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KNOWLEDGE AND DETERMINATION OF ARTIFICIAL INTELLIGENCE IN EDUCATION SYSTEM SCALE: VALIDATION AND RELIABILITY IN PHYSIOTHERAPY EDUCATION

Hetvi Dimothe[1], Anjal Prajapati[2]

[1] KD Institute of Physiotherapy, Ahmedabad, India
[2] Third Year BPT Student, KD Institute of Physiotherapy

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ABSTRACT

Background: Artificial Intelligence (AI) is transforming education, including physiotherapy training, by enhancing learning methodologies and clinical decision-making. Assessing AI awareness among physiotherapy students is essential for effective curriculum integration.

Objective: This study aims to validate the Knowledge and Determination of Artificial Intelligence in Education System Scale, measuring AI awareness among physiotherapy students.

Methods : The validation process involved face and content validity assessments by experts. Reliability was evaluated using Cronbach's alpha for internal consistency. A total of 100 physiotherapy students participated by completing the questionnaire.

Results: The scale demonstrated good validity and reliability, with a Content Validity Index (CVI) of 0.79 and a Cronbach's alpha coefficient of 0.907.

Conclusion: The Knowledge and Determination of Artificial Intelligence in Education System Scale is a valid and reliable tool for evaluating AI awareness in physiotherapy education. Further research should explore its application across diverse student populations.

Keywords: Artificial Intelligence, Physiotherapy Education, Reliability, Validity, Content Validity.

INTRODUCTION

Artificial Intelligence (AI) is a transformative technology that has made significant strides across various industries, including healthcare and education. In recent years, AI has demonstrated immense potential in revolutionizing how professionals' approach complex problems, optimize decision-making processes, and

enhance overall efficiency[1]. Within healthcare, AI has proven its ability to support clinicians with improved diagnostic accuracy, personalized treatment plans, and enhanced patient care outcomes[2]. This technological evolution has extended to education, particularly in physiotherapy training, where AI is redefining how students learn and interact with clinical scenarios [3]. As the physiotherapy field becomes increasingly reliant on data-driven decision-making and technological tools, it is essential to explore how AI can be integrated into educational settings to prepare future physiotherapists for the demands of an AI-enhanced healthcare environment[4].

AI applications in physiotherapy education hold great promise in providing innovative and adaptive learning experiences for students. These applications include the use of machine learning models to analyze vast datasets, virtual simulations that allow for interactive and immersive learning, and personalized feedback systems that cater to each student's unique learning pace[5]. For example, machine learning algorithms can predict the outcomes of various rehabilitation treatments based on patient data, enabling students to see firsthand how treatment plans may evolve based on clinical evidence[6]. Additionally, AI can be integrated into virtual patient interactions, offering students the opportunity to practice diagnosing and treating conditions in a risk-free environment, thus enhancing both their technical and decision-making skills[7]. This type of adaptive learning creates a more dynamic and engaging educational experience, empowering students to develop competencies that align with the future demands of the profession[8].

As AI becomes more embedded in physiotherapy education, it is essential to assess the level of AI knowledge and awareness among physiotherapy students[9]. Understanding the degree to which students are familiar with AI and its potential applications is crucial for designing educational interventions and curricula that effectively integrate these technologies[10]. Moreover, it is important to evaluate students' perceptions and readiness for incorporating AI into their clinical practice. The development of a reliable and validated scale to measure AI knowledge in physiotherapy education can offer valuable insights into the current state of AI literacy among students, guiding curriculum development to ensure that future practitioners are well-equipped to leverage AI tools[11].

The integration of AI into the educational environment is not without challenges. While the benefits of AI applications are evident, there are significant barriers that must be addressed, including the need for faculty training, resistance to change among educators and students, and concerns about the ethical implications of AI in healthcare[12]. Furthermore, AI's rapid development means that students must continually update their knowledge to keep pace with technological advancements[13]. This calls for educational systems to remain agile and responsive, ensuring that students are equipped with the skills necessary to not only use AI tools but also critically evaluate and adapt them as part of their professional practice[14].

Given these considerations, a systematic approach to evaluating AI awareness in physiotherapy students is crucial for understanding gaps in knowledge and areas of strength[15]. This study proposes the development

and validation of a scale specifically designed to assess AI knowledge in physiotherapy education[16]. By providing a standardized measure of AI literacy, the scale aims to support the identification of key learning outcomes, inform curriculum adjustments, and guide the incorporation of AI technologies in physiotherapy education[17]. The successful integration of AI into the educational framework can help ensure that future physiotherapists are prepared to thrive in a technology-driven healthcare landscape, ultimately improving patient outcomes and the overall quality of care[18].

In summary, the increasing prominence of AI in physiotherapy education highlights the need for an evidence-based approach to evaluate students' knowledge and understanding of these technologies[19]. This study seeks to bridge this gap by developing a robust tool to assess AI awareness, thereby contributing to the effective integration of AI into physiotherapy curricula and fostering a generation of physiotherapists who are well-prepared to utilize AI in their clinical practice[20].

METHODOLOGY

Study Design

A cross-sectional study was conducted among 100 physiotherapy students to evaluate the reliability and validity of the AI knowledge scale.

Scale Development

The scale was designed based on existing literature on AI in healthcare and education. It included items assessing AI knowledge, perceptions, and applications in physiotherapy.

To achieve this aim, two steps approach was adopted. First step being construction of Test (Scale) and second preliminary investigation of Psychometric properties. In the first step, test items were generated from literature review, expert review of these items, and investigation of item properties. The second step consisted of investigation of validity of test in terms of sensitivity and checking reliability of the scale.

First step - Test construction

Content of items were selected from the literature review and included issues identified previous as important to create awareness about Artificial Intelligence in Physiotherapy Students. The items included were about enhancement of Quality of treatments, AI assisted ethical concerns, resistance to change from traditional physiotherapy methods and facilitators and barriers in the adoption of AI in physiotherapy practice. Simple language with one theme per sentence was maintained for better readability. 20 items were generated more than the required as recommended by Nunnally and Bernstein , 5 point likert scale was formulated to reduce likelihood of guessing.

The questionnaire was drafted under four domains: demographics, knowledge, barriers and facilitators to adoption of AI in Physiotherapy and willingness of students to adopt AI in future practice. There were five questions in knowledge, five questions in barriers and facilitators to adoption of AI in Physiotherapy and five in willingness of students to adopt AI in future practice ; a total of 20 questions were formed. The content validity ratio (CVR) was calculated based on the responses of the panel experts.

Pilot testing of the scale was done through expert review and estimation of item properties. Expert review was done by inviting 8 physiotherapists working in various fields of Physiotherapy to comment on overall structure and optimal content. The reviewers were asked to comment on each item of scale on 4 dimensions via clarity of item wording, relevance of item to the overall aim of scale, whether the item should be included or excluded with a specific reason, if to be excluded, perceived usefulness of an item for overall use of the scale, on a binary scale of yes or no. Finally, a comment was invited about the clinical and research applicability of the scale on a 5-point Likert scale. All reviewers responded within a given time frame.

Step Two: Preliminary Investigations of the Psychometric Testing

After finalizing the items of test, first step was to assess readability, reliability, and validity. A readability analysis was performed to check the comprehensibility. It reveals that, the language used was of "standard" level based on formal criteria .

A total of three indices (relevance, clarity and representativeness) were used to determine the content validity of each item in the instrument. A Likert-type rating scale of 1–4 was used to rate each item of the indices (1 = not relevant, 2 = somewhat relevant, 3 = relevant and 4 = very relevant). The completed rating scores from the experts were then collected to calculate the item content validity index (I-CVI) and the overall content validity of the instrument. The panel of experts were encouraged to give written feedback and recommendations on the overall structure of the CCEVI. The I-CVI of the entire instrument was calculated based on the proportion of items in the instrument that achieved a relevant rating by the content experts. It has been shown that an acceptable content validity index (CVI) score from a panel of 3–5 experts is 1.00[21]

- Face Validity: Five subject-matter experts reviewed the scale for clarity and relevance.
- Content Validity: A panel of experts assessed the appropriateness and comprehensiveness of items, leading to the calculation of the Content Validity Index (CVI).
- Reliability Analysis: Internal consistency was measured using Cronbach's alpha.

Data Collection

100 Participants completed the questionnaire via Google Forms, and responses were analyzed for statistical validation using SPSS version 21.

RESULTS

- Validity Analysis

The Content Validity Index (CVI) was 0.79, indicating satisfactory content validity.

- Reliability Analysis

The Cronbach's alpha coefficient was 0.907, demonstrating strong internal consistency through SPSS v21.

Table 1: Reliability Statistics Table

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha based on Standardized Items	No. of Items
0.907	0.890	20

Table 2: Basic awareness about Artificial Intelligence in Physiotherapy Students

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Al may enhance the quality of physiotherapy treatments.	1.9%	2.9%	35.2%	55.2%	3.8%
Al may reduce the workload of physiotherapists.	1.9%	4.8%	31.4%	55.2%	5.7%
Al-based simulations and virtual learning can enhance physiotherapy education	1.9%	1%	22.9%	62.9%	10.5%
AI-assisted physiotherapy, such as motion analysis, robotics, and virtual rehabilitation, is increasingly integrated into clinical practice.	5.7%	1.9%	36.2%	54.3%	5.7%
Al-assisted physiotherapy poses ethical concerns (e.g., privacy, data security).	2.9%	9.5%	41.9%	41.9%	2.9%

The table presents key insights into AI's impact on physiotherapy. A majority of respondents agree that AI can enhance the quality of physiotherapy treatments (55.2% agree, 3.8% strongly agree) and reduce the workload of physiotherapists (55.2% agree, 5.7% strongly agree). AI-based simulations and virtual learning were also recognized as valuable tools for physiotherapy education (62.9% agree, 10.5% strongly agree). Additionally, AI-assisted physiotherapy, including motion analysis, robotics, and virtual rehabilitation, is becoming increasingly integrated into clinical practice (54.3% agree, 5.7% strongly agree). However, ethical concerns such as privacy and data security remain a topic of discussion, with 41.9% agreeing that AI-assisted physiotherapy raises such issues.

Table 3: Barriers in the adoption of AI

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The high initial investment and maintenance costs of AI systems are major barriers to their widespread adoption in physiotherapy clinics and institutions	1%	3.8%	27.6%	56.2%	10.5%
Lack of awareness and education about Al in physiotherapy	1.9%	3.8%	26.7%	52.4%	14.3%
Resistance to change from traditional therapy methods	1.9%	5.7%	53.3%	36.2%	1.9%
Need for specialized training to use Al tools	1%	4.8%	18.1%	64.8%	10.5%
Risk of job replacement for physiotherapists	6.7%	7.6%	19%	30.5%	35.2%

The summarized table highlights key barriers to AI adoption in physiotherapy. High initial investment and maintenance costs were identified as significant challenges, with 56.2% of respondents agreeing and 10.5% strongly agreeing. Similarly, a lack of awareness and education was noted as a barrier (52.4% agree, 14.3% strongly agree). Resistance to change from traditional therapy methods was observed, with a majority of respondents remaining neutral (53.3%). The need for specialized training to use AI tools was strongly recognized, with 64.8% agreeing and 10.5% strongly agreeing. Additionally, concerns over job replacement due to AI were notable, with 30.5% agreeing and 35.2% strongly agreeing, indicating apprehensions about AI's long-term impact on physiotherapy roles.

Table 4: Facilitators in the adoption of AI

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
More Al training programs for students and professionals are needed.	1%	1.9%	25.7%	64.8%	5.7%
Reducing the cost of Al technology will encourage its use	1%	5.7%	20%	57.1%	15.2%
Including Al-related content in physiotherapy education will improve adoption.	1%	5.7%	41%	41.9%	9.5%
Government and institutional support will help Al integration in physiotherapy	1%	1%	34.3%	52.4%	10.5%
Increased awareness through research and education will facilitate Al adoption	1%	1%	22.9%	60%	14.3%

The table highlights key facilitators in AI adoption within physiotherapy education. The majority of respondents agree that increasing AI training programs for students and professionals (64.8% agree, 5.7% strongly agree) and reducing AI technology costs (57.1% agree, 15.2% strongly agree) would encourage adoption. Similarly, incorporating AI-related content into physiotherapy curricula received significant support (41.9% agree, 9.5% strongly agree). Government and institutional backing (52.4% agree, 10.5% strongly agree) and increasing awareness through research and education (60% agree, 14.3% strongly agree) were also seen as essential steps for successful AI integration

Table 5: Willingness to adopt AI in Future Practice

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Will you actively seek information about Al in health care and physiotherapy	1.9%	3.8%	31.4%	54.3%	7.6%
Do you believe your physiotherapy curriculum should include more structured content on AI applications in clinical practice and education	22.9%	2.91%	28.6%	58.1%	8.6%
Will you be interested in attending Al training/certification programs?	58.1%	10.5%	4.81%	15.2%	55.2%
Will you consider using Al-assisted tools in future physiotherapy practice ?	0%	0%	27.6%	2.9%	27.6%
Learning Al applications will be beneficial for student's future physiotherapy practice	1%	1.90%	15.2%	60%	21%

The table reflects students' perspectives on AI in physiotherapy education. A majority (54.3%) expressed willingness to seek AI-related information in healthcare, while 58.1% believed AI content should be more structured in their curriculum. Interest in AI training or certification programs was mixed, with notable responses across all categories. Regarding AI-assisted tools in physiotherapy, 27.6% were neutral, while another 27.6% strongly agreed to consider them. Most respondents (60%) agreed that learning AI applications would benefit their future physiotherapy practice, reinforcing the need for AI integration into physiotherapy education.

Findings Interpretation

High reliability and validity suggests that the scale provides consistent measurements of AI awareness among physiotherapy students.

DISCUSSION

The findings indicate that the developed scale is a reliable and valid tool for assessing AI awareness in physiotherapy students. The high Cronbach's alpha suggests strong internal consistency, aligning with previous AI literacy assessment tools.

Limitations

- The study sample was limited to a single institution, restricting generalizability.
- Self-reported responses may introduce bias.
- Further validation with a diverse population is required.

Future Directions

- Expanding the study to include physiotherapy students from multiple institutions.
- Evaluating the scale's predictive validity in assessing AI competency.
- Incorporating AI-based interventions and reassessing AI awareness post-training.

CONCLUSION

This scale may add to the pool of outcome measures which can be used for future researchers, either to measure the awareness at baseline or to assess the efficacy of educational. The Knowledge and Determination of Artificial Intelligence in Education System Scale is a valid and reliable tool for assessing AI awareness in physiotherapy education. Future studies should explore its application in diverse educational settings to further establish its utility.

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