

Attitudes Toward School Subjects among Students Entering Preschool and Primary Teacher Education Programs

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Students entering teacher education bring with them previous school experiences and subject preferences that may influence how they engage with their studies, how confident they feel in different curriculum areas, and what kinds of pedagogical practices they later develop. This study examined the school subject attitudes of 528 students entering preschool and primary teacher education programs across 12 school subjects. The results showed that students' most favorable attitudes were related to the arts, physical education, humanities, and language, whereas mathematics, physics, chemistry, and technology-related areas received less favorable evaluations. Students' attitudes were organized into different patterns, suggesting that they enter teacher education with diverse support needs from the very beginning of their studies. Primary teacher education students reported more positive attitudes toward several science- and technology-related subjects, whereas preschool teacher education students had more favorable attitudes toward music. Compared with Grade 11 students, students entering teacher education had more favorable attitudes toward literature, art, biology, and history, but evaluated mathematics, physics, and foreign language less favorably. The practical significance of the findings is that teacher education programs should assess students' school subject attitudes at program entry and provide targeted support in areas where students have less positive prior experiences. Strengthening confidence, interest, and pedagogical self-efficacy in science-, mathematics-, and technology-related areas appears especially important.

Keywords: school subject attitudes; school subjects; preschool teacher education; primary teacher education; preservice teachers

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Introduction

Students entering teacher education programs do not begin their professional preparation with neutral views of school subjects. By the time they enter higher education, they have accumulated many years of learning experiences that shape their preferences, emotions, confidence, and perceived competence in different curriculum areas. These attitudes toward school subjects may later influence how future teachers approach subject learning, interpret pedagogical tasks, and develop their professional identity (Efe et al., 2012; Shin & Alpern, 2024). Positive attitudes may support confidence, engagement, and willingness to teach a subject, whereas less favorable attitudes may contribute to avoidance, anxiety, or reduced instructional confidence.

The role of school subject attitudes is especially important in teacher education because future teachers' personal learning histories may become part of their professional practice. Previous research has shown that teachers' and teacher education students' attitudes are related to teaching self-efficacy, classroom practices, and the quality of learning opportunities they provide for students (Kartal, 2020; Letina & Diković, 2021). Negative attitudes toward subjects such as mathematics and science may be particularly problematic, as they can reduce prospective teachers' confidence and willingness to use engaging, inquiry-based, or student-centered approaches (Hourigan & Leavy, 2017; Riegle-Crumb et al., 2015). Conversely, positive attitudes toward a subject may encourage future teachers to create richer learning environments and to support students' interest, curiosity, and motivation.

In the Hungarian educational context, the study of attitudes toward school subjects has a strong research tradition. Csapó (2000) provided an important analysis of students' attitudes toward school subjects, showing that affective factors are meaningful components of schooling and that attitudes differ substantially across curriculum areas. Csíkos (2012) further demonstrated the relevance of examining students' subject preferences directly, using open-ended written responses to explore favorite school subjects. Józsa and Pap-Szigeti (2006) also examined subject

liking as an indicator of subject attitudes in a longitudinal study of students aged 14–18, showing that attitudes toward several school subjects changed substantially during secondary education. More recently, Czető (2022) examined secondary school students' and teachers' school-related attitudes and included subject attitudes as part of a broader school attitude framework. These studies indicate that attitudes toward school subjects are not marginal features of education, but important indicators of students' affective relationship with learning. However, most Hungarian research has focused on school-aged students, while less is known about the school subject attitudes of students entering teacher education.

Czető's (2021) systematic review further highlights the conceptual complexity of school attitude research, showing that constructs such as school attitude, engagement, and school well-being often overlap in their cognitive, affective, and behavioral components. Importantly, she also notes that Hungarian educational research uses related constructs such as school attachment, school attitude, and subject attitude to describe students' relationship with schooling and learning. This supports the need for clear terminology in the present study and justifies the use of the more specific term attitudes toward school subjects.

International research also suggests that attitudes toward school subjects are not equally positive across the curriculum. Mathematics, physics, chemistry, and other science- and technology-related areas often receive less favorable evaluations from teacher education students than humanities, arts, or physical education (Mateos Núñez et al., 2021; Riegle-Crumb et al., 2015). In addition, research on mathematics and science attitudes has shown that positive attitudes may be associated with achievement and may form distinctive attitudinal profiles (Berger et al., 2020). This is educationally relevant because preschool and primary teachers are expected to support children's early experiences across a broad range of domains, including mathematical thinking, scientific curiosity, language development, artistic expression, music, movement, and social understanding. If future teachers enter their programs with low confidence or unfavorable attitudes toward particular subjects, these attitudes may influence their later engagement with subject-specific coursework and teaching practice.

At the same time, attitudes toward humanities, languages, arts, music, and physical education are also important for teacher preparation. These domains contribute to children's communication, creativity, aesthetic development, physical activity, emotional expression, and social participation. Positive attitudes to-

ward literature, history, foreign languages, art, music, and physical education may support future teachers in integrating creative, expressive, and holistic learning opportunities into their pedagogical practice (Bilir-Seyhan & Ocak-Karabay, 2018; Milić et al., 2022; Soini et al., 2021). Therefore, a comprehensive analysis of school subject attitudes should not be limited to mathematics and science, but should include a broad set of curriculum areas.

One important issue is whether students' attitudes toward individual school subjects can be organized into broader domains. Studies on subject-specific attitudes frequently examine single subjects, especially mathematics or science, but this approach provides only a partial view of students' affective orientation toward the curriculum. A broader domain-based approach can reveal whether attitudes are structured around related areas, such as science and technology, humanities and language, natural and social sciences, or arts and physical education. Such information may help teacher educators identify not only individual problematic subjects, but also wider patterns of strengths and vulnerabilities among students entering teacher education.

A person-centered approach can further deepen this understanding. Students may not simply differ in the overall positivity of their attitudes; they may also show different configurations of subject preferences. For example, some students may show generally favorable attitudes across most subjects, whereas others may have strong preferences for humanities and arts but less favorable attitudes toward science and technology. Latent profile analysis can identify such subgroups and provide a more differentiated picture of students' school subject attitudes. This may be useful for teacher education programs because different groups of students may require different forms of academic, affective, and pedagogical support.

School subject attitudes may also differ according to the type of teacher education program. In Hungary, preschool teacher education and primary teacher education prepare students for related but distinct professional roles. Preschool teacher education prepares students to work with children in kindergarten/preschool settings, where play-based learning, holistic development, care, socialization, movement, music, storytelling, and integrated activities are central. Primary teacher education prepares students to teach in the lower grades of primary school, where individual school subjects and subject-specific instructional responsibilities become more explicit. These different professional expectations may contribute to differences in students' attitudes toward particular curriculum areas. Previous research

has also suggested that preschool teacher education students may experience lower confidence in mathematics and science, whereas primary teacher education students may be more strongly oriented toward subject-specific teaching responsibilities (Garbett, 2003; García et al., 2024; Zacharos et al., 2007).

Study mode may represent another source of variation. Full-time and part-time students often enter higher education with different educational histories, life situations, work experiences, and patterns of engagement. Full-time students usually participate more intensively in campus-based learning and peer interaction, whereas part-time students often combine their studies with employment, family responsibilities, or previous professional experience (Kember & Leung, 2005; Leung & Kember, 2006; Lowe & Gayle, 2007). These differences may influence how students relate to school subjects and how they evaluate their own learning experiences. Examining school subject attitudes by study mode may therefore contribute to a more nuanced understanding of the student population entering teacher education.

A further contextual perspective can be gained by comparing students entering teacher education with upper secondary school students. Grade 11 students are still embedded in school learning and are approaching important educational and career decisions, whereas teacher education students have already chosen a teaching-related professional pathway. Comparing these groups may therefore help identify whether students entering teacher education show distinctive subject-attitude patterns before their university-level professional preparation begins. Such a comparison should be interpreted cautiously, because the groups differ in age, educational context, and career orientation. Nevertheless, it can serve as a useful benchmark for understanding the attitudinal profile of future preschool and primary teachers.

Despite the relevance of school subject attitudes, several gaps remain. First, much previous research has focused on individual subjects, particularly mathematics, science, or physical education, rather than examining attitudes across a wide range of school subjects. Second, limited evidence is available on how students entering preschool and primary teacher education differ in their attitudes toward school subjects. Third, study mode has rarely been examined in relation to school subject attitudes, even though full-time and part-time students may have different educational and professional backgrounds. Fourth, comparisons between teacher education students and upper secondary school students remain scarce,

although such comparisons may provide useful contextual information about the distinctive characteristics of future teachers at program entry.

The contribution of the present study is that it combines a broad subject-level perspective with a domain-based and person-centered analysis of school subject attitudes at the point of entry into teacher education. By examining twelve school subjects, broader attitude domains, latent student profiles, program differences, study-mode differences, and a benchmark comparison with Grade 11 students, the study provides a comprehensive picture of the affective orientations that future preschool and primary teachers bring into their professional preparation.

Therefore, the present study examined attitudes toward school subjects among students entering preschool and primary teacher education programs in Hungary. The study investigated attitudes toward individual school subjects and broader subject domains, identified latent attitude profiles, examined differences according to teacher education program and study mode, and compared teacher education students' attitudes with those of Grade 11 students. The following research questions were addressed:

- RQ1. What are entering teacher education students' attitudes toward different school subjects and broader subject domains?
- RQ2. Are there distinct latent profiles of students based on their attitudes toward different subject domains?
- RQ3. To what extent do attitudes toward school subjects differ according to teacher education program and study mode?
- RQ4. How do the school subject attitudes of students entering teacher education programs compare with those of Grade 11 students?

Methods

Participants

The study involved 528 students entering teacher education programs at two Hungarian universities. Participants were enrolled in either preschool teacher education programs, preparing students to become kindergarten/preschool teachers, or primary teacher education programs, preparing students to teach in the lower grades of primary school. Of the participants, 408 were enrolled in preschool teacher education and 120 in primary teacher education. The sample was predominantly female: 511 participants were women (97%) and 17 were men

(3%). Regarding study mode, 114 students (22%) were enrolled in full-time programs and 414 students (78%) in part-time programs.

For contextual comparison, data from 159 Grade 11 students collected in 2024 were also used as a reference group. These data were drawn from the dataset reported by Józsa et al. (2026). The Grade 11 sample was part of a larger study that included students from Grades 5, 7, 9, and 11; for the present analysis, only the Grade 11 subsample was used. The students attended 15 different schools located in different regions of Hungary. The Grade 11 sample included students from upper secondary school types preparing students for the Hungarian secondary school-leaving examination, including general upper secondary schools and vocational secondary schools that also lead to the school-leaving examination. Although the sample was not nationally representative, it included students from different school types and geographical areas, and therefore provided a meaningful contextual benchmark for comparing the school subject attitudes of students entering teacher education. A detailed description of the full sample and data collection procedure is provided in Józsa et al. (2026). The Grade 11 sample was included only for additional benchmark comparisons of attitudes toward school subjects and was not treated as a control group.

Instrument

Students' attitudes toward school subjects were assessed using 12 subject-specific items included in the questionnaire. Participants were asked the following question: "How much did/do you like the following subjects?" The subjects were mathematics, physics, computer science, chemistry, biology, geography, literature, history, foreign language, physical education, music, and art. Responses were recorded on a five-point scale ranging from 1 (Did not like at all) to 5 (Liked very much), with higher scores indicating more positive attitudes toward the given subject. Because the items focused on subject liking, they primarily captured the affective component of school subject attitudes rather than the full multidimensional construct of attitude, which may also include cognitive beliefs, perceived competence, anxiety, and behavioral intentions.

For descriptive analyses, responses were grouped into three categories: negative attitudes (responses 1–2), neutral attitudes (response 3), and positive attitudes (responses 4–5). For the comparison with Grade 11 students, only subjects that were assessed with identical attitude items and response scales in both datasets

were included. The 12 items were also used to calculate an overall school subject attitude index for descriptive purposes. The internal consistency of this overall index was acceptable (Cronbach's $\alpha = 0.70$), although the factor analysis indicated that attitudes toward school subjects were multidimensional rather than representing a single homogeneous construct.

Procedure

The teacher education data were collected anonymously at the beginning of the academic year in September 2025, before students had completed substantial university-level subject-specific coursework. Participation was voluntary, and students were informed about the purpose of the study and the confidential treatment of their responses. The Grade 11 data used for the contextual benchmark comparison were drawn from the dataset reported by Józsa et al. (2026).

Analysis

Data were analyzed using IBM SPSS Statistics 23 and Stata 19. First, descriptive statistics were calculated for the 12 school subjects and for the broader subject domains. Responses on the five-point attitude scale were also recoded into three categories: negative (1–2), neutral (3), and positive (4–5), in order to describe the distribution of attitudes toward individual subjects and domains.

An exploratory factor analysis (EFA) was conducted to examine the underlying structure of students' attitudes toward school subjects. The factor solution was evaluated on the basis of statistical criteria and theoretical interpretability. The resulting domain scores were used in subsequent analyses to describe broader patterns of school subject attitudes. Domain scores were calculated as the mean of the subject items loading on each factor; these domain scores were then used in the descriptive analyses and standardized for the latent profile analysis.

Latent profile analysis (LPA) was performed in Stata 19 to identify distinct attitude profiles among students. The LPA was conducted using the standardized scores of the four attitude domains identified in the exploratory factor analysis. Competing profile solutions were compared using several model fit indices, including the Akaike Information Criterion (AIC), the Bayesian Information Criterion (BIC), entropy, and the Vuong-Lo-Mendell-Rubin likelihood ratio test (VLMR). The final profile solution was selected by considering both statistical fit and substantive interpretability, as well as the size and educational meaningfulness of the identified profiles.

To examine differences in attitudes toward school subjects across teacher education programs and study modes, multivariate analyses of variance (MANOVAs) were conducted. Program type and study mode were analyzed separately. When the assumption of homogeneity of covariance matrices was violated, Pillai's Trace was used as the multivariate test statistic because of its robustness (Tabachnick & Fidell, 2019). Follow-up univariate analyses of variance (ANOVAs) were conducted to examine significant multivariate effects at the level of individual subjects.

For the contextual comparison, the school subject attitudes of teacher education students were compared with those of Grade 11 students assessed in 2024. These comparisons were based only on subjects that were included in both data-sets. Independent-samples t-tests were used to examine group differences, and Cohen's d effect sizes were calculated to estimate the magnitude of the differences. Statistical significance was evaluated at the .05 level.

Findings

Exploratory Factor Analysis

An EFA was conducted using principal axis factoring with Varimax rotation to examine the underlying structure of students' attitudes toward twelve school subjects (Table 1). The Kaiser-Meyer-Olkin measure of sampling adequacy was acceptable ($KMO = 0.675$), and Bartlett's test of sphericity was significant, $\chi^2(66) = 1017$, $p < .001$, indicating that the data were suitable for factor analysis. Using the Kaiser criterion (eigenvalues > 1), four factors were extracted, accounting for 56.61% of the total variance. Communalities ranged from 0.356 to 0.698. The four-factor solution was retained because it was both statistically acceptable and theoretically interpretable. The rotated solution revealed four meaningful domains. The first factor, science and technology attitudes, included mathematics, physics, computer science, and chemistry. The second factor, natural and social sciences attitudes, comprised biology and geography. This label was used because school geography in the Hungarian curriculum connects natural, environmental, spatial, and social aspects of the world, while biology represents a core natural science subject. The third factor, humanities and language attitudes, consisted of literature, history, and foreign language. The fourth factor, arts and physical education attitudes, included art, music, and physical education. Overall, the EFA indicated

that students' school subject attitudes were organized into distinct domains rather than representing a single homogeneous construct.

Subject	Science & technology	Natural & social sciences	Humanities & language	Arts & physical education	h^2
Mathematics	0.748				0.578
Physics	0.723				0.698
Computer Science	0.669				0.520
Chemistry	0.537				0.596
Biology		0.714			0.578
Geography		0.709			0.557
Literature			0.693		0.596
Foreign Language			0.676		0.539
History			0.636		0.634
Art				0.749	0.568
Music				0.734	0.593
Physical Education				0.530	0.356

Table 1. Rotated factor loadings and communalities for subject attitude items. Note. Only loadings ≥ 0.40 are shown, h^2 = communality

Descriptive Statistics

Descriptive statistics were calculated to examine teacher education students' attitudes toward school subjects (Table 2). Among the four domains, the highest mean score was observed for arts and physical education attitudes ($M = 3.84$, $SD = 0.78$), followed by humanities and language attitudes ($M = 3.75$, $SD = 0.81$), natural and social sciences attitudes ($M = 3.40$, $SD = 0.98$), and science and technology attitudes ($M = 2.53$, $SD = 0.84$). These findings indicate that students generally expressed more positive attitudes toward artistic, musical, and humanities-related subjects than toward mathematics, science, and technology-related subjects.

At the subject level, the most positively evaluated subjects were art ($M = 4.11$, $SD = 1.03$) and literature ($M = 4.05$, $SD = 0.95$), whereas physics ($M = 2.02$, $SD = 1.03$), chemistry ($M = 2.34$, $SD = 1.20$), and mathematics ($M = 2.63$, $SD = 1.33$) re-

ceived the lowest ratings. Skewness and kurtosis values were within acceptable ranges, suggesting no substantial deviations from normality in the domain scores.

Domain	Subject	Subject M (SD)	Domain M (SD)	Skewness	Kurtosis
Science & technology	Mathematics	2.63 (1.33)	2.53 (0.84)	0.15	-0.57
	Physics	2.02 (1.03)			
	Computer Science	3.09 (1.08)			
	Chemistry	2.34 (1.20)			
Natural & social sciences	Biology	3.51 (1.16)	3.40 (0.98)	-0.52	-0.16
	Geography	3.30 (1.14)			
Humanities & language	Literature	4.05 (0.95)	3.75 (0.81)	-0.66	0.32
	History	3.61 (1.25)			
	Foreign Language	3.58 (1.23)			
Arts & physical education	Art	4.11 (1.03)	3.84 (0.78)	-0.59	0.07
	Music	3.71 (1.04)			
	Physical Education	3.70 (1.28)			

Table 2. Students' attitudes toward school subjects in the teacher education sample. Note. M (mean), SD (standard deviation)

Negative, Neutral, and Positive Attitudes by Subject

The original five-point attitude scale was re-coded into three categories: negative attitudes (responses 1–2), neutral attitudes (response 3), and positive attitudes (responses 4–5). Table 3 presents the percentage distribution of students across these three attitude categories for each subject. Percentages are rounded to the nearest whole number. Literature (77%) and art (75%) received the highest proportions of positive evaluations, followed by music (63%) and physical education (60%). More than half of the students also reported positive attitudes toward foreign language (57%), history (57%), and biology (57%). In contrast, physics (69%), chemistry (57%), and mathematics (49%) showed the highest proportions of negative attitudes. Only 9% of students expressed positive attitudes toward physics, while positive evaluations were also relatively uncommon for chemistry (19%) and mathematics (28%).

Computer science displayed a more balanced profile, with 34% positive, 41% neutral, and 25% negative responses. These findings suggest that teacher education students generally held more positive attitudes toward humanities, arts, and music-related subjects than toward mathematics and science-related subjects.

Based on the overall mean attitude score across the twelve subjects, 8% of students were classified as having negative attitudes ($M < 2.50$), 51% as having neutral attitudes ($M = 2.50\text{--}3.49$), and 42% as having positive attitudes ($M \geq 3.50$). This pattern suggests that most teacher education students held neutral or positive overall attitudes toward school subjects.

Subject	Negative (%)	Neutral (%)	Positive (%)
Literature	6	17	77
Art	6	19	75
Music	13	25	63
Physical Education	18	22	60
Foreign Language	19	24	57
History	18	25	57
Biology	18	25	57
Geography	23	29	48
Computer Science	25	41	34
Mathematics	49	23	28
Chemistry	57	24	19
Physics	69	22	9
Total subject attitudes	8	51	42

Table 3. Percentage distribution of students' attitudes toward school subjects.

Note. Negative attitudes = responses 1–2; neutral attitudes = response 3; positive attitudes = responses 4–5. Percentages are rounded to the nearest whole number; totals may not always sum to 100% due to rounding.

Students' attitudes toward the four subject domains are also presented in Figure 1. The highest proportion of positive attitudes was observed for arts and physical education (80%), followed by humanities and language (78%) and natural and social sciences (60%). In contrast, science and technology showed the lowest proportion of positive attitudes (26%) and the highest proportion of negative attitudes (43%). These findings indicate that teacher education students generally

held more positive attitudes toward artistic, musical, and humanities-related domains than toward mathematics, science, and technology-related domains.

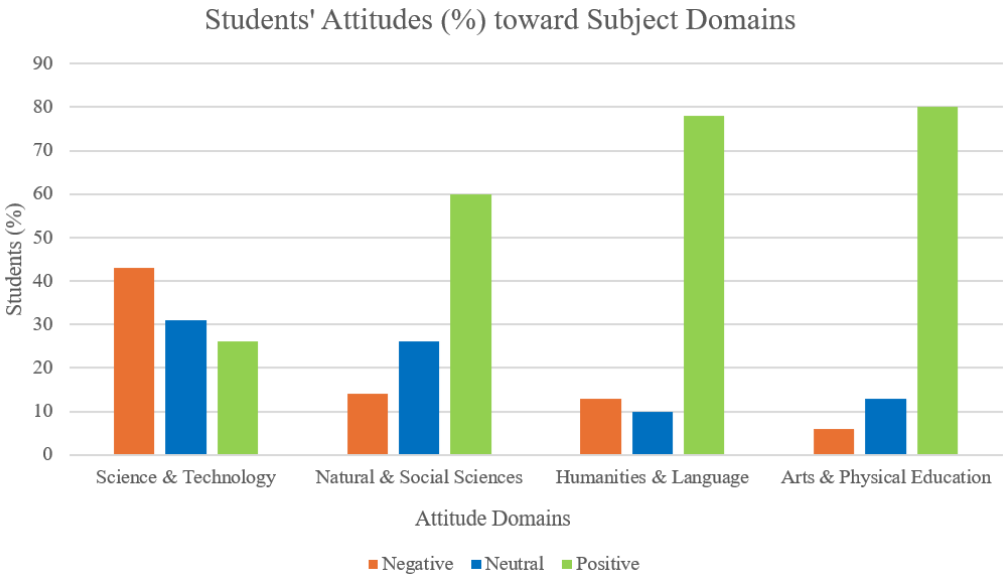


Figure 1. Distribution of students’ attitudes across four factor domains

Note. Science and technology subjects = mathematics, physics, computer science, and chemistry; natural and social sciences = biology and geography; humanities and language = literature, history, and foreign language; arts and physical education = art, music, and physical education. Categories are based on domain mean scores: negative ($M < 2.50$), neutral ($M = 2.50-3.49$), and positive ($M \geq 3.50$). Percentages are rounded to the nearest whole number.

Comparison of Latent Profiles of Students’ Attitudes

To identify distinct patterns of attitudes toward school subjects, latent profile analyses were conducted and compared across 2-, 3-, and 4-profile solutions. The fit indices did not uniformly support a single optimal solution (Table 4). The 4-profile solution provided the lowest AIC (5815.07) and a significant VLMR test ($p < .001$), suggesting improved fit compared with the 3-profile model. However, the smallest profile in the 4-profile solution contained only 5% of the sample, indicating a very small subgroup. The 2-profile solution showed the lowest BIC (5907.66) and the highest entropy (0.76), but it provided only a broad distinction between students with generally lower and higher school subject attitudes. Although the 3-profile solution had lower entropy, it produced more differentiated and educationally meaningful profiles while maintaining adequate profile sizes. Therefore, the 3-

profile solution was selected as a substantively interpretable and parsimonious representation of students' attitude patterns at program entry.

Model	Classes	Log likelihood	AIC	BIC	Entropy	Smallest class (%)	VLMR p
C2	2	-2913.08	5852.16	5907.66	0.762	22	–
C3	3	-2904.90	5845.80	5922.64	0.553	19	.053
C4	4	-2884.54	5815.07	5913.26	0.643	5	< .001

Table 4. Fit indices for latent profile models. Note. AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; VLMR = Vuong-Lo-Mendell-Rubin likelihood ratio test. Lower AIC and BIC values indicate better model fit, whereas higher entropy values indicate better classification accuracy. Class percentages are rounded to the nearest whole number.

Characteristics of Three Profiles of Students' Attitudes

The 3-profile solution showed distinct patterns of school subject attitudes among teacher education students (Table 5). Profile 1 (19%) represented a generally low-attitude profile, characterized by below-average attitudes across all four subject domains, especially natural and social sciences ($z = -1.48$). Profile 2 (44%), the largest group, represented a moderate humanities/natural-sciences profile: students in this group showed moderately positive attitudes toward natural and social sciences ($z = 0.31$) and humanities and language ($z = 0.27$), while maintaining below-average attitudes toward science and technology ($z = -0.52$). Profile 3 (37%) represented a science-and-technology-oriented profile, characterized by a strong positive orientation toward science and technology ($z = 1.03$), while attitudes toward the remaining domains were close to or slightly above the sample average. Figure 2 provides a graphical representation of the three profiles and demonstrates how attitudes toward the four subject domains varied across student groups.

Profile	n (%)	S&T	N&SS	H&L	A&PE	Interpretation
Profile 1: Generally low-attitude profile	102 (19%)	-0.81	-1.48	-0.62	-0.73	Generally low attitudes across all domains
Profile 2: Moderate humanities/natural-sciences profile	230 (44%)	-0.52	0.31	0.27	0.09	Positive attitudes toward natural/social sciences and humanities/language, but lower attitudes toward science and technology
Profile 3: Science-and-technology-oriented profile	196 (37%)	1.03	0.40	0.01	0.27	Particularly positive attitudes toward science and technology; attitudes in other domains are near the sample average

Table 5. Characteristics of the three school subject attitude profiles. Note. S&T = science and technology; N&SS = natural and social sciences; H&L = humanities and language; A&PE = arts and physical education. Values represent standardized z-scores. Positive values indicate above-average attitudes, whereas negative values indicate below-average attitudes relative to the total sample.

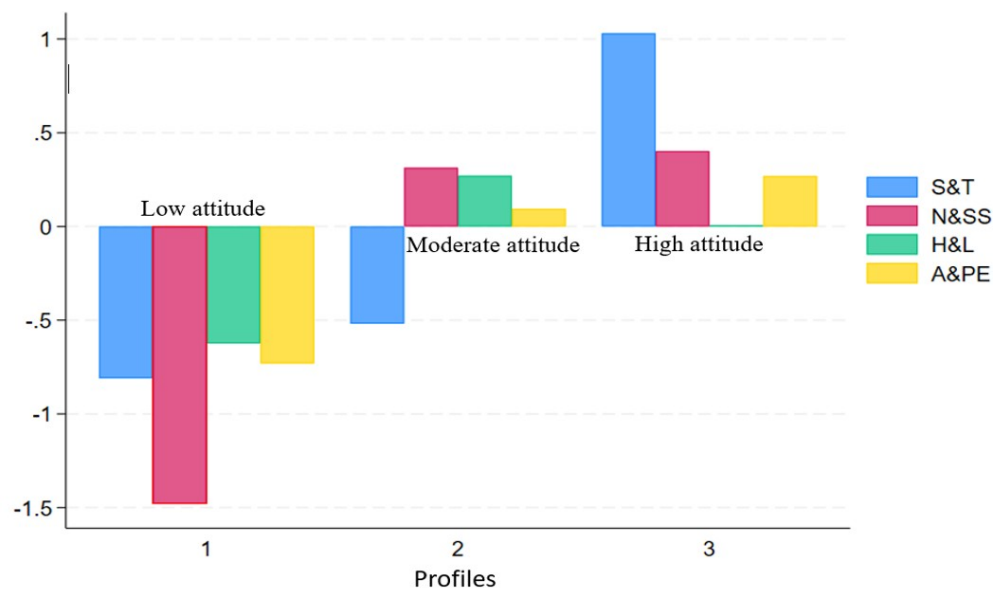


Figure 2. Three latent profiles of students' attitudes toward school subject domains. Note. Values are standardized z-scores. S&T = science and technology (mathematics, physics, computer science, and chemistry); N&SS = natural and social sciences (biology and geography); H&L = humanities and language (literature, history, and foreign language); A&PE = arts and physical education (art, music, and physical education). Profile 1 = generally low-attitude profile; Profile 2 = moderate humanities/natural-sciences profile; Profile 3 = science-and-technology-oriented profile.

Attitude Comparison across Teacher Education Program (Preschool vs. Primary Teacher Education)

A one-way MANOVA was conducted to examine whether students enrolled in preschool teacher education ($N = 408$) and primary teacher education ($N = 120$) differed in their attitudes toward school subjects. Because Box's test of equality of covariance matrices was significant (Box's $M = 111.93$, $p < .05$), Pillai's Trace was used as the multivariate test statistic. The multivariate effect of teacher education program was significant, Pillai's Trace = 0.112, $F(12, 515) = 5.41$, $p < .001$, partial $\eta^2 = 0.112$, indicating that school subject attitudes differed between the two groups. Follow-up ANOVAs revealed significant differences in attitudes toward mathematics, physics, computer science, chemistry, history, and music (Table 6). Primary teacher education students reported more positive attitudes toward mathematics, physics, computer science, chemistry, and history, whereas preschool teacher education students reported more positive attitudes toward music. However, all effect sizes were small (partial $\eta^2 = .007-.061$), indicating that the practical magnitude of these program-related differences was limited. No significant differences were found for the other subjects. An independent-samples t-test was also conducted to compare students' overall attitudes toward school subjects. Consistent with the subject-specific findings, primary teacher education students reported significantly more positive overall attitudes ($M = 3.42$, $SD = 0.50$) than preschool teacher education students ($M = 3.27$, $SD = 0.52$), $p = .005$.

Subject	Preschool M (SD)	Primary M (SD)	MD	F	p	η^2p
Mathematics	2.47 (1.29)	3.26 (1.27)	0.79	34.47	< .001	.061
Physics	1.93 (1.01)	2.30 (1.04)	0.37	12.06	< .01	.022
Computer Science	3.00 (1.08)	3.38 (1.03)	0.38	11.86	< .01	.022
Chemistry	2.27 (1.18)	2.60 (1.23)	0.33	7.11	< .01	.013
Biology	3.54 (1.16)	3.39 (1.18)	-0.15	1.49	.223	.003
Geography	3.25 (1.15)	3.43 (1.12)	0.18	2.27	.133	.004
Literature	4.08 (0.93)	3.98 (1.00)	-0.10	0.88	.348	.002
History	3.54 (1.27)	3.85 (1.14)	0.31	5.71	< .05	.011
Foreign Language	3.56 (1.21)	3.67 (1.29)	0.11	0.75	.388	.001
Physical Education	3.73 (1.26)	3.59 (1.36)	-0.14	1.05	.306	.002
Music	3.77 (1.00)	3.51 (1.12)	-0.26	5.85	< .05	.011
Art	4.11 (1.03)	4.10 (1.02)	-0.01	0.01	.905	.000

Table 6. Differences in students' attitudes toward school subjects by teacher education program. Note. MD = mean difference (Primary – Preschool). Positive values indicate higher scores among primary teacher education students; negative values indicate higher scores among preschool teacher education students. η^2p = partial eta squared.

Attitude Comparison across Study Mode (Full-time vs. Part-time)

A one-way MANOVA was conducted to examine differences in attitudes toward school subjects according to study mode (full-time vs. part-time). The multivariate effect was statistically significant, Pillai's Trace = 0.098, $F(12, 515) = 4.69$, $p < .001$, partial $\eta^2 = 0.098$, indicating that school subject attitudes differed between the two study modes (Table 7). Follow-up univariate analyses revealed significant differences for physics, computer science, chemistry, geography, history, and music. In all cases, part-time students reported more positive attitudes than full-time students. The largest difference was observed for geography, $F(1, 526) = 34.69$, $p < .001$, partial $\eta^2 = .062$, followed by computer science, $F(1, 526) = 14.07$, $p < .001$, partial $\eta^2 = .026$, and physics, $F(1, 526) = 11.77$, $p < .01$, partial $\eta^2 = .022$. No significant differences were found for mathematics, biology, literature, foreign language, physical education, or art. In addition, an independent-samples t-test indicated that part-time students ($M = 3.36$, $SD = 0.50$) reported significantly more positive overall school subject attitudes than full-time students ($M = 3.10$, $SD = 0.55$), $p < .001$.

Subject	Full-time M (SD)	Part-time M (SD)	MD	F	p	η^2p
Mathematics	2.44 (1.36)	2.71 (1.32)	0.27	3.76	.053	.007
Physics	1.73 (1.00)	2.10 (1.02)	0.37	11.77	< .01	.022
Computer Science	2.75 (1.13)	3.18 (1.05)	0.43	14.07	< .001	.026
Chemistry	2.06 (1.23)	2.42 (1.18)	0.36	8.21	< .01	.015
Biology	3.34 (1.25)	3.55 (1.14)	0.21	2.88	.090	.005
Geography	2.75 (1.16)	3.44 (1.09)	0.69	34.69	< .001	.062
Literature	4.08 (0.93)	4.05 (0.96)	-0.03	0.09	.761	.000
History	3.30 (1.43)	3.70 (1.18)	0.40	9.31	< .01	.017
Foreign Language	3.52 (1.31)	3.60 (1.21)	0.08	0.39	.531	.001
Physical Education	3.66 (1.30)	3.71 (1.28)	0.05	0.14	.713	.000
Music	3.49 (1.04)	3.77 (1.03)	0.28	6.46	< .05	.012
Art	4.03 (1.08)	4.13 (1.01)	0.10	0.97	.326	.002

Table 7. Differences in students' attitudes toward school subjects by study mode. Note. MD = mean difference (Part-time – Full-time). Positive MD values indicate more favorable attitudes among part-time students, whereas negative MD values indicate more favorable attitudes among full-time students. η^2p = partial eta squared.

Comparison with Grade 11 Students' School Subject Attitudes

To contextualize the school subject attitudes of students entering teacher education programs, an additional benchmark comparison was conducted using data collected from Grade 11 students in 2024. This comparison was restricted to subjects represented in both datasets, namely literature, mathematics, history, physics, chemistry, biology, geography, foreign language/language, and art. Grammar was not included in the teacher education dataset, whereas computer science, music, and physical education were not available in the Grade 11 dataset. Therefore, these unavailable subjects were excluded from the comparison.

The results showed that students entering teacher education programs reported more positive attitudes toward literature, art, biology, and history. In contrast, Grade 11 students reported more positive attitudes toward physics, mathematics, and foreign language (Table 8). Specifically, teacher education students reported higher attitude scores for literature ($M = 4.05$, $SD = 0.95$) than Grade 11 students ($M = 3.08$, $SD = 1.13$), representing the largest difference between the two groups ($d =$

0.98, $p < .001$). A statistically significant difference was also found for art ($M = 4.11$, $SD = 1.03$ vs. $M = 3.36$, $SD = 1.40$, $d = 0.67$, $p < .001$). Moreover, teacher education students demonstrated significantly more positive attitudes toward biology ($M = 3.51$ vs. 3.04 , $d = 0.39$, $p < .001$) and history ($M = 3.61$ vs. 3.32 , $d = 0.23$, $p < .01$).

In contrast, Grade 11 students reported higher attitudes than teacher education students for physics ($M = 2.44$ vs. 2.02 , $d = -0.38$, $p < .001$), mathematics ($M = 2.90$ vs. 2.63 , $d = -0.20$, $p < .05$), and foreign language ($M = 3.85$ vs. 3.58 , $d = -0.23$, $p < .01$). The remaining two subjects, chemistry and geography, showed no significant differences between Grade 11 and teacher education students.

Subject	Grade 11 M (SD)	Teacher education M (SD)	MD	t	p	d
Literature	3.08 (1.13)	4.05 (0.95)	0.97	9.83	< .001	0.98
Mathematics	2.90 (1.31)	2.63 (1.33)	-0.27	-2.27	< .05	-0.20
History	3.32 (1.20)	3.61 (1.25)	0.29	2.65	< .01	0.23
Physics	2.44 (1.34)	2.02 (1.03)	-0.42	-3.64	< .001	-0.38
Chemistry	2.56 (1.32)	2.34 (1.20)	-0.22	-1.88	.061	-0.18
Biology	3.04 (1.33)	3.51 (1.16)	0.47	4.02	< .001	0.39
Geography	3.13 (1.22)	3.30 (1.14)	0.17	1.56	.119	0.15
Foreign Language	3.85 (1.08)	3.58 (1.23)	-0.27	-2.67	< .01	-0.23
Art	3.36 (1.40)	4.11 (1.03)	0.75	6.26	< .001	0.67

Table 8. A benchmark comparison between Grade 11 and teacher education students. Note. MD = mean difference (teacher education – Grade 11). d = Cohen's d.

Discussion

This study examined attitudes toward school subjects among students entering preschool and primary teacher education programs in Hungary. The study focused on attitudes toward 12 school subjects and broader subject domains, identified latent attitude profiles, examined differences by teacher education program and study mode, and compared teacher education students' attitudes with those of Grade 11 students as a contextual benchmark. Overall, the findings show that students enter teacher education with clearly differentiated school subject attitudes. Their attitudes were most favorable toward arts and physical education and

humanities and language, whereas science and technology received the least favorable evaluations. These results suggest that school subject attitudes at program entry are not evenly distributed across the curriculum and that some subject areas, especially mathematics, physics, chemistry, and technology-related subjects, may require particular attention in teacher education.

The first research question explored students' attitudes toward individual school subjects and broader subject domains. The results revealed a clear pattern: students reported the most positive attitudes toward art, literature, music, physical education, foreign language, history, and biology, whereas physics, chemistry, and mathematics received the lowest ratings. At the domain level, arts and physical education and humanities and language were evaluated most positively, while science and technology was the least favored domain. This pattern is consistent with previous research indicating that teacher education students often report lower confidence and less favorable attitudes toward mathematics and science than toward humanities- or arts-related subjects (Hourigan & Leavy, 2017; Mateos Núñez et al., 2021; Riegle-Crumb et al., 2015). It also aligns with evidence that mathematics and science attitudes may be structured in meaningful profiles and are related to achievement outcomes (Berger et al., 2020). The findings are also in line with Hungarian research showing that attitudes toward school subjects differ substantially across curriculum areas, with science-related subjects, particularly physics and chemistry, often occupying less favorable positions in students' evaluations (Csapó, 2000; Csíkos, 2012; Malmos & Chrappán, 2016).

These results are educationally important because attitudes toward school subjects may influence future teachers' engagement with subject-specific coursework, their teaching confidence, and their later instructional practices. Less favorable attitudes toward mathematics, physics, and chemistry are particularly relevant in preschool and primary teacher education because these programs prepare future teachers to support children's early mathematical thinking, scientific curiosity, problem solving, and exploration of the natural and technological world. The especially low rating of physics is noteworthy, as trainee teachers' perceptions of physics may influence their willingness to engage children with physics-related learning experiences (Pahl, 2022). If students enter teacher education with negative experiences or low confidence in these domains, they may need carefully designed learning experiences that help them rebuild confidence and develop more positive emotional and pedagogical orientations toward these sub-

jects. Previous research also suggests that preservice teachers' attitudes toward science can develop positively during appropriately designed science courses (Pino-Pasternak & Volet, 2018). Inquiry-based, hands-on, collaborative, and mastery-oriented learning experiences may be especially useful for this purpose (McDonald et al., 2021; Taskin-Can, 2011).

The second research question examined whether distinct latent profiles could be identified on the basis of students' attitudes toward the four subject domains. The three-profile solution provided a substantively meaningful and educationally interpretable representation of students' attitude patterns. The first profile represented students with generally low attitudes across all domains, with especially low attitudes toward natural and social sciences. This group is important from a teacher education perspective because students with broadly unfavorable school subject attitudes may need more comprehensive affective and academic support. The second and largest profile represented a moderate pattern, with relatively favorable attitudes toward natural and social sciences, humanities and language, and arts and physical education, but lower attitudes toward science and technology. This profile reflects the overall tendency observed in the full sample: many students enter teacher education with relatively positive attitudes toward several curriculum areas, but with weaker orientations toward science- and technology-related subjects. The third profile was characterized primarily by a strong positive orientation toward science and technology, while attitudes toward the other domains were close to or slightly above the sample average. Therefore, this group may be better described as a science-and-technology-oriented profile rather than a generally high-attitude profile.

The identification of these profiles shows that students entering teacher education do not form a homogeneous group. Their school subject attitudes differ not only in overall positivity, but also in their configuration across curriculum domains. This supports the value of a person-centered approach, because it reveals patterns that would remain hidden in variable-centered analyses alone. From a practical perspective, these profiles may help teacher educators identify students who would benefit from different forms of support. Students in the generally low-attitude profile may need broad encouragement and confidence-building across several areas, whereas students in the moderate profile may particularly benefit from targeted support in science and technology. The science-and-technology-oriented group may represent an important resource in teacher education programs,

as these students may be especially receptive to subject-specific development in areas often perceived as challenging by their peers.

The third research question examined differences according to teacher education program and study mode. The more favorable attitudes toward music among preschool teacher education students deserve brief attention. In preschool education, music is not only a school subject or a separate curriculum area, but is closely connected to play, singing, movement, emotional expression, communication, and everyday pedagogical interaction. Therefore, the higher music-related attitudes of preschool teacher education students may reflect the stronger presence of music in the professional role expectations and daily practices associated with preschool education. However, this interpretation should be made cautiously, because the program-related difference in music was small.

These differences are consistent with the different professional orientations of the two programs. Primary teacher education prepares students for more explicit subject-based teaching in the lower grades of primary school, whereas preschool teacher education places stronger emphasis on holistic development, play-based learning, care, movement, music, storytelling, and integrated activities. The more favorable attitudes toward music among preschool teacher education students are also relevant because preservice teachers' confidence and beliefs in music education may shape their willingness to integrate musical activities into early childhood settings (Kong & Xiong, 2025). The higher attitudes of primary teacher education students toward several science- and technology-related subjects may reflect their stronger orientation toward school-subject-based teaching responsibilities. However, the effect sizes were small, suggesting that these differences should not be overinterpreted. The results indicate tendencies rather than large practical gaps between the two groups.

Study mode was also associated with differences in school subject attitudes. Part-time students reported more favorable attitudes than full-time students toward physics, computer science, chemistry, geography, history, and music. These differences may reflect the distinct backgrounds and life experiences of part-time students. One possible interpretation is that some part-time students may already have practical experience in educational settings, for example as pedagogical or teaching assistants in kindergartens or schools. Such experience may contribute to a more practice-oriented and professionally grounded relationship with school subjects and teaching than that of full-time students, many of whom may enter

teacher education directly after secondary school. At the same time, these findings should be interpreted cautiously, because program type and study mode were analyzed separately. It is possible that differences attributed to study mode partly reflect other background factors, such as age, previous educational experience, employment history, or the distribution of students across programs. Future studies should examine program type and study mode in the same multivariate model and test possible interaction effects.

The fourth research question compared teacher education students' school subject attitudes with those of Grade 11 students. This comparison was used as a contextual benchmark rather than as a control-group comparison. Teacher education students reported more favorable attitudes toward literature, art, biology, and history, whereas Grade 11 students reported more favorable attitudes toward physics, mathematics, and foreign language. These results suggest that students entering preschool and primary teacher education may already have a distinctive subject-attitude pattern before beginning their university-level professional preparation. Their stronger attitudes toward literature, art, biology, and history may be related to the interests, educational orientations, and professional motivations of students who choose teaching-related programs (Colić et al., 2025; Şahan & Zög, 2017). Conversely, their lower attitudes toward mathematics and physics suggest that less favorable experiences in these domains may persist into teacher education.

The lower attitudes of teacher education students toward mathematics and physics compared with Grade 11 students are especially noteworthy. These findings indicate that the science- and technology-related challenges observed within the teacher education sample are not merely general features of adolescent subject preferences, but may be particularly characteristic of students entering these teacher education programs. This has important implications for curriculum development. Teacher education programs should not assume that students arrive with balanced confidence across the curriculum. Instead, program-entry diagnostics of school subject attitudes could help identify domains in which students may need additional support from the beginning of their studies.

The findings have several practical implications. First, teacher education programs should consider assessing school subject attitudes at program entry. Such assessment could help identify students or groups of students who may need targeted support in specific domains. Second, science and technology should receive particular attention, not only in terms of content knowledge, but also in terms of

confidence, enjoyment, and pedagogical self-efficacy. Third, teacher educators should design learning experiences that provide positive mastery experiences, reduce anxiety, and connect subject knowledge with meaningful preschool and primary pedagogical practice. Research showing positive changes in preservice teachers' science attitudes during well-designed introductory science learning further supports this implication (Pino-Pasternak & Volet, 2018). In practical terms, this support could include low-stakes, hands-on science and mathematics activities, opportunities to experience success in solving subject-related problems, explicit reflection on earlier negative school experiences, and examples of how scientific, mathematical, and technological ideas can be introduced through play, stories, movement, art, and everyday preschool or primary classroom situations. Fourth, the positive attitudes observed toward arts and physical education and humanities and language should be used as strengths. In particular, favorable attitudes toward arts, music, and physical education may be interpreted as pedagogical resources: music, movement, visual expression, body percussion, and story-based artistic activities may provide integrative bridges for approaching less favored domains, such as mathematics, science, and technology, in more playful, embodied, and experience-based ways. This may be especially relevant in preschool and primary teacher education, where integrated and activity-based pedagogical approaches are central to children's learning.

Several limitations should be acknowledged. The study used a cross-sectional design; therefore, it cannot show how school subject attitudes develop during teacher education. Longitudinal studies are needed to examine whether teacher education programs strengthen, weaken, or reshape students' attitudes over time. The entropy of the selected three-profile solution was relatively modest; therefore, the latent profiles should be interpreted as exploratory and substantively meaningful patterns rather than as definitive student categories. The sample was drawn from Hungarian teacher education institutions, which may limit the generalizability of the findings to other national or institutional contexts. School subject attitudes were measured with single subject-specific liking items. Although this approach is useful for comparing a broad range of subjects, future research should also include more complex measures of attitude, self-efficacy, anxiety, perceived competence, and teaching motivation. The Grade 11 comparison should be interpreted cautiously because the two groups differed in age, educational context, career orientation, and data collection year. Program type and study mode

were analyzed separately, so the possible interaction between these two factors could not be examined. Finally, the sample was predominantly female, which reflects the gender composition of preschool and primary teacher education but limits the possibility of analyzing gender differences.

Despite these limitations, the study contributes to the literature by providing a broad, domain-based and person-centered analysis of school subject attitudes among students entering preschool and primary teacher education. The results show that students bring differentiated affective orientations into teacher education and that these orientations vary across subjects, domains, programs, study modes, and in comparison with upper secondary students. Recognizing these differences at program entry may help teacher education programs provide more responsive and targeted preparation for future preschool and primary teachers.

Conclusion

This study examined attitudes toward school subjects among students entering preschool and primary teacher education programs in Hungary. The findings showed that students reported the most favorable attitudes toward arts and physical education and humanities and language, whereas science and technology received the least favorable evaluations. Three latent profiles were identified, indicating that students enter teacher education with different configurations of school subject attitudes rather than a single common attitude pattern. Primary teacher education students reported more positive attitudes toward several science- and technology-related subjects than preschool teacher education students, while part-time students showed more favorable attitudes than full-time students in several subjects. Compared with Grade 11 students, teacher education students showed more positive attitudes toward literature, art, biology, and history, but less favorable attitudes toward mathematics, physics, and foreign language.

These findings highlight the importance of recognizing the diversity of school subject attitudes at the beginning of teacher education. They also suggest that teacher education programs should provide targeted support in domains where students enter with less favorable attitudes, particularly mathematics, physics, chemistry, and technology-related subjects. Strengthening positive attitudes, confidence, and pedagogical engagement in these areas may contribute to the preparation of future preschool and primary teachers who are better able to provide rich, balanced, and motivating learning experiences across the curriculum.

References

- Berger, N., Mackenzie, E. & Holmes, K. (2020). Positive attitudes towards mathematics and science are mutually beneficial for student achievement: A latent profile analysis of TIMSS 2015. *The Australian Educational Researcher*, 47(3), 409–444. <https://doi.org/10.1007/s13384-020-00379-8>
- Bilir-Seyhan, G. & Ocak-Karabay, S. (2018). Early childhood pre-service teachers' views about visual arts education and aesthetics. *Eurasian Journal of Educational Research*, 73, 131–148. <https://doi.org/10.14689/ejer.2018.73.8>
- Colić, V., Lužanin, Z., Lazić, B., Maričić, S. & Klemenović, J. (2025). Views on mathematics education: A comparative study of future primary and future mathematics teachers. *Education Sciences*, 15(10), Article 1370. <https://doi.org/10.3390/educsci15101370>
- Czető, K. (2021). Az iskolai attitűd kutatásának kérdései: elméleti modellek és lehetséges mérőeszközök. Egy szisztematikus szakirodalmi áttekintés eredményei. *Iskolakultúra*, 31(3), 51–74.
- Czető, K. (2022). Mit gondolnak a tanulók és tanárok az iskoláról? Egy iskolaiattitűd-kutatás eredményei. *Iskolakultúra*, 32(8–9), 30–52. <https://doi.org/10.14232/iskkult.2022.8-9.30>
- Csapó, B. (2000). A tantárgyakkal kapcsolatos attitűdök összefüggései. *Magyar Pedagógia*, 100(3), 343–366.
- Csikós, Cs. (2012). Melyik a kedvenc tantárgyad? Tantárgyi attitűdök vizsgálata a nyílt végű írásbeli kikérdezés módszerével. *Iskolakultúra*, 22(1), 3–13.
- Efe, R., Oral, B. & Efe, H. A. (2012). Student teachers' attitudes toward the teaching profession. In Zysberg, L. (Ed.), *Student attitudes* (pp. 251–266). Nova Science Publishers.
- Garbett, D. (2003). Science education in early childhood teacher education: Putting forward a case to enhance student teachers' confidence and competence. *Research in Science Education*, 33(4), 467–481. <https://doi.org/10.1023/B:RISE.00000005251.20085.62>
- García, A. R., Ramírez, E. S., Fontana, R. J. & Pérez, L. R. (2024). The environmental literacy of future pre-school and primary school teachers in Andalusia. *Enseñanza de las Ciencias*, 42(3), 159–184. <https://doi.org/10.5565/rev/ensciencias.6130>

- Hourigan, M. & Leavy, A. M. (2017). Rate your course! Student teachers' perceptions of a primary pre-service mathematics education programme. *Journal of Curriculum Studies*, 49(6), 802–829.
<https://doi.org/10.1080/00220272.2017.1284266>
- Józsa, K. & Pap-Szigeti, R. (2006). Az olvasási képesség és az anyanyelvhasználat fejlődése 14–18 éves korban. In Józsa, K. (Ed.), *Az olvasási képesség fejlődése és fejlesztése* (pp. 131–153). Dinasztia Tankönyvkiadó.
- Józsa, K., Kiss, B. & Oo, T. Z. (2026). Az iskolai tantárgyak kedveltsége Magyarországon: 25 év változásai (1999–2024). *Magyar Pedagógia* (in press).
- Kartal, B. (2020). Pre-service science and mathematics teachers' teaching efficacy beliefs and attitudes toward teaching: A partial correlation research. *Australian Journal of Teacher Education*, 45(9), 41–61.
<https://doi.org/10.14221/ajte.2020v45n9.3>
- Kember, D. & Leung, D. Y. P. (2005). The influence of active learning experiences on the development of graduate capabilities. *Studies in Higher Education*, 30(2), 155–170. <https://doi.org/10.1080/03075070500043127>
- Kong, S.-H. & Xiong, X. (2025). Pre-service kindergarten teachers' confidence and beliefs in music education: A study in the Chinese context. *Education Sciences*, 15(6), Article 772. <https://doi.org/10.3390/educsci15060772>
- Letina, A. & Diković, M. (2021). Student teachers' classroom management orientations and their beliefs on effective teaching behaviour. *Sodobna Pedagogika / Journal of Contemporary Educational Studies*, 72(1), 128–143.
- Leung, D. Y. P. & Kember, D. (2006). The influence of teaching approach and teacher-student interaction on the development of graduate capabilities. *Structural Equation Modeling*, 13(2), 264–286.
https://doi.org/10.1207/s15328007sem1302_6
- Lowe, J. & Gayle, V. (2007). Exploring the work/life/study balance: The experience of higher education students in a Scottish further education college. *Journal of Further and Higher Education*, 31(3), 225–238.
<https://doi.org/10.1080/03098770701424942>
- Malmos, E. & Chrappán, M. (2016). Természettudományos attitűd vizsgálat egy pilot mérés tükrében. *Educatio*, 25(4), 608–616.
- Mateos Núñez, M., Martínez Borreguero, G. & Naranjo Correa, F. L. (2021). Diagnosis of the affective domain of primary school teacher trainees in the teaching-learning of STEM areas: Comparative analysis with primary school

- students. In Bowman, M. N. (Ed.), *Topics in science education* (pp. 169–197). Nova Science Publishers.
- McDonald, C. V., Klieve, H. & Kanasa, H. (2021). Exploring Australian preservice primary teachers' attitudes toward teaching science using the dimensions of attitude toward science (DAS). *Research in Science Education*, 51(5), 1325–1348. <https://doi.org/10.1007/s11165-019-09910-z>
- Milić, M., Radić Hozo, E., Maulini, C., De Giorgio, A. & Kuvačić, G. (2022). What is the place of physical education among the teaching priorities of primary school teachers? An empirical study on importance, qualification and perceived teachers' competence. *Education Sciences*, 12(9), Article 609. <https://doi.org/10.3390/educsci12090613>
- Pahl, A. (2022). Teaching physics in kindergarten and primary school: What do trainee teachers think of this? In Borg Marks, J., Galea, P., Gatt, S. & Sands, D. (Eds.), *Physics teacher education* (pp. 59–73). Springer. https://doi.org/10.1007/978-3-031-06193-6_5
- Pino-Pasternak, D. & Volet, S. (2018). Evolution of pre-service teachers' attitudes towards learning science during an introductory science unit. *International Journal of Science Education*, 40(12), 1520–1541. <https://doi.org/10.1080/09500693.2018.1486521>
- Riegle-Crumb, C., Morton, K., Moore, C., Chimonidou, A., Labrake, C. & Kopp, S. (2015). Do inquiring minds have positive attitudes? The science education of preservice elementary teachers. *Science Education*, 99(5), 819–836. <https://doi.org/10.1002/sce.21177>
- Şahan, H. H. & Zöğ, H. (2017). An analysis of the relation between teacher candidates' attitudes toward the teaching profession and teaching-learning process competencies. *Pegem Journal of Education and Instruction*, 7(4), 583–610. <https://doi.org/10.14527/pegegog.2017.021>
- Shin, M. & Alpern, L. W. (2024). Drawing teacher identity: Perspectives of students in a teacher education program. *Social Sciences & Humanities Open*, 10, Article 101036. <https://doi.org/10.1016/j.ssaho.2024.101036>
- Soini, A., Watt, A., & Sääkslahti, A. (2021). Finnish pre-service teachers' perceptions of perceived competence in early childhood physical education. *International Journal of Environmental Research and Public Health*, 18(12), Article 6454. <https://doi.org/10.3390/ijerph18126454>
- Tabachnick, B. G. & Fidell, L. S. (2019). *Using multivariate statistics* (7th ed.). Pearson.

Taskin-Can, B. (2011). The perceptions of pre-service science teachers concerning constructivist perspectives to teaching. *Journal of Baltic Science Education*, 10(4), 219–228.

Zacharos, K., Koliopoulos, D., Dokimaki, M. & Kassoumi, H. (2007). Views of prospective early childhood education teachers towards mathematics and its instruction. *European Journal of Teacher Education*, 30(3), 305–318.
<https://doi.org/10.1080/02619760701486134>

Tantárgyi attitűdök az óvodapedagógus- és tanítóképzésbe belépő hallgatók körében

A pedagógusképzésbe belépő hallgatók korábbi iskolai tapasztalatai és tantárgyi preferenciái hatással lehetnek arra, hogy hogyan kapcsolódnak be a képzésbe, mennyire érzik magukat magabiztosnak az egyes tantervi területeken, és később milyen pedagógiai gyakorlatot alakítanak ki. Jelen tanulmány 528, óvodapedagógus- és tanítóképzésbe belépő hallgató tantárgyi attitűdjeit vizsgálta 12 iskolai tantárgy mentén. Az eredmények szerint a hallgatók legkedvezőbb attitűdjei a művészetekhez, a testneveléshez, valamint a humán és a nyelvi területekhez kapcsolódtak, míg a matematika, a fizika, a kémia és a technológiai jellegű területek kevésbé kedvező megítélést kaptak. A hallgatók attitűdjei eltérő mintázatokba rendeződtek, ami arra utal, hogy már a képzés kezdetén különböző támogatási igényekkel érkeznek. A tanítóképzésben tanulók több természettudományos és technológiai jellegű tantárgy esetében pozitívabb attitűdökről számoltak be, míg az óvodapedagógusképzésben tanulók zenéhez kapcsolódó attitűdjei voltak kedvezőbbek. A 11. évfolyamos tanulókkal összehasonlítva a pedagógusképzésbe belépő hallgatók kedvezőbben viszonyultak az irodalomhoz, a rajzhoz, a biológiához és a történelemhez, ugyanakkor kevésbé kedvezően értékelték a matematikát, a fizikát és az idegen nyelvet. Az eredmények gyakorlati jelentősége, hogy a képzés elején érdemes feltárni a hallgatók tantárgyi attitűdjeit, és célzottan támogatni azokat a területeket, ahol kevésbé pozitív előzetes tapasztalatokkal rendelkeznek. Különösen fontos a természettudományos, a matematikai és a technológiai területekhez kapcsolódó magabiztosság, érdeklődés és pedagógiai önhatékonyság erősítése.

Kulcsszavak: *tantárgyi attitűdök; tantárgyak; óvodapedagógus-képzés; tanítóképzés; pedagógusjelöltek*