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Review

A Review of Research on Attitude Scales for Artificial Intelligence in Education and Future Prospects

Yifei Wang*
School of Public Health, Southern Medical University, Guangzhou 510000, China.
***Corresponding author:** Yifei Wang, 13823388576@163.com.

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Abstract: This research systematically examines the current development of the attitude scales to AI applications in education, profiles the psychometric properties and encourages the development of attitude scales appropriate to the Chinese context. This work systematically organizes and compares the measurement instruments of attitudes toward artificial intelligence in education based on a literature review. Results: 7 scales were finally screened out, falling into 3 categories: student scales (4 scales), teacher scales (1 scale), and general scales (2 scales), with the item number between 4-28 and the dimensional number between 1 and 5; the internal consistency reliability is generally high, having Cronbach's α between 0.84 and 0.902; the retest reliability is not reported thoroughly, with only one scale existing temporal stability evidence. The development of attitude scales toward artificial intelligence in education is not up to the requirements of China's research needs, and there are problems such as the poor cultural adaptability of the scales, imperfect measurement content, and a simple range of application. This study may serve as reference for scale selection in the field of education and illustrates the timeliness for developing the measurement scales toward AI attitude in China.

Keywords: artificial intelligence attitude scales; education sector; psychometric characteristics; localized development

1. Introduction

With the development of artificial intelligence, education is transforming from the “teacher-student” binary model to the “teacher-machine-student” collaborative model (Chai et al., 2024). The attitudes of teachers and students will be crucial for the successful use of AI (Zhang et al., 2023). And the report of Zhejiang University (Chiu et al., 2025) also shows that the degree of AI literacy of college students is closely related to the effect of educational artificial intelligence promotion. The most crucial aspect of educational reform is that the teachers determine the level of AI literacy, which will ultimately determine the progress of smart education (Grassini, 2023). Meanwhile, education departments in different areas are also investigating the practice of AI education. The AI literacy framework for primary and secondary teachers and students in Guangdong province was published first (Marengo et al., 2025), followed by a student AI competency framework, published working with UNESCO (Galindo-Domínguez et al., 2024). Many researchers have talked about the ideational framework and elements of AI literacy from their own angles (Schepman & Rodway, 2023), and few have begun to pay attention to the effect of attitude measurement towards intelligent technology acceptance (Suh & Ahn, 2022). The incorporation of AI in education has greatly increased over the last 10 years due to the rapid development of machine learning, natural language processing, and adaptive learning systems. Schools and universities throughout the world are getting serious about the potential of AI to allow for personalized learning experiences, automate basic admin tasks and facilitate intelligent tutoring support. Nevertheless, the adoption and propagation of these advances are highly influenced by the perceptions and attitudes of the prominent players in the educational environment.

User attitudes are, indeed, commonly found as “the cornerstone of models of technology acceptance for end-users,” as stated by Molla and Licker. When it comes to AI in education, understanding and measuring AI attitudes are of particular importance given the complexity and newness of these technologies. Unlike conventional educational technologies, AI systems often include complex algorithms which may be capable of taking decisions on their own, that can learn from users: or that can act in ways that may not at first be apparent to users.

Currently, most literature focuses on the theoretical building of attitude scales (Viberg et al., 2024), rather than providing a strong systematical review of attitude scales within the area of educational AI and little is investigated of what features of scales are more preferred, and their advantages and constraints. The present work systematically reviews the studies on the attitude scales for AI in education and compares the psychometric properties of different scales, as well as limitations of and insufficiencies in scale development, so as to offer insights for the localization of scale development in future research. The significance of this study is both theoretical and practical to promote the educational human-computer era of artificial intelligence turns (Yim & Wegerif, 2024). The increasing attention for evidence-based educational practices has strengthened the demand for valid measurement instruments that properly captures stakeholder attitudes towards AI-technologies. Researchers and practitioners require valid and reliable attitude scales in order to understand the factors that affect the acceptance of AI, better understand obstacles to implementation, and create effective professional development programs. As schools and universities continue to invest in AI and related technology, there is a clear need for tools to understand the return on investment in terms of human experience.

2. Analysis of the Current Status of AI Attitude Scales in Education

2.1. AI Attitude Scales for Student Groups

There have been varied trends of student Artificial intelligence attitude scales developments. Researches show that students' artificial intelligence attitude plays and effect on the students' attitude of technology and use effectively. Existing scales include the generative AI-assisted learning attitude scale that was developed with the ABC three-dimensional model (affective, behavioral, and cognitive) and the student generative artificial intelligence attitude scale (S-GAIA), constructed using a positive-negative binary framework that affords easy and effective measurement with positive and negative attitude comparison. Student-centred AI attitude instruments have strong theoretical underpinnings in established attitude theories with the tri-component model of attitudes, cognitive, affective and behavioral, being of central

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importance. This theoretical base is essential for comprehending how students do not see AI technologies as just tools that they use but as entities that have the ability to affect the way that they learn, their achievement at school, and their future career prospects. The cognitive aspect covers what learners know and believe about the capabilities and constraints of AI, while the affective dimension measures how learners feel, i.e., experiences of excitement, interest, anxiety, and curiosity. The behavioral component is intention to use or use AI in educational settings.

More recent advances in measuring student attitudes toward AI have been influenced by the Technology Acceptance Model (TAM) and its modifications based on the realization that the perceived usefulness and the ease of use are essential factors in the student acceptance process. Yet, other than for traditional technology acceptance models, the particular demarcation of AI technologies as systems with learning capabilities, possibility for autonomous decision and personalization necessitate new conceptualizations.

The SATAI scale inherits the four-dimensional tradition of cognition, affect, and behavior, on the theoretical model, and is aimed at the student population of K-12, calculating the scale total score by [formula]. Informed by the principles of functional attitude theory, the FAAI scale measures the three dimensions (utility cognition, value expression, and ego-defense) of students' attitudes toward artificial intelligence. This scale can assess students' practical attitude from different angles and specific target. Because of the varied measurement requirements of the artificial intelligence attitudes of the learners, this scale has multiple versions. The creation of student-oriented scales has also exposed crucial age-specific aspects. Younger students will conceptualize AI differently from older students; thus, the use of developmentally appropriate language and concepts is essential. Furthermore, students' previous experiences with AI technologies, for example, through schooling or practical use of AI-based applications, are highly relevant to students' attitudes and this influence needs to be taken into account when developing and interpreting scales.

2.2. AI Attitude Scales for Teacher Groups

There is little research in to teacher artificial intelligence attitude scales. The TATAIE scale is a widely used instrument, which comprises five constructs (interest, usage intention, ethics, etc.) of 28 entries with 5-point Likert, it can be counted as one of the tailored scale features for a specific disciplinary domain. Teacher AI attitude scales demonstrate professionally oriented and morally concerned features, and are more concentrated on AI's favorable effect on teaching practice and students. The domain-specific design attributes contribute toward the educational context sensitivity of the scale, but they reduce the generalizability of the scale and the comparative study across groups.

Teacher attitudes about AI in education are especially multifaceted since these technologies touch upon issues of professional development and maintenance. While students may predominately see AI as a learning tool, teachers much consider how AI affects their professional identity, teaching success, job continuation, and ethical obligations. This complexity requires measurement tools able to depict this multi-dimensionality of teacher attitudes in a sensitive manner that considers the variety of contexts teachers are working in.

The professional development implications of teachers' adoption of AI are an additional level of complexity when measuring teachers' attitude. There is also teacher fear of AI related to: increasing training, the time required to master a new tech, the impact of AI on professional autonomy in a positive or negative sense. These concerns are apparent in the dimensional structure of the teacher-centred scales, which generally encompass factors of professional capability, instructional effectiveness and school support.

In addition, great variation in the attitudes is also found between teachers according to their subject category. For example, STEM teachers might have a different view on AI than humanities teachers, due to both different exposure to technology and topical relevance for teaching. As a result, subject-specific versions of teacher attitude scales have been constructed, but such specialization limits the possibility of a more general comparability across school and educational systems.

2.3. Application of General AI Attitude Scales in Educational Settings

General AI attitude scales are well-adjusted to educational environments. The GAAIS scale has a bipolar two-dimensional structure, 20 items, and is independent of positive-negative correlation, which can predict students' reactions to AI-based educational applications effectively. The AIAS-4 scale is comprised of only four items and is 10-point Likert scored, and thus is suitable for rapid administration in educational settings. There are some general scales that have practicality and convenience for cross-group comparison but lack educational specificity and are not difficult to express professional attitudes in educational environment. General domain and domain specific scales in combination might offer broader view to AI attitude measurement in educational context.

3. Comparison of Psychometric Properties of Existing Scales

3.1. Analysis of Reliability and Validity Characteristics

The quality of attitude scales in education is mixed, with fewer performing well than poorly. The results of reliability analysis show that the Cronbach's α values across all the seven scales are between 0.84 and 0.902, indicating that the internal consistency of the seven scales is well. Test-retest reliability was severely underreported across the reviewed scales. Among all seven scales, only the SGAI scale explicitly reported temporal stability data (r=0.90), which significantly limits the utility of these instruments for longitudinal research. As for construct validity, SATAI and FAAI scales demonstrated proper fit in stringent confirmatory factor analysis models, whereas for most other scales (a) factor structure analyses are not available (b) analysis were not in-depth. In terms of criterion validity, there is no correlational criterion of the previous instruments, and there is no empirical study which demonstrates the predictive and incremental validity of the attitude scales, thereby affecting the application value and theoretical explanation ability of the scales.

3.2. Comparison of Scale Component Elements

When looking at the sub-components, there are important differences among the attitude's scales. In **Figure 1** the scale dimensions are between the one-dimensional AIAS-4 up to the five-dimensional TATAIE: it indicates that there are different views on AI attitude conceptualization. The number of items ranges widely from 4 (AIAS-4) to 28 (TATAIE) items, indicating the trade-off between enhancing the quality of the measure from the convenience point of view. Rating scales are largely five-point Likert-type (except AIAS-4 which is scored at 10 levels); choice of scale levels has implications for scale sensitivity and discriminability. The target populations of the

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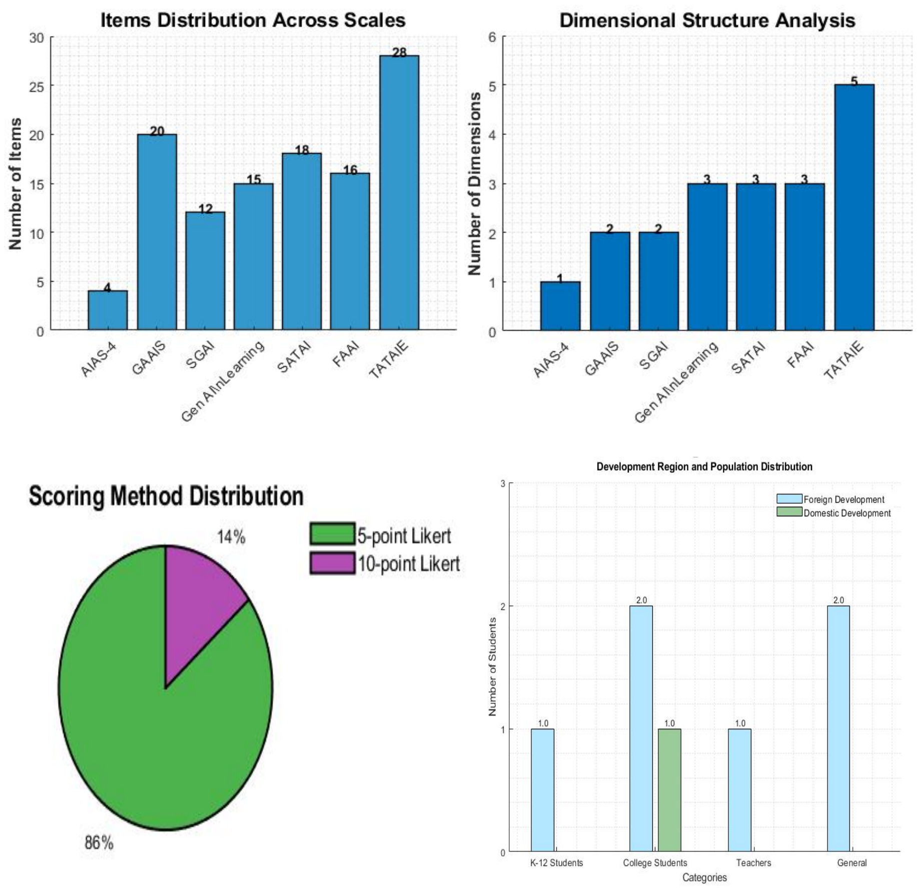
tools show a specialization, TATAIE that fits only EFL teachers, SATAI that fits only K-12 students; while GAAIS and AIAS-4 are meant to be suitable for a wider range of people. Hyperlocal scales have targeted measurement efforts but reduce the ability to compare across groups. Most of the regional scales have been developed in foreign countries as the number of domestic indigenous scales is limit.

Figure 1

Characteristics analysis of measurement tools for AI attitude scales in the field of education



4. Discussion

There is lack of agreement about the dimensionalities of the existing AIAS in various educational areas, and only a small number of AI attitude instruments cater to the particular area. Most samples were from Western countries with low generalizability; most of the items lack polarity and cross-cultural validation; cross-sectional studies are not complemented by longitudinal follow-up; assessment instruments are largely dependent on self-report questionnaires, thus suffer from

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social desirability bias. Theoretical Basis and Application Scope As we found, educational domain-based scales do not have good theoretical consistency and universality, and the theoretical support of which remains weak. Recent map of AI attitude scales leads to several theoretical limitations that impede their success in educational domains. Most scales are without a sound theoretical basis and are based on various theories that are not well integrated. This theoretical division of the scale interprets it as a multicomponent measure of different facets of AI attitudes, rather than offering a cohesive conceptualization of the construct. Moreover, the lack of a theory that is tailored to AI in education is a strong limitation that impacts both the validity of current instruments and the extent to which results can be compared across studies.

The Western construction of the available scales raises the cross-cultural applicability problem, in particular for non-Western educational systems. Cultural disparities in technology acceptance, values of education, teacher-student relationships, and conceptions of AI present challenges when attempting to utilize current tools for adaptation and potentially hinder the interpretation of the scores. For example, the role of AI and the relevant considerations in AI adoption could be different in collectivistic cultures than in individualistic cultures (e.g., the impact of group consensus and social harmony in the acceptance of AI and its use).

In addition, the reliance on self-report methods affords a number of opportunities for bias other than social desirability, such as response acquiescence and the influence of transient emotional states on responses. The static nature of most existing scales does not model the dynamic development of attitudes over time when users gain more experience with AI technologies, which is especially problematic in educational or teaching scenarios for which users' attitudes may change rapidly.

This research provides a reference for the selection of scales, but new tools with searching bias limitations may have been omitted; future research should further enrich the development of the scales with Chinese characteristics and establish an AI attitude measurement system for the background of Chinese education culture and the AI education application reality assertion 1). Scales development ought to evolve from generalization to specialization, establishing dedicated measurement tools for each specific AI technology, enhancing objective use of multiple methods, assessing every educational level from environmental perspective, converting AI attitude measurement from macro to micro levels.

5. Conclusion

Using a sample from the field of educations, the content applicability, cultural fairness, measurement completeness and population coverage of seven AI attitude scales, ranging from 4 to 28 items and up to five-dimensional structures, was examined. Although these components have shown high levels of reliability (α>0.84), they have remained confined in their application, cultural and/or measure saturation, and the population they represent. In addition to presenting added convenience to the selection of scale for application in educational settings, this review also calls attention to the insufficiency of scales, thus signifying the importance of further education domain scale development. From the perspective of the further integration of AI in education, the Future Scale Assessment System would contribute to the realization of educational intelligent transition, and the scale measurement validity would be more accurate and more comprehensive. This systematic review has provided valuable insights into AI attitude measurement in education by offering a systematic comparison of AI attitude scales used in educational contexts. The comparison of these psychometric properties by scale can be used to make evidence-based choices of instruments depending on specific research questions and setting.

The results suggest a number of important directions for future research and design. Evidently, cultural adapted scales should be developed which most accurately mirrors local educational values and practices. Longitudinal designs are also critical, given that attitudes toward new technologies are dynamic and different procedures are needed to measure change in attitudes as experiences with AI systems are accrued.

Practically, the findings will provide essential direction for educational administrators and policy makers who are interested in understanding stakeholder attitudes towards AI, both prior to rolling out AI initiatives (pre-implementation), during roll out (implementation), and post- implementation. Discovered scale limitations are good to know in relation to decisions on technology adoption strategy and what new change management can be applied.

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