction, and (3) swimming facilities and equipment. Correct responses were scored 1 and incorrect responses 0, producing a possible total score of 0–28. The retained instrument had a reported reliability coefficient of 0.959. The source manuscript did not identify the reliability model, validation sample, item-level validity statistics, content blueprint, or decision rule used to remove the two items; these details should be added from the original validation records.

Testing was administered to the participants in the school setting. The original manuscript did not specify test duration, supervision, instructions, measures to prevent answer sharing, or procedures for handling incomplete responses. These operational details should be documented to improve reproducibility. Because the test measures declarative knowledge, its results should not be interpreted as evidence of actual in-water performance.

Statistical Analysis

Data were analyzed descriptively using SPSS version 20. The analysis included sample size, minimum, maximum, mean, standard deviation, frequency, and percentage. The manuscript classified scores into five sample-referenced categories using the reported mean and standard-deviation cut points: very high (>24.53), high (21.34–24.53), moderate (18.13–21.33), low (14.93–18.12), and very low (≤14.92). Percentages were recalculated from the reported frequencies and sample size to one decimal place. No inferential analysis was performed.

Ethical Considerations

The source manuscript did not provide an ethics committee name, approval number, school authorization, parental consent, child assent, confidentiality procedures, or data-protection statement. The authors should verify and insert this information before journal submission. No identifying student information is reported in this article.

Results

All 29 students completed the knowledge test. Scores ranged from 10 to 24. The mean score was 19.72 (SD = 3.26), equivalent to 70.4% of the maximum possible score of 28. Based on the reported cut points, the mean lies in the moderate category.

Table 1. Descriptive statistics for basic swimming-movement knowledge scores (n = 29)

No	Possible range	Observed minimum	Observed maximum	Mean	SD
29	0–28	10	24	19.72	3.26

The high category contained the largest number of students: 11 (37.9%). It was followed by the moderate category with 10 students (34.5%), the low category with 7 (24.1%), and the very-low category with 1 (3.4%). No student reached the very-high category. Overall, 8 students (27.6%) were classified as low or very low, whereas 11 (37.9%) were high and 10 (34.5%) were moderate.

Table 2. Distribution of students' basic swimming-movement knowledge (n = 29)

No.	Score interval	Category	Frequency	Percentage
1	>24.53	Very high	0	0.0%
2	21.34–24.53	High	11	37.9%
3	18.13–21.33	Moderate	10	34.5%

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4	14.93–18.12	Low	7	24.1%
5	≤14.92	Very low	1	3.4%
	—	**Total**	**29**	**100.0%**

The result therefore requires two complementary descriptions. The modal category was high because it contained the most students, but the arithmetic mean was moderate. Describing the entire group as simply "high" would overlook both the mean-based classification and the 27.6% of students in the low or very-low categories.

Discussion

The study found an uneven distribution of theoretical knowledge about basic swimming movements. The largest subgroup was high, yet the mean score remained moderate and more than one-quarter of students were low or very low. This pattern suggests that classroom instruction had enabled many students to acquire important concepts, but the learning outcomes were not consistent across the whole class. A targeted review is needed for students who have not yet mastered essential concepts, particularly those related to technique, safe conduct, and equipment use.

The findings should be interpreted in relation to the type of measurement. Costa et al. (2020) showed that perceived and real aquatic competence can differ among children aged 6–10 years. The present test assessed correct answers, not perceived competence, but the same interpretive caution applies: cognitive knowledge does not establish that a child can coordinate breathing, flotation, propulsion, entry, or exit in water. Sundan et al. (2025) used direct assessment of six in-water skills and found that 62.5% of primary-school children met a swimming-competence standard. Their approach demonstrates why a complete evaluation of aquatic learning requires performance evidence in addition to written knowledge.

The school's limited pool access offers a plausible context for the moderate mean, although the present design did not test facility access as a causal factor. The review by van Duijn et al. (2021) concluded that equipment and physical and social environments shape how children acquire aquatic skills and whether those skills transfer to other settings. Consequently, theory-only instruction may be strengthened by sequenced video demonstrations, movement diagrams, teacher modeling, safety scenarios, and dry-land rehearsal. These resources should prepare students for, rather than replace, supervised practical instruction.

Pedagogical evidence also supports active and varied learning. Invernizzi et al. (2021) reported that an aquatic physical-literacy program influenced children's and parents' perceptions of aquatic motor competence, while Mekkaoui et al. (2022) emphasized learner-centered, playful, and developmentally appropriate practices in their systematic review. For fifth-grade students, teachers can use picture-based error analysis, ordering activities for stroke phases, equipment-identification tasks, and scenario questions about safe behavior. Such tasks make conceptual learning more applied and may help identify misconceptions before students enter the water.

Knowledge of water safety deserves explicit emphasis. Kishi et al. (2023) found that a structured water-safety program improved junior-high-school students' awareness and responses to aquatic risk. Although the participants were older than those in the present study, the finding supports deliberate teaching of hazard recognition, safe rescue choices, appropriate behavior, and emergency responses. These topics should be integrated with stroke knowledge rather than treated as optional additions.

When practical sessions become feasible, instruction should address emotional as well as motor readiness. Ostrowski et al. (2022) identified fear of water as an important factor associated with difficulty in learning to swim among 10-year-old children. Safe progression from water familiarization to breathing, flotation, body orientation, propulsion, and coordinated strokes can reduce unnecessary task difficulty. Teachers should avoid inferring low motivation from low test scores and should instead examine students' prior experience, access, anxiety, and learning opportunities.

Swimming participation can also contribute beyond domain-specific knowledge. A six-week school-based swimming intervention improved aspects of gross motor development among primary-school children (Pratt et al., 2024), and a systematic review reported positive links between swimming and fundamental movement-skill development (Sinclair & Roscoe, 2023). These studies reinforce the value of eventually connecting classroom knowledge to well-supervised, developmentally appropriate water practice. However, such practical benefits cannot be claimed from the current descriptive knowledge data.

Practical Implications

Teachers should use item-level results to identify which concepts were most frequently misunderstood, reteach those concepts through visual and scenario-based activities, and administer a short follow-up assessment. Students in the low and very-low categories require additional support rather than repetition of the same explanation. If safe facilities, qualified personnel, parental permission, and risk-management procedures are available, written assessment should be complemented by progressive in-water observation of entry, breath control, floating, propulsion, stroke coordination, and safe exit.

Limitations

The study involved one class of 29 students at a single school and used a cross-sectional design, limiting generalization and causal interpretation. Participant characteristics and prior swimming experience were unavailable. The source manuscript did not provide the complete item blueprint, validation procedure, or domain-level scores. Most importantly, a multiple-choice test cannot measure actual swimming or water-survival competence. Future studies should report item and domain performance, use validated knowledge and practical assessment instruments, document exposure to instruction, and examine changes after a structured learning program.

Conclusions

Fifth-grade students at SD Negeri 166492 Tebing Tinggi obtained a mean basic swimming-movement knowledge score of 19.72 (SD = 3.26) out of 28, placing the group mean in the moderate category. The largest subgroup was high (11 students; 37.9%), followed by moderate (10; 34.5%), low (7; 24.1%), very low (1; 3.4%), and very high (0). The results show uneven theoretical understanding rather than uniformly high knowledge. Instruction should prioritize misconceptions revealed by item-level analysis, strengthen water-safety concepts, and employ engaging visual or simulation resources. When conditions permit, theoretical knowledge should be complemented by supervised practical assessment because written knowledge alone does not demonstrate swimming competence.

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Author Contributions

Fuad Diansyah Nst: conceptualization, methodology, investigation, project administration, and writing—original draft. Eka Abdurrahman: data curation, formal analysis, interpretation, and writing—review and editing. Ramadan Ginting: validation, interpretation, and writing—review and editing. All authors approved the final manuscript and accept responsibility for the integrity of the work.

Conflict of Interest

The authors declare no conflict of interest.

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Data Availability

The aggregate data supporting the findings are presented in this article. De-identified item-level data may be made available by the corresponding author upon reasonable request, subject to verification of the original records and applicable ethical requirements.

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