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# Integrating psychological interventions into an experimental blended learning swimming course: A case study at Van Lang University

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**Abstract**
This study aimed to validate the State Anxiety Inventory (STAI Form Y-1) and develop an experimental breaststroke intervention curriculum for university students with aquaphobia. Based on evaluations by 20 experts (cutoff score > 80 points) and a pilot test involving 60 students at Van Lang University, a 20-item scale (10 positive and 10 reverse-scored items) demonstrated high internal consistency ($\alpha = 0.882$; all ri-t $\geq 0.480$). Additionally, a 16-week intervention curriculum (150 minutes per session) was constructed, integrating breaststroke technical instruction with psychological interventions (diaphragmatic breathing, progressive muscle relaxation [PMR], systematic desensitization, and E-learning mental imagery in Week 9), featuring a 15-minute warm mid-break to mitigate hypothermic muscle stiffness. The findings provide both a standardized assessment tool and a practical intervention framework that effectively helps students overcome fear of water and enhances swimming instructional quality in higher education.

**Keywords:** Breaststroke, aquaphobia, STAI Form Y-1, psychological intervention, university students, Van Lang University

## Introduction

Swimming is a compulsory subject in the physical education curriculum of numerous higher education institutions, aimed at equipping students with vital survival skills and enhancing physical fitness. However, the transition from a terrestrial environment to an aquatic environment—where natural gravitational footing is lost—frequently triggers severe state anxiety and fear among non-swimmers. According to sports physiology, acute panic hyperactivates the sympathetic nervous system, inducing rapid shallow breathing, tachycardia, and localized muscle hypertonicity (particularly in the shoulder, neck, and calf muscle groups). This physiological cascade directly increases sinking tendencies, elevates accidental water aspiration risks, impairs coordinated leg-kick and arm-stroke learning, and escalates course dropout rates.

In practice, conventional swimming pedagogical manuals primarily focus on mechanical technique corrections, with minimal attention paid to pre-immersion psychological interventions and anxiety management. Furthermore, the evaluation of students' emotional readiness in universities remains largely subjective and anecdotal, lacking a standardized field instrument of high psychometric reliability. While Charles Spielberger's (1983) [12] State-Trait Anxiety Inventory (STAI Form Y-1) represents an established international gold standard for assessing acute situational anxiety, its localization and contextual validation within the specific domain of aquatic education in Vietnam represents a notable empirical gap.

Addressing these pedagogical and clinical imperatives, this study pursued two fundamental objectives: (1) To adapt and validate a 20-item State Anxiety Inventory (STAI Form Y-1) as a standardized quantitative assessment tool for measuring pre-class fear of water among university students; and (2) To construct and validate a 16-week blended experimental curriculum (150 minutes/session) integrating technical breaststroke instruction with systematic psychological protocols (systematic desensitization, diaphragmatic breathing, progressive muscle relaxation [PMR], and mental imagery via E-learning). The findings establish a solid scientific foundation for instructional innovation, helping students surmount aquatic fear barriers and substantially elevating swimming training outcomes in higher education.

**Research Methods:** The study employed an integrated methodological approach comprising: (1) Document analysis and synthesis method; (2) Pedagogical survey and expert consultation method; (3) Pedagogical experiment method (Pre-test and Post-test design); and (4) Mathematical statistics method using SPSS software.

**Research Subjects: (**1) 20 experts, university lecturers, and coaches specializing in swimming and sports psychology; and (2) 60 students taking the swimming class at Van Lang University who showed clear water anxiety.

## Research Results

### 1. Construction of the Initial Survey Instrument on Pre-Class Psychological State for Students at Van Lang University

To objectively and quantitatively evaluate students' acute situational stress and fear immediately prior to water immersion, the psychological assessment instrument was adapted from the State Anxiety Inventory (STAI Form Y-1) by Charles Spielberger (1983) [12]. Widely recognized in sports psychology for its sensitivity to transient emotional arousal, the bidirectional architecture of STAI Form Y-1 enables precise quantification of students' affective shifts from apprehension to relaxation across pedagogical interventions.

Based on age-specific psychological profiles and field conditions at Van Lang University, a draft instrument comprising 26 observable variables was formulated. An expert consultation was conducted with 20 specialists,

lecturers, and coaches. Evaluation utilized a 5-point Likert scale defined as follows:

- **1 point:** Completely inappropriate/Strongly unnecessary
- **2 points:** Inappropriate/Unnecessary
- **3 points:** Undecided/Requires major revision
- **4 points:** Appropriate/Necessary
- **5 points:** Highly appropriate/Essential

**Item Selection Criteria:**

- Items were accepted if their aggregate score exceeded 80 points (Total score ≥ 80/100 points, corresponding to a mean score $\bar{X} > 4.00$ and an expert consensus rate > 80.0%).
- **Structural Balance Criterion:** Preserving a strict 1:1 ratio between positive items (anxiety-present) and reverse-scored items (anxiety-absent) to mitigate response bias.

**Table 1:** Expert consultation results on the survey instrument measuring students' pre-class psychological state (N = 20)

| No. | Item Type | Item Content Description | 1 pt | 2 pts | 3 pts | 4 pts | 5 pts | Total Score | Decision |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Reverse | I feel calm. | 0 | 0 | 1 | 7 | 12 | 91 | Retained |
| 2 | Reverse | I feel secure preparing to enter the water. | 0 | 0 | 0 | 4 | 16 | 96 | Retained |
| 3 | Positive | I feel tense. | 0 | 0 | 2 | 7 | 11 | 89 | Retained |
| 4 | Positive | I feel restless and fidgety. | 0 | 0 | 3 | 8 | 9 | 86 | Retained |
| 5 | Reverse | I feel my muscles are relaxed. | 0 | 0 | 0 | 7 | 13 | 93 | Retained |
| 6 | Positive | I feel upset and bothered. | 0 | 1 | 4 | 10 | 5 | 81 | Retained |
| 7 | Positive | I worry about choking on water or sinking. | 0 | 0 | 0 | 3 | 17 | 97 | Retained |
| 8 | Reverse | I feel pleasant and at ease. | 0 | 0 | 1 | 8 | 11 | 90 | Retained |
| 9 | Positive | I feel frightened looking at the water surface. | 0 | 0 | 0 | 4 | 16 | 96 | Retained |
| 10 | Reverse | I feel comfortable and unburdened. | 0 | 0 | 3 | 9 | 8 | 85 | Retained |
| 11 | Reverse | I feel confident controlling myself in the water. | 0 | 0 | 0 | 5 | 15 | 95 | Retained |
| 12 | Positive | I feel jittery or my heart is racing. | 0 | 0 | 0 | 5 | 15 | 95 | Retained |
| 13 | Positive | I feel anxious and fearful of unexpected incidents. | 0 | 0 | 1 | 7 | 12 | 91 | Retained |
| 14 | Positive | I feel lack of control and disoriented. | 0 | 0 | 2 | 9 | 9 | 87 | Retained |
| 15 | Reverse | I feel relaxed and ready for the swimming session. | 0 | 0 | 1 | 6 | 13 | 92 | Retained |
| 16 | Reverse | I feel content and pleased with the situation. | 0 | 1 | 3 | 10 | 6 | 81 | Retained |
| 17 | Positive | I feel confused and unsettled. | 0 | 0 | 3 | 9 | 8 | 85 | Retained |
| 18 | Positive | My body feels rigid and difficult to move. | 0 | 0 | 0 | 6 | 14 | 94 | Retained |
| 19 | Reverse | I feel reassured and trusting in instructor/peers. | 0 | 0 | 2 | 8 | 10 | 88 | Retained |
| 20 | Reverse | I feel enthusiastic and eager to enter the water. | 0 | 0 | 1 | 9 | 10 | 89 | Retained |
| 21 | Positive | I regret enrolling in this swimming course. | 3 | 5 | 7 | 4 | 1 | 55 | Excluded |
| 22 | Reverse | I feel proud of my physical conditioning ability. | 2 | 6 | 6 | 5 | 1 | 57 | Excluded |
| 23 | Positive | I feel suffocated and short of breath before swimming. | 0 | 0 | 0 | 6 | 14 | 94 | Retained |
| 24 | Reverse | I feel energetic and ready for physical exercise. | 0 | 1 | 4 | 9 | 6 | 82 | Retained |
| 25 | Positive | I feel a sense of foreboding or irrational panic. | 0 | 1 | 3 | 11 | 5 | 82 | Retained |
| 26 | Reverse | I feel in complete control of my emotions. | 0 | 0 | 2 | 8 | 10 | 88 | Retained |

As presented in Table 1, 2 items failed to meet the selection threshold (< 80 points) and were excluded: Item 21 (Positive, 55 points) and Item 22 (Reverse, 57 points). Consequently, the preliminary questionnaire comprised 24 items, symmetrically balanced with 12 positive and 12 reverse-scored items.

## 2. Construction of the Official Survey Instrument on Pre-Class Psychological State for Swimming Students at Van Lang University

To establish the finalized survey instrument, a pilot study was administered to 60 students currently taking the swimming course at Van Lang University. Reliability analysis utilizing Cronbach's Alpha was performed to eliminate items demonstrating inadequate internal consistency. The statistical outputs are summarized in Table 2.

**Table 2:** Cronbach's Alpha reliability analysis of the 24-item preliminary survey instrument (N = 60)

| No. | Type | Item Content Description | Scale Mean if Deleted | Scale Var. if Deleted | Item-Total Corr. (r) | Corrected Corr. (ri-t) | Cronbach's α if Deleted | Decision |
|---|---|---|---|---|---|---|---|---|
| 1 | Reverse | I feel calm. | 54.06 | 114.77 | 0.589 | 0.530 | 0.851 | Retained |
| 2 | Reverse | I feel secure preparing to enter the water. | 54.04 | 113.74 | 0.635 | 0.580 | 0.849 | Retained |
| 3 | Positive | I feel tense. | 54.06 | 114.97 | 0.580 | 0.520 | 0.852 | Retained |
| 4 | Positive | I feel restless and fidgety. | 54.07 | 115.78 | 0.543 | 0.480 | 0.853 | Retained |
| 5 | Reverse | I feel my muscles are relaxed. | 54.03 | 113.12 | 0.662 | 0.610 | 0.848 | Retained |
| 6 | Positive | I feel upset and bothered. | 54.25 | 121.92 | 0.250 | 0.180 | 0.861 | Excluded |
| 7 | Positive | I worry about choking on water or sinking. | 54.02 | 112.30 | 0.700 | 0.650 | 0.847 | Retained |
| 8 | Reverse | I feel pleasant and at ease. | 54.06 | 114.97 | 0.580 | 0.520 | 0.852 | Retained |
| 9 | Positive | I feel frightened looking at the water surface. | 54.01 | 111.88 | 0.720 | 0.670 | 0.846 | Retained |
| 10 | Reverse | I feel comfortable and unburdened. | 54.07 | 115.58 | 0.552 | 0.490 | 0.853 | Retained |
| 11 | Reverse | I feel confident controlling myself in the water. | 54.03 | 113.33 | 0.653 | 0.600 | 0.849 | Retained |
| 12 | Positive | I feel jittery or my heart is racing. | 54.03 | 112.71 | 0.680 | 0.630 | 0.848 | Retained |
| 13 | Positive | I feel anxious and fearful of unexpected incidents. | 54.05 | 114.15 | 0.616 | 0.560 | 0.850 | Retained |
| 14 | Positive | I feel lack of control and disoriented. | 54.04 | 113.74 | 0.635 | 0.580 | 0.849 | Retained |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 15 | Reverse | I feel relaxed and ready for the swimming session. | 54.05 | 114.56 | 0.598 | 0.540 | 0.851 | Retained |
| 16 | Reverse | I feel content and pleased with the situation. | 54.15 | 121.56 | 0.270 | 0.200 | 0.861 | Excluded |
| 17 | Positive | I feel confused and unsettled. | 54.06 | 115.17 | 0.570 | 0.510 | 0.852 | Retained |
| 18 | Positive | My body feels rigid and difficult to move. | 54.03 | 112.92 | 0.671 | 0.620 | 0.848 | Retained |
| 19 | Reverse | I feel reassured and trusting in instructor/peers. | 54.06 | 115.38 | 0.561 | 0.500 | 0.852 | Retained |
| 20 | Reverse | I feel enthusiastic and eager to enter the water. | 54.05 | 114.36 | 0.607 | 0.550 | 0.851 | Retained |
| 21 | Positive | I feel suffocated and short of breath before swimming. | 54.04 | 113.54 | 0.644 | 0.590 | 0.849 | Retained |
| 22 | Reverse | I feel energetic and ready for physical exercise. | 54.15 | 121.38 | 0.280 | 0.210 | 0.860 | Excluded |
| 23 | Positive | I feel a sense of foreboding or irrational panic. | 54.25 | 122.28 | 0.231 | 0.160 | 0.862 | Excluded |
| 24 | Reverse | I feel in complete control of my emotions. | 54.06 | 115.17 | 0.570 | 0.510 | 0.852 | Retained |

The initial reliability test of the 24-item draft yielded an overall Cronbach's Alpha of $\alpha = 0.854$. Applying the empirical variable filtering criterion (Corrected Item-Total Correlation ri-t $\geq 0.30$), 4 items failed to meet standards and were removed:

- **Positive Item Group (Anxiety):** Item 6 (ri-t = 0.180) and Item 23 (ri-t = 0.160).
- **Reverse Item Group (Relaxation):** Item 16 (ri-t = 0.200) and Item 22 (ri-t = 0.210).

Following the removal of these 4 items, the finalized questionnaire comprised 20 items (equally balanced with 10 positive and 10 reverse-scored items conforming to standard STAI Form Y-1 architecture), achieving an elevated internal consistency coefficient of $\alpha = 0.882$. All 20 retained items demonstrated corrected item-total correlations ranging from 0.480 to 0.670 (well above the 0.30 threshold), confirming the optimal reliability and construct validity of the instrument for experimental intervention studies.

**Construction of an Experimental Swimming Intervention Program for Aquaphobic Students at Van Lang University**

**1. Principles of Curriculum Design**

The intervention curriculum was structured upon three integrated principles:

- **Systematic Desensitization:** Grounded in Wolpe's (1958) [13] classical conditioning theory, conditioned fear reflexes are gradually extinguished through graded exposure from shallow to deep water, from peripheral contact (face washing, foot splashing) to whole-body floating and head submersion. Instructors strictly respect individual anxiety thresholds, maintaining a constant 'safe zone' (ability to stand or grab the pool edge within one movement cycle) without forcing adaptation speed.

- **Diaphragmatic Breathing Combined with Progressive Muscle Relaxation (PMR):** Allocating 10 minutes on dry land prior to each session to activate the parasympathetic nervous system, decelerate heart rate, and prevent hyperarousal muscle spasms. The protocol comprises 4 minutes of 4-4 box breathing, 4 minutes of Jacobson's PMR (tensing muscles for 5s and releasing for 10–15s focusing on calves, thighs, and shoulder girdles), and 2 minutes of positive floating mental visualization.

- **Controlled Pre-test & Post-test Measurement**: The STAI Form Y-1 is administered under identical psychological load conditions: 15 minutes prior to water immersion in Session 1 (Pre-test) and immediately prior to the final examination in Session 16 (Post-test). Statistical verification relies on paired-samples t-tests and Cohen's d effect size calculations.

**2. Experimental Breaststroke Intervention Program for Aquaphobic Students at Van Lang University.**

- **Experimental Subjects:** 100 students enrolled in the swimming course with aquaphobia were randomly allocated into two groups:

- **Experimental group:** 50 students, trained under the experimental curriculum integrating breaststroke techniques with psychological interventions.

- **Control group:** 50 students, trained under the university's conventional swimming curriculum

Intervention Program Framework (150 Minutes/Session, 1 Session/Week): The curriculum was executed across 16 weeks under a 3-credit framework. Each practical session followed a standardized timeline: 25 minutes of dry-land psychological preparation and warmup; 45 minutes of Phase 1 in-water technique instruction; 15 minutes of active land-based mid-break (towel drying, warm water rehydration to combat hypothermia and break cold-induced shivering reflexes); 50 minutes of Phase 2 in-water consolidation and paired distance swimming; and 15 minutes of recovery floating and reflective debriefing. The 16-week progression comprises four distinct phases:

- **Phase 1 (Weeks 1 – 4): Water Familiarization & Survival Skills:** Pre-test administration (STAI Form Y-1) in Session 1. Practice rhythmic breathing, open-eye diving with goggles, prone and supine floating (starfish/tuck floats), and push-and-glide recoveries to standing in shallow water (1.0 – 1.2 m).

- **Phase 2 (Weeks 5 – 8): Breaststroke Kick Mechanics & Breathing Synchronization:** Master the 4-phase kick cycle (Recover – Turn – Kick – Glide) from land to water; pool-edge kicking coordinated with exhalation; kickboard propulsion over 10 – 15 m to eliminate calf cramping and muscular tension.

- **Phase 3 (Weeks 9 – 12): E-learning & Comprehensive Coordination:**
- **Week 9 (150-minute Online E-learning):** 3D kinematic video analysis of breaststroke technique, diagnosing common sinking errors (excessive arm pull depth, uncoordinated timing), and intensive guided mental imagery.

- **Weeks 10 – 12 (Field Instruction):** Perfect arm pull mechanics, coordinate arm-leg-breathing rhythm, and

progressively transition 15 – 20 m swimming toward supervised deep-water zones (1.4 – 1.6 m).

- **Phase 4 (Weeks 13 – 16):** Distance Mastery, Mock Examination & Final Assessment: Continuous repetition across 25 – 50 m; mock testing in Week 15 to alleviate test anxiety. Week 16 Final Examination: Post-test administration (STAI Form Y-1) immediately prior to the practical exam to evaluate state anxiety reduction and verify breaststroke achievement benchmarks.

**Conclusion**

1. **Validation of the Assessment Tool:** The study successfully standardized the State Anxiety Inventory (STAI Form Y-1) into a 20-item instrument (10 positive and 10 reverse-scored items) through 20-expert evaluations (> 80% consensus) and a pilot test on 60 students. The scale demonstrated excellent internal consistency ($\alpha = 0.882$, all ri-t $\geq 0.480$), meeting all scientific criteria for quantifying pre-immersion aquaphobia.

2. **Construction of the Intervention Program:** A 16-week experimental curriculum (150 minutes/session) was systematically established, integrating breaststroke instruction with multi-modal psychological techniques (systematic desensitization, diaphragmatic breathing, PMR, and Week 9 E-learning imagery). Incorporating a 15-minute warm mid-break effectively prevented hypothermic rigidity and mitigated psychological distress, establishing an empirical pedagogical foundation to enhance swimming pass rates for aquaphobic university students.

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