Dear Students,

Greetings! Thank you for taking part in this questionnaire survey regarding the application of the BOPPPS+AI teaching model in nephrology clerkship training. This questionnaire aims to investigate your perceptions, attitudes and expected learning outcomes towards the six-stage BOPPPS+AI teaching framework (Bridge-in, Objectives, Pre-assessment, Participatory Learning, Post-assessment, and Summary), so as to provide evidence for optimizing clinical clerkship teaching strategies.

The questionnaire covers your practical experience with AI-assisted tools (including the DoctorU mini-program and Shengyun Medical Education Platform), the impacts of this integrated model on your learning motivation and clinical competencies, as well as its comparative advantages relative to conventional teaching approaches. Your responses are of great significance to our research. All collected personal data will be kept strictly confidential and used solely for academic analysis.

Please fill out the questionnaire based on your genuine feelings and real experience. It will take approximately 5 to 8 minutes to complete. We appreciate your support and cooperation!

Basic Information

1. Your gender:

A. Male

B. Female

2. Your Age:

A. Under 15

B. 15–20

C. 21–25

D. 26–30

E. Over 30

3. Your Grade:

A. Undergraduate Year 3 and below

B. Undergraduate Year 4

C. Undergraduate Year 5

D. Resident Trainee

E. Postgraduate Student

4. Your Institution:

A. Central South University

B. Other universities

Perception of the BOPPPS+AI Model

1. After the PPT introduction, how well do you understand the six stages: Bridge-in (AI consultation), Objectives, Pre-test, Participatory Learning (virtual puncture), Post-test, and Summary?

A. 1 = Not understand at all

B. 2 = Slightly understand

C. 3 = Neutral

D. 4 = Fairly understand

E. 5 = Fully understand

2. Do you think the process of virtual case consultation and medical history collection via the DoctorU mini-program (Bridge-in) is clear and easy to follow?

A. Extremely unclear

B. Slightly unclear

C. Neutral

D. Fairly clear

E. Extremely clear

3. Do you believe pre-class online questionnaires and oral quizzes (Pre-assessment) help identify your knowledge gaps and learning demands?

A. No help at all

B. Minimal help

C. Neutral

D. Moderately helpful

E. Extremely helpful

4. How helpful is the virtual thoracentesis training on the Shengyun Medical Education

Platform (Participatory Learning) for you to grasp procedural steps and key operational points?

A. No help at all

B. Minimal help

C. Neutral

D. Moderately helpful

E. Extremely helpful

5. Do you think AI learning analytics from Xuexitong online tests and operation statistics on the Shengyun Platform (Post-assessment) can comprehensively reveal your overall weaknesses in theoretical knowledge and practical skills?

A. Not at all

B. Barely

C. Moderately helpful

D. Significantly helpful

E. Extremely helpful

6. If the Summary session delivers targeted review based on AI-generated personal learning reports, do you think it can resolve your learning confusion better than a unified generic summary?

A. Not at all

B. Barely

C. Moderately helpful

D. Significantly helpful

E. Extremely helpful

Expected Learning Outcomes

1. Learning Interest: Predict how your interest in clinical clerkship will change after participating in the BOPPPS+AI model.

A. 1 = Significantly decreased

B. 2 = Decreased

C. 3 = No obvious change

D. 4 = Increased

E. 5 = Significantly increased

2. Theoretical Mastery: Predict how well you will systematically master thoracentesis standard procedures, contraindications and related knowledge after the BOPPPS+AI training.

A. 1 = Barely grasp any knowledge

B. 2 = Master very little

C. 3 = Master partial knowledge

D. 4 = Master well

E. 5 = Master excellently

3. Clinical Thinking: Predict the improvement degree of your clinical thinking ability (case analysis → puncture risk assessment → individualized treatment planning) via this model.

A. 1 = No improvement at all

B. 2 = Minimal improvement

C. 3 = Moderate improvement

D. 4 = Significant improvement

E. 5 = Great improvement

4. Practical Skill Improvement: Predict how effectively virtual puncture training on the Shengyun Platform can compensate for insufficient real clinical practice opportunities.

A. 1 = Cannot compensate at all

B. 2 = Barely compensate

C. 3 = Moderately effective with limited benefits

D. 4 = Well compensate

E. 5 = Fully compensate

5. Innovative Learning Ability: Predict how much AI tools (intelligent consultation, virtual operation training) inspire you to explore new learning methods.

A. 1 = Not inspire at all

B. 2 = Barely inspire

C. 3 = Neutral

D. 4 = Fairly inspiring

E. 5 = Highly inspiring

Comparison with Other Teaching Models

1. Among LBL, PBL and BOPPPS+AI models for nephrology clerkship, which best stimulates your learning interest?

A. BOPPPS+AI model

B. LBL model

C. PBL model

2. Compared with LBL and PBL, which model deepens your understanding of thoracentesis standards (procedures, contraindications)?

A. BOPPPS+AI model

B. LBL model

C. PBL model

3. Compared with LBL and PBL, which model better improves your clinical decision-making ability (case analysis → risk assessment → individualized plan formulation)?

A. BOPPPS+AI model

B. LBL model

C. PBL model

4. What are the biggest advantages of BOPPPS+AI over traditional LBL/PBL? (Multiple choices allowed)

A. Better stimulate student participation

B. More accurate evaluation of learning outcomes

C. Better integrate theory and practice

D. Higher personalization

E. Others (please specify)

Acceptance and Concerns

1. Would you like to adopt the BOPPPS+AI model during clerkship?

A. 1 = Extremely unwilling

B. 2 = Unwilling

C. 3 = Uncertain

D. 4 = Willing

E. 5 = Extremely willing

2. What potential obstacles may exist during implementation? (Multiple choices allowed)

A. Complex operation of AI tools with high learning barriers

B. Large gap between virtual training and real clinical scenarios, unable to fully replace real clinical experience

C. Extra time consumption

D. Restrictions of network and hardware equipment

E. Others (please specify)

Open-ended Suggestions

What specific suggestions do you have to optimize the BOPPPS+AI teaching model?