# Artificial Intelligence in Education: Teachers' Trust, Self-Efficacy, Anxiety and Task Value

Fien Depaepe[1,2†], Rani Van Schoors[1,2† *], Stefanie Vanbecelaere [1,2] and Mutlu Cukurova [3]

[1] *Centre for Instructional Psychology and Technology, KU Leuven, Leuven, Belgium*
[2] *itec, imec research group at KU Leuven, Kortrijk, Belgium*
[3] *Knowledge Lab, University College London, UK*

**Abstract**

To achieve sustainable AI implementation, it is crucial to consider teachers, particularly their trust in AI, which influences their adoption of AI technology in the classroom. This study investigated pre-service teachers' trust in AI related to their self-efficacy (SE), anxiety (AN) and task value (TV) of AI-based EdTech. Three objectives were: (1) identifying reliable factors within trust, (2) determining if these factors are associated with background variables and other beliefs (SE, AN, TV) and (3) detecting meaningful profiles that explain differences in other beliefs (SE, AN, TV). A questionnaire based on prior studies [1,2,3] and completed by 311 pre-service teachers revealed four factors via factor analysis: (F1) Trust and confidence in AI-based personalization, (F2) Pitfalls of AI-based EdTech, (F3) Conditions to increase use and trust and (F4) AI-based EdTech vs. Human Advice. Regression analyses showed significant positive effects of SE on F1, F2 and F3, TV on F1, F3, F4 and AN on F4, with a significant negative effect of having completed a theoretical track in secondary education on F4. Cluster analysis identified more pre-service teachers holding lower professional beliefs (n=178; high AN, low SE, and TV) compared to higher professional beliefs (n=133; low AN, high SE, and TV).

**Keywords**

Artificial Intelligence, Teachers' trust, AIED

## 1. Introduction

A critical factor in understanding AI adoption in classrooms is teachers' trust in AI, as it significantly influences their willingness to integrate these technologies into their practice [1,4]. While initial research has begun to explore this, many aspects of trust formation remain unclear. Qin and colleagues [5] highlight that trust is influenced by factors at multiple levels, including school policies, the usability of AI tools, and individual perceptions influenced by transparency, agency, and control. Nazaretsky and colleagues [1] developed a survey to examine three key factors influencing AI use: self-efficacy (SE), anxiety (AN), and task value (TV). Building on their research and contributing to the validation of their questionnaire, this study specifically focuses on these three elements.

SE in AI refers to teachers' confidence in selecting, using, and implementing appropriate AI tools. Teachers with higher SE tend to experience more benefits and fewer concerns regarding AI, enhancing their willingness to adopt these technologies [6]. AN reflects teachers' fears about using AI and its potential impact on their practice. Studies show a negative correlation between SE and AN, meaning higher SE can reduce AN [2]. Finally, TV refers to teachers' assessment of AI's usefulness in education. This study investigates how these factors—AN, SE, and TV— relate to trust

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* Corresponding author.
† These authors contributed equally and should both be seen as first author.
fien.depaepe@kuleuven.be (F. Depaepe); rani.vanschoors@kuleuven.be (R. Van Schoors); stefanie.vanbecelaere@kuleuven.be (S. Vanbecelaere); m.cukurova@ucl.ac.uk (M. Cukurova)
0000-0001-5440-1318 (F. Depaepe); 0000-0003-1462-268X (R. Van Schoors); 0000-0002-5495-2192 (S. Vanbecelaere); 0000-0001-5843-4854 (M. Cukurova)

in AI, offering insights that can inform future research, as well as guidance and professional development for teachers.

## 2. Aims

The study addresses the following research questions: (RQ1) In the context of contributing to the validation of a questionnaire regarding teachers' trust in AI [1,4], can we identify reliable factors based on a new data sample (pre-service teachers) and do factors based on our sample overlap with those distinguished in other contexts (e.g., in-service teachers from Japan and Israel)? (RQ2) To what extent can the identified factors be explained by background variables on one hand and other important beliefs such as SE, AN and TV on the other? (RQ3) Can we detect meaningful profiles of pre-service teachers that explain differences in other beliefs (SE, AN, TV)?

## 3. Methodology

The survey targeted pre-service teachers training to work in primary education to teach students aged from 6-12. It was sent out at the end of the school year 2022-2023. In the country where the study was conducted, teacher education for primary education is offered at universities of applied sciences (hogescholen) and spans three years. The program combines theoretical coursework with practical components, ensuring students gain hands-on experience from the start. The final sample consists of 311 pre-service teachers, of which most are female (84.6%). The respondents' ages range from 17 (n=1) to 55 (n=1), with 61.3% between 17 and 19 years old. Most of the pre-service teachers have an educational background from TSO (technical secondary education, 54.7%) and ASO (more theoretical, general secondary education, 40.5%). Few followed BSO (vocational secondary education, 2.9%) or KSO (artistic secondary education, 1.9%). Depending on their track in secondary education, participants had followed a different amount of math instruction in their last year of secondary education. This was considered because, according to the track, they may also have received a different introduction to educational technology (more practical versus more theoretical). Most participants (43.4%) had 3 hours of mathematics per week in their final year of secondary education.

The survey, consisting of 48 questions, includes only self-report items measured on a 5-point Likert scale and is structured into four sections: (1) trust in AI, (2) SE in using AI, (3) AN about AI, and (4) TV of AI-based tools. All questions were included from previously developed instruments [1,2,3]. The obtained survey data contains only minimal missing data, which was excluded from the analysis and is not expected to impact the results. To assess the internal consistency of the different dimensions of the survey, we calculated Cronbach's alpha, with all values being equal to or greater than .69.

Factor analysis was conducted to identify reliable factors within trust, followed by a comparison with the original study's findings and with results from other contexts (Japan and Israel, see [7]). Reliability for each subscale was evaluated using Cronbach's Alpha, with values exceeding 0.75, indicating good reliability. Based on the previous exploratory factor analysis (EFA), two factor models (4-factor and 7-factor) were selected for further investigation. Fit measures were calculated using confirmatory factor analysis (CFA) with the maximum likelihood estimation for both Varimax and Oblimin rotations. The choice for these two models was influenced by the alpha values, which were sufficiently high for Factors 1 to 4 but not for Factors 5 to 7. Consequently, a 4-factor model was considered, excluding the factors with insufficient alpha values (see Table 1 for variances explained by the four factors extracted in the EFA).

| Factors | Oblimin | Varimax |
|---|---|---|
| F1 | 0.081 | 0.093 |
| F2 | 0.107 | 0.106 |
| F3 | 0.071 | 0.068 |
| F4 | 0.070 | 0.060 |
| Total | 0.328 | 0.328 |

**Table 1:** Variances explained by the four factors extracted in the EFA

To explore the relationships between trust in AI and other variables, two linear regression analyses (using ordinary least squares estimation) were conducted (see Fig. 1). One focused on background variables such as gender, study year, and high school educational track. The other examined SE, AN, and TV scores. K-means cluster analysis was performed to identify distinct profiles of pre-service teachers based on their SE, AN, and TV.

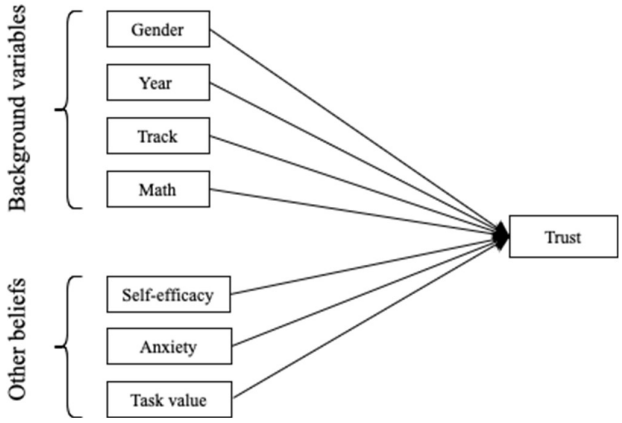


**Figure 1:** visualization of elements within the two linear regressions

## 4. Findings

Regarding RQ1, the exploratory factor analysis (EFA) performed in this study produced a stable 4-factor model, as visualized in the path diagram (Fig. 2). Factor 1 (F1) represents "Trust and confidence in AI-based personalization tools for education". Factor 2 (F2) captures "Pitfalls of AI-based EdTech". Factor 3 (F3) identifies "Conditions to increase use and trust in AI-based EdTech" and Factor 4 (F4) represents "AI-based EdTech vs. Human Advice".

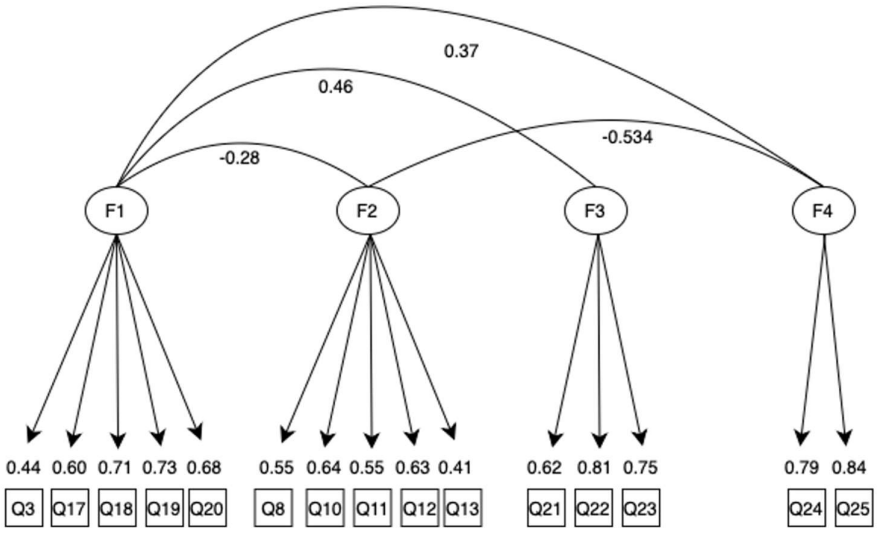


**Figure 2:** Path diagram of the 4-factor model with correlation values. Only significant correlations are visualized.

The factor correlations in the path diagram show significant relationships: F1 is slightly negatively correlated with F2, while positively correlated with both F3 and F4. F2 is negatively correlated with F4, suggesting that teachers who recognize AI pitfalls are less likely to favor combining AI with human advice. In comparison with Nazaretsky [1], who identified a six-factor model, this study's four-factor model shows strong overlap with some of the original factors.

To investigate the relationship (RQ2) between the four identified factors and background variables, as well as beliefs such as SE, AN and TV, four regression analyses were performed. For F1, SE (B = .246; p = .010) and TV (B = .301; p< .001) were significant predictors. Similarly, SE positively influenced F2, F3, and F4. Notably, AN also significantly impacted F4. These results suggest that SE and TV play key roles in shaping teachers' trust in AI.

For RQ3, a K-means cluster analysis using Euclidean distance was performed. Several analyses (3, 4 clusters) were done, but it appeared most meaningful for two clusters. The two clusters identified two distinct profiles of pre-service teachers based on SE, AN, and TV (see table 2). Cluster 1, with 178 participants, showed high AN, low SE, and low TV, termed 'lower professional beliefs.' Cluster 2, with 133 participants, exhibited low AN, high SE, and high TV, labeled 'higher professional beliefs.

| | Cluster | | Error | | | |
|---|---|---|---|---|---|---|
| | Mean square | df | Mean square | df | F | Sig. |
| Self-efficacy | 93.623 | 1 | .700 | 309 | 133.700 | <.001 |
| Anxiety | 131.847 | 1 | .577 | 309 | 228.685 | <.001 |
| Value estimate | 69.953 | 1 | .777 | 309 | 90.046 | <.001 |

**Table 2:** ANOVA – cluster differences

## 5. Theoretical and educational significance

This study examined pre-service teachers' trust in AI, focusing on self-efficacy, anxiety, and task value while contributing to the validation of the Teachers' Trust in AI questionnaire. The

findings provide key theoretical and educational insights, confirming that trust in AI is shaped by contextual, individual, and technological factors [5]. Our results align with existing literature, showing that higher self-efficacy enhances confidence and willingness to integrate AI while reducing anxiety [8]. Insights from RQ2 and RQ3 further clarify how self-efficacy, anxiety, and task value influence trust, suggesting that training interventions should strengthen self-efficacy, highlight AI's value, and address anxiety-related concerns. Additionally, informing AI developers about teachers' beliefs can improve transparency and better align AI tools with educators' needs. While pre-service teachers recognize AI's benefits, such as personalized learning and efficiency [9], concerns persist regarding privacy, ethics, and reduced human interaction. Addressing misconceptions and fostering informed discussions can support AI adoption. AI literacy also plays a key role, as greater understanding enhances self-efficacy [10], yet many studies focus too narrowly on usability and user-friendliness. Our study identified distinct teacher profiles that explain variations in AI trust, enabling targeted interventions and support strategies. Since trust evolves with new policies and technologies, continuous monitoring is essential. Beyond self-efficacy, anxiety, and value estimation, more factors (e.g., teachers' autonomy, agency…) must also be considered, as limited control over AI tools can negatively impact agency and, consequently, trust [11].

## 6. Future steps for this study

This study is still ongoing, which limits the current reporting of methods and results. As we finalize the study and further develop our findings, we aim to provide a more in-depth and comprehensive analysis. For example, one key next step is to validate the selected cluster solution. Similar to factor analysis, we will examine whether the extracted clusters differ based on background variables. This will help determine whether the clusters are meaningfully associated with demographic factors, offering deeper insights into their robustness and relevance across different contexts.

## Declaration on Generative AI

During the preparation of this work, the authors used GPT-4 for Grammar and spelling check. The authors take full responsibility for the publication's content.

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