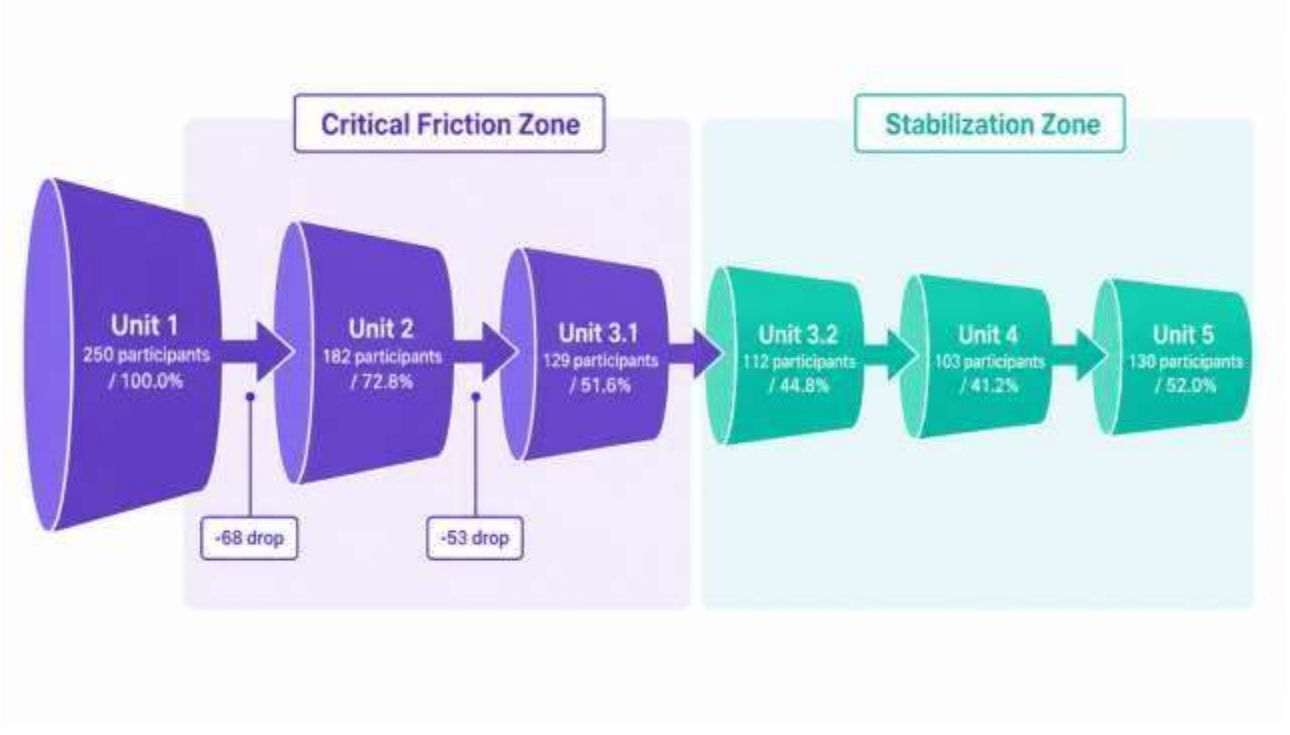
Analytical Report on Data from the Bulgarian National Pilot Implementation of the Teacher Training Program under the PAIDEIA Project

Progress, engagement, completion, self-assessment, profile analysis, and feedback from participants



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Analytical report on data from the Bulgarian national pilot of the teacher training program under the Paideia project

1. Summary

The Bulgarian pilot of the PAIDEIA program was implemented through six training modules based on the Moodle platform: Module 1, Module 2, Module 3.1, Module 3.2, Module 4, and Module 5. The analytical dataset includes 284 records of real participants, after excluding 13 test/service accounts labeled as “Paideia users.”

The pilot implementation showed high initial activity: 250 participants accessed Module 1. For the purposes of this analysis, completion of the pilot implementation is defined as submitting a final questionnaire—ID 5 or ID 12. This definition was chosen because Moodle’s automatic tracking of Module 5 completion is unreliable, and downloading a certificate is considered an optional feature for participants rather than a mandatory requirement for valid completion of the pilot.

A total of 125 users submitted one of the two final survey forms. After excluding 2 test/service accounts labeled as “Paideia users,” the analytical count of real participants who completed the pilot evaluation cycle is 123. Of these, 101 real participants submitted the final feedback related to certification, while 22 participants submitted the alternative final feedback form. Therefore, in this analysis, these two groups are considered as different trajectories of completed pilot participation, rather than as a dichotomy between “completers” and “non-completers.”

Data on progress through the modules show that the greatest decline in activity occurs in the early part of the learning trajectory—specifically between Module 1, Module 2, and Module 3.1. After Module 3.1, the group of continuing participants stabilizes. For Module 5, the Moodle platform does not report a “course completed” status, as no formal completion criteria have been configured. Nevertheless, the data show that 130 participants accessed Module 5, and 116 participants completed at least one activity within it. Therefore, the Moodle completion indicator for Module 5 is not considered a valid measure of final participation.

The profile analysis shows that the program is most attractive and most suitable for teachers with basic and moderate practical experience with artificial intelligence, especially in the context of secondary education. Data on participants who submitted final feedback and/or a certification-related survey indicate that the course most strongly attracts teachers who already have a basic orientation or actual practical experience with AI but need a more structured pedagogical, ethical, and didactic framework. Based on the criteria of educational level and school profile, the most pronounced trend toward successful completion of the pilot program is observed among teachers from general and specialized secondary schools.

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The feedback from participants who submitted the final certification form is extremely positive. They highly value the structure of the training, its professional applicability, the support for understanding the role of artificial intelligence in education, the usability of the platform, and their own readiness to apply pedagogical approaches supported by AI. The main barrier to practical implementation cited by participants is limited time, followed by technical and infrastructure conditions, ethical and regulatory considerations, as well as the need for additional support.

Feedback from participants who submitted the alternative final form ID 12 is also generally positive, though more moderate. This group includes 22 respondents and highlights more pronounced difficulties related to navigating the platform, time constraints, technical conditions, and the design of the assessment. The presence of positive feedback in this group as well indicates that different participation trajectories should not automatically be interpreted as a lack of interest or rejection of the program. Rather, they point to the need for clearer orientation within the platform, better progress tracking, more visible information regarding certification eligibility, and additional support for participants in the early stages of training.

In summary, the Bulgarian pilot demonstrates that PAIDEIA is perceived as a valuable and professionally relevant program for training teachers in the use of artificial intelligence in education. The strengths of the model include its clear pedagogical structure, ethical focus, practical applicability, and support for a more systematic understanding of AI in a school context. The main challenges are not related to initially attracting participants, but rather to maintaining steady progress through the early modules, improving navigation, and clarifying the connection between participation, final feedback, and the opportunity for certification.

2. Purpose and Scope of the Analysis

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The purpose of this report is to analyze the implementation in Bulgaria of the PAIDEIA teacher training program, focusing not only on the administrative progression through the individual Moodle modules but also on participation in the pilot process as a comprehensive cycle of training, self-assessment, and feedback.

The analysis examines the completion of pilot participation through the submission of a final questionnaire—ID 5 or ID 12. This approach allows for the inclusion of all participants who reached the final stage of evaluation and reflection on the program, regardless of whether they took advantage of the opportunity to download a certificate. The certificate is viewed as an additional opportunity for formal acknowledgement of participation of participation, rather than as the sole condition for completing the pilot.

The analysis focuses on:

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- participant activity and engagement;
- progress in the six Bulgarian Moodle modules;
- the various trajectories of participation in the training;
- completion of the assessment cycle through final feedback;
- the use of the certification option;
- differences between participants' profiles;
- the logic of self-reflection in Module 1 and Module 5;
- the results of formative assessment and self-assessment;
- feedback from participants who completed the final questionnaires;
- implications for improving, adapting, and expanding the PAIDEIA model.

The report retains the analysis of module progress, as it provides important information on how participants navigate the training structure. At the same time, data on module access, completed activities, and Moodle statuses are not used as the sole criterion for successful participation, as Module 5 does not contain a reliably configured formal criterion for completion. Therefore, the primary indicator of completed pilot participation is the submission of final feedback.

The analysis is based on data exported from Moodle and feedback datasets generated by the Bulgarian PAIDEIA courses. The data is interpreted by distinguishing between observed facts, analytical interpretation, hypotheses, and recommendations.

3. Data Sources and Methodological Notes

3.1 Data processing and analytical support

The data from the Bulgarian pilot were processed based on raw data exported from the Moodle platform. The main datasets were generated through customized reports and queries executed at the level of the Bulgarian PAIDEIA courses. They cover the entire learning path, including Module 1, Module 2, Module 3.1, Module 3.2,
Module 4, and Module 5.

The extracted data includes user-level information on enrollment, access to modules, completion of activities, progress through modules, test attempts and self-assessment, membership in cohorts and groups, as well as submission of final feedback. Personal data was not used for the analytical conclusions; participants were considered through anonymized or technical identifiers and through group profiles.

Subsequent data processing, aggregation, and interpretation were supported by a dedicated analytical environment, PAIDEIA Pilot Data Analyst ChatGPT, configured for analyzing pilot data from the PAIDEIA project. This environment was used for data structuring, consistency checking, calculating metrics, comparing

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profiles, and preparing analytical statements. Responsibility for the final interpretation, validation, and reporting remains with the PAIDEIA project team.

3.2 Data Sources

The analysis uses the following data exported from the platform and its associated forms:

1. Summary of progress across all Bulgarian modules;
2. User-level progress across all Bulgarian modules;
3. Report on completed activities;
4. Test attempts and results;
5. Self-assessment results in Module 1 and Module 5;
6. Comparison of user profiles;
7. Data on cohorts and groups;
8. Data on users who submitted a final questionnaire;
9. Feedback from participants who completed the final form ID 5;
10. Feedback from participants who completed the final Form ID 12.

The two final forms are identical in structure and content, but serve different analytical purposes and are targeted at different groups of participants. Form **ID 5** is aimed at participants who have completed all training modules and reached the final stage involving feedback and the opportunity for certification. Form **ID 12** was activated later for participants who attended one or more of the modules but did not complete the full course for one reason or another. In this way, the two forms allow for the collection of comparable final feedback from both participants who completed the full training pathway and those with a partial participation trajectory.

3.3 Data Exclusion

The raw data from Moodle includes both real participants and several test/service accounts created for evaluation purposes. All accounts labeled as “Paideia users” are excluded from the analysis of real participants.

Category	Number
Total number of user records before exclusion	297
Excluded test/service accounts	13
Analyzed records of real participants	284

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3.4 Definition of completion of participation in the pilot

For the purposes of this analysis, completion of pilot participation is not defined by settings, such as those allowed by an LMS platform, for "completion" or by the issuance of a certificate. There are no defined learning paths for participants based on their self-assessment in Module 1, for example. In general, there are defined conditions for completing Modules 1 through 4, but in Module 5, there are no set criteria that would restrict the downloading of the final certificate or the submission of feedback, which would limit the number of participants solely to those who have completed the full learning path. We view the certificate itself, within the scope of the pilot, as an additional opportunity for formal acknowledgement of participation of participation, rather than as a mandatory condition for valid completion of the pilot process.

Instead, in the Bulgarian analysis, completion is accepted by us at the operational level through the submission of final feedback via Feedback Form **ID 5**. This form is completed by participants who have completed Modules 1–5 and have reached the final stage. In this sense, Form ID 5 is used as the primary practical indicator of completion of the full training trajectory.

A second feedback form—**ID 12**—was made available later for participants who attended one or more of the modules but did not complete the full course for one reason or another. It covers participants who completed more than one activity in any of the modules but discontinued their participation before completing the full training trajectory. This second form is analyzed separately as feedback from participants with a partial or varied participation trajectory.

The two final forms are identical in structure and content, allowing for a comparative analysis of the feedback. At the same time, they serve different analytical purposes: **ID 5** serves as an indicator of completion of the full training trajectory, while **ID 12** provides an additional perspective from participants who actually participated in the training but did not complete all modules. Thus, the analysis accounts for both participants who reached the final stage of the course and those whose responses help to understand the reasons, barriers, and conditions associated with partial participation.

Indicator	Group of respondents	Analytical role	Number
Final Form ID 5	Participants who completed the educational pathway from Module 1 to Module 5 and submitted feedback	Completed pilot participation; Certificate download	103 users
Final Form ID 5 after excluding test/service accounts	Real participants who completed the educational pathway from	Completed pilot participation; Certificate download	101

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Indicator	Respondent group	Analytical role	Number
	Modules 1 through 5 and submitted feedback		
Final Form ID 12	Participants who submitted feedback but chose their own learning path	Completed pilot participation on their own educational path	22
Total real participants with final questionnaire form ID 5 or ID 12	All participants who submitted final feedback	Key indicator for a completed pilot evaluation cycle	123

3.5 Distinction between participation, module progress, and certification

The analysis distinguishes between several different indicators:

Indicator	What it measures
Registered participants	Users enrolled in the relevant Moodle module
Module access	Participants who have actually accessed a given module
Completed activities	Participants who have completed one or more activities in the module
Reaching Module 5	Participants who have reached the final module
Final survey form	Participants who have provided final feedback via one of the two forms
Requirement for downloading a certificate	Participants who submitted one of the two feedback forms
Certificate download	Additional indicator of certificate download that should be analyzed separately when reliable data is available

This distinction is important because different metrics answer different analytical questions. Data on access and completed activities show how participants move through and navigate the learning content. Data on final forms show which participants chose to complete the pilot cycle and how they did so. Data on certificates show which participants took advantage of the opportunity for formal acknowledgement of participation of their participation.

In this sense, the absence of a downloaded certificate is not automatically interpreted as non-completion. The reasons for not taking advantage of the certificate option should be further clarified

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further, as the available data do not allow for a reliable conclusion as to whether this is due to a lack of interest, a technical difficulty, an unclear procedure, an oversight, or some other circumstance.

3.6 Limitations of the analysis

The analysis should be interpreted in light of several limitations:

- Completion of Module 5 is not a valid indicator, as no official completion criterion has been configured for this module.
- Completed pilot participation is defined by the submission of a final ID 5 or ID 12 survey form, not by an automatic Moodle status.
- The certificate is considered an additional option, not a mandatory requirement for completing the pilot participation.
- Not all participants who submitted final feedback followed the same learning path. Therefore, progress data is analyzed separately from final feedback data.
- Form ID 12 includes 22 respondents who responded and completed the form. The group is relatively large, and the data from it allows for interpretation; however, it should not be automatically generalized to all participants with an incomplete or different training trajectory.
- The exported file containing individual feedback for participants in the certification track contains 91 individual responses and is used for a detailed analysis of the evaluative and qualitative feedback.
- The location profile is missing for a significant portion of the participants; therefore, conclusions regarding differences between urban and rural areas should be interpreted with caution.
- Module 1 “Self-Reflection” functions as an adaptive guidance mechanism rather than a standard pre-test. Therefore, the lower number of participants in the subsequent steps of the self-assessment should not automatically be interpreted as early discontinuation.

These limitations do not invalidate the analysis, but require a careful distinction between observed data, interpretation, hypotheses, and recommendations.

4. Activity and Participation Trajectories

The Bulgarian pilot implementation shows high initial activity and clearly distinguishable participation trajectories in the learning process. The analysis of module progress is not used as the sole criterion for completion, but as an indicator of how participants navigated the course structure. Completed pilot participation is recorded by submitting a final questionnaire form ID 5 or ID 12, while data on access to

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modules and completed activities indicates the degree and depth of engagement with the training content.

4.1 Participant activity in the training modules

Module	Enrolled	Access	Users who have completed more than one activity in the course	Completed all activities in the module
Module 1	282	250	205	159
Module 2	280	182	166	118
Module 3.1	261	129	128	84
Module 3.2	270	112	103	84
Module 4	270	103	97	83
Module 5	273	130	116	0

Observed data:
The highest activity is observed at the beginning of the course. Of the 282 participants enrolled in Module 1, 250 actually accessed the module, and 205 completed more than one activity. This indicates strong initial engagement and genuine participation in the training, rather than merely formal registration.

After Module 1, there is a decrease in the number of participants who continue to the subsequent modules. Access drops from 250 in Module 1 to 182 in Module 2 and 129 in Module 3.1. After Module 3.1, the number of participants with access and completed activities becomes more stable. In Module 5, an increase is observed compared to Module 4: 130 participants accessed the final module, and 116 completed at least one activity within it.

Interpretation:
The main challenge is not initially attracting participants, but maintaining steady progress after initial enrollment. The most critical point is the transition from Module 1 to Module 2 and Module 3.1. Once participants reach Module 3.1, the active group stabilizes and the likelihood of continuing into the subsequent modules appears higher.

This outlines two main phases of participation. The first is a phase of initial orientation and selection, in which some participants become active but do not continue consistently through the subsequent modules. The second is a phase of stable participation, in which participants who have reached the core part of the course are more likely to continue to the final activities.

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These data should not be interpreted solely as “early discontinuation.” It is more appropriate to speak of different participation trajectories: a complete training path, selective completion of individual modules, reaching the final form, and taking or not taking advantage of the certification opportunity.

The increase in access to Module 5 compared to Module 4 indicates that some participants reached the final stage directly, which involves self-assessment, final feedback, and the opportunity for certification. This confirms that participation in the pilot did not proceed in exactly the same way for all participants and that the analysis must distinguish between different participation trajectories; in the future, this specificity should be taken into account and opportunities for individual learning paths should be proposed

4.2 Completed activities by module

Module	Users with completed activities
Module 1	205
Module 2	166
Module 3.1	128
Module 3.2	103
Module 4	97
Module 5	116

Observed data:
Completed activities indicate a deeper level of engagement compared to simply accessing the module. In Module 1, 205 participants completed activities, confirming a high level of initial engagement. The number gradually decreased through Module 4, where 97 participants completed activities. In Module 5, the number increases again to 116.

Interpretation:
The increase in Module 5 indicates that the final stage attracted participants who may not have progressed through all previous modules in the same way but engaged in final activities related to self-assessment, feedback, or certification. This is important for interpreting the pilot because it shows that final participation does not fully correspond to a linear progression through all modules.

Therefore, data on completed activities should be used to analyze the intensity of participation, but not as the sole criterion for completing pilot participation. The primary criterion for a completed assessment cycle remains the submission of the final ID 5 or ID 12 questionnaire.

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4.3 Final Participation and Questionnaire Forms

Indicator	Number
Users who submitted a final ID 5 form	103
"Paideia users" test/service accounts in Form ID 5	2
Real participants who submitted Form ID 5	101
Real participants who submitted Form ID 12	22
Total real participants with a final ID 5 or ID 12 questionnaire	123

Observed data:
A total of 123 real participants submitted one of the two final questionnaire forms. Of these, 101 submitted Form ID 5, associated with the certification track, and 22 submitted Form ID 12, which reflects an alternative final participation track.

Interpretation:
We consider these 123 participants, at the operational level, to have completed the pilot evaluation cycle because they provided final feedback on the program. However, within this group, there are different forms of participation. Some participants have completed the full standard trajectory, while others have provided final feedback through the alternative and additionally available form.

This distinction is important because the certificate is not treated as a mandatory requirement for completing the pilot. It is an additional option for certifying participation. Therefore, participants who submitted final feedback but did not take advantage of the certificate option should not automatically be considered as having not completed the pilot or as having dropped out.

4.4 Note on Module 5 and the completion indicator

Module 5 has:

- 130 users who have visited it;
- 116 users with completed activities;
- 123 real participants who submitted a final survey form ID 5 or ID 12;
- 0 completed courses according to the automatic Moodle indicator.

This confirms that the zero value for “course completed” in Moodle for Module 5 is a technical result of the lack of a configured formal completion criterion, rather than evidence of a lack of final participation.

Interpretation:
For future reports, it is necessary to distinguish at least four different indicators: reaching Module 5, completed activities in Module 5, submitted final feedback, and

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use of the certification option. Only in this way can confusion be avoided between technical Moodle tracking, actual learning activity, assessment feedback, and the administrative, predefined right to certification.

4.5 Summary of Participation Trajectories

The data show that the Bulgarian pilot does not follow a single linear trajectory for all participants. Instead, several types of participation can be distinguished:

Trajectory	Description	Analytical significance
Initial activation	Participants who enter Module 1 and begin training	Indicates the appeal and initial engagement of the course
Sustained module progress	Participants who continue through Module 2, Module 3.1, and subsequent modules	Indicates genuine engagement with the training content
Final module participation	Participants who reach Module 5 and complete the activities therein	Demonstrates involvement in the final phase of the course
Certification track	Participants who have submitted Form ID 5	Indicates participation associated with the possibility of certification
Alternative final track	Participants who have submitted Form ID 12	Indicates a completed assessment cycle for an individually selected training pathway

Summary interpretation:
The Bulgarian pilot achieved high initial engagement and a significant number of participants who completed the assessment cycle through final feedback. The main challenge is related to maintaining sustainable progress after initial engagement, especially in the transition from Module 1 to Module 2 and Module 3.1. At the same time, data for Module 5 and the final forms indicate that some participants followed different, non-linear paths of participation, which must also be recognized as valid forms of pilot participation.

From the perspective of future improvements to the PAIDEIA model, this means that the platform and the training organization **must clearly distinguish between learning progress, final feedback, and certification.** It is also necessary for participants to receive clearer **information** about **possible completion pathways**, the right to a certificate, and the steps they must take to obtain it.

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5. Profile-based progress analysis

Profile analysis examines how different groups of participants move through the PAIDEIA learning trajectory. Unlike the analysis of the final questionnaires, which tracks completed pilot participation via ID 5 or ID 12, this section covers **the entire cohort of 284 real participants** and tracks their activity from Module 1 to Module 5.

Participant profiles were derived from the cohorts and groups in Moodle. Previous AI experience, school profile, and location were identified through the cohorts. The categories “Self-registered” and “In-person” were identified through the groups in Moodle.

This section distinguishes between three different types of indicators:

Indicator	**Value**
Access to Module 1	Indicates initial engagement and actual participation in the course
Access to Module 5	Indicates reaching the final module, regardless of the specific path
Final Form ID 5 or ID 12	Indicates completed evaluative participation in the pilot
Final participation rate	Proportion of participants in the respective profile group who submitted a final questionnaire

This approach allows for an analysis of progress throughout the entire course, without limiting the profile analysis solely to participants who completed the final questionnaire or reached Module 5.

5.1 Progression based on reported prior experience with AI

Profile of AI experience	**Participants**	**Access to Module 1**	**Access to Module 5**	**Final Form ID 5 or ID 12**	**Final Participation Rate**	**Early withdrawal**
Intermediate level of experience	78	70	41	38	48.7%	33.3%
Basic experience	96	83	42	42	43.8%	36.5%
No prior experience	35	30	18	18	51.4%	37.1%

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AI Experience Profile	Participants	Access to Module 1	Access to Module 5	Final Form ID 5 or ID 12	Final Participation Rate	Early withdrawal
High level of experience	27	24	14	13	48.1%	51.9%
Not identified / other channel of engagement	48	43	15	12	25.0%	29.2%

Observed data:
All groups identified by prior AI experience showed actual participation in the course and reached the final assessment stage. In absolute numbers, the highest number of final participants was observed among those with basic experience—42—and those with intermediate experience—38. Participants with no or limited prior experience numbered 18, while those with a high level of prior experience numbered 13.

In terms of the share of final participation relative to group size, the values for the identified profiles are relatively close: between 43.8% and 51.4%. The lowest proportion is among the unidentified profiles—25.0%, which is likely due to weaker profiling or more diverse recruitment channels.

Interpretation:
The data show that PAIDEIA is not attractive only to a strictly defined group of teachers. However, the strongest absolute concentration of final participation is observed among teachers with **basic** and **moderate** experience with AI. This means that the course is most successful in reaching participants who already have a basic orientation or practical exposure to artificial intelligence but still need a structured pedagogical, ethical, and didactic framework.

Participants with no or limited prior experience also show a good rate of completion. This suggests that the course has potential as an introductory program, but this group may require stronger initial support, clearer guidance, and a more gradual introduction to the topic.

Hypothesis:
The higher rate of early early discontinuation among participants with a high level of prior experience may mean that some of them used the course selectively or judged that part of the content was already familiar to them. This should be viewed as a hypothesis, not as a definitive conclusion.

5.2 Progress by School Profile

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School profile	Participants	Access to Module 1	Access to Module 5	Final Form ID 5 or ID 12	Final Participation Rate	Early withdrawal
General secondary school	58	50	32	33	56.9%	29.3%
Profiled secondary school	38	33	19	19	50.0%	39.5%
Primary and lower-secondary school	72	63	32	28	38.9%	34.7%
All sectors	27	24	14	13	48.1%	51.9%
General / mixed profile	11	8	4	5	45.5%	45.5%
Not identified	78	72	29	25	32.1%	33.3%

Observed data:
The highest share of final participation is observed among General secondary school teachers—56.9%, followed by teachers from Profiled secondary school—50.0%.
Participants from Primary and lower-secondary school also constitute a significant group, with 28 final participations and a share of 38.9%.

Interpretation:
The data confirm that the course is particularly relevant for secondary school teachers. This can be explained by the more direct connection between PAIDEIA's content and the professional challenges at this stage: the use of AI in teaching, assessment, critical thinking, student AI literacy, ethics, and academic integrity.

At the same time, the participation of elementary and middle school educators indicates that the program also has potential for earlier educational stages. For these participants, however, a greater differentiation of examples may be necessary—for instance, working with AI among younger students, early digital literacy, safe use of tools, and the teacher's role as a mediator.

Recommendation:
Future versions of the training could be enriched with more practical examples tailored to educational stages. For secondary education, more case studies on assessment, student work with AI, and critical thinking could be developed. For primary education, more examples related to age-appropriate use, safety, and support for early digital literacy are needed.

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5.3 Progress by Location

Location Location	Participants	Access to Module 1	Access to Module 5	Final Form ID 5 or ID 12	Final Participation Share	Early withdrawal
City	51	47	23	20	39.2%	37.3%
Rural	20	17	8	7	35.0%	40.0%
All / mixed	38	32	18	18	47.4%	50.0%
Not identified	175	154	81	78	44.6%	32.0%

Observed data:
Location data should be interpreted with caution, as the location is not identified for a large proportion of participants. Among participants with available profiles, a relatively similar share of final participation is observed in the urban and rural groups—39.2% and 35.0%, respectively. The "All/Mixed" group has a higher share—47.4%—but it does not represent a homogeneous territorial profile.

Interpretation:
The available data do not allow for a definitive conclusion that location alone is a decisive factor for progress in the course. It is possible that the differences are due not only to urban or rural environments, but also to other conditions: institutional support, technical infrastructure, individual motivation, channel of enrollment, and the participant's professional profile.

Recommendation:
In future pilot activities and when scaling up the model, it is recommended to ensure more comprehensive and reliable profiling by location. Territorial differences may be relevant for analyzing access to digital resources, school infrastructure, available support, and opportunities for applying AI in the classroom.

5.4 Progress by registration/training method

Method	Participants	Access to Module 1	Access to Module 5	Final Form ID 5 or ID 12	Final Participation Share	Did not reached Module 5
Main cohort groups	239	209	116	116	48.5%	51.5%

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Method	Participants	Access to Module 1	Access to Module 5	Final Form ID 5 or ID 12	Final Participation Share	Did not reached Module 5
In-person introductory training	26	26	9	2	7.7%	65.4%
Self-registered	18	14	5	5	27.8%	72.2%

Observed data:
Participants from the main cohort groups had the highest number of final completions—116. There were 18 self-registered participants, of whom 5 submitted a final form. Participants enrolled via in-person enrollment showed full initial access to Module 1, but only 2 out of 26 submitted a final form.

Interpretation:
The data indicate that the enrollment channel matters for participation retention. The primary cohort groups appear more stable, likely because they were more clearly profiled, enrolled through a more structured process, or received more context and expectations regarding participation.

Self-registered participants show a more unstable trajectory. This may be due to weaker initial orientation, a lower sense of commitment, or a lack of follow-up support. With in-person onboarding, initial engagement is high, but it does not automatically translate into sustained, meaningful participation. This means that a one-time in-person onboarding session is not sufficient unless it is followed by structured online support.

Note:
These categories should not be interpreted as completely independent and exhaustive models of learning. They reflect specific conditions for registration, onboarding, or initial engagement, rather than the full profile of participants. The results were likely influenced by factors such as the timing of engagement, recruitment channel, prior expectations, individual motivation, and available support during the training.

Recommendation:
If self-registration is used in future scaling, it should be combined with a clearly structured onboarding process, automated reminders, brief orientation instructions, and visible information about final feedback and the option for a certificate. For in-person introductory training, it is recommended to provide follow-up online support so that initial motivation is maintained and transformed into sustainable progress.

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5.5 What the profile analysis reveals about the course's appeal and suitability

The profile analysis shows that PAIDEIA has broad applicability but is not equally attractive or equally easy to complete for all participant groups.

In terms of prior experience with AI, the course appears most attractive to teachers with **basic** and **intermediate** experience. They form the largest groups among participants who provided final feedback. This suggests that PAIDEIA best meets the needs of teachers who already have some initial exposure to AI but require a more systematic framework for pedagogical application.

In terms of school profile, **secondary school** teachers stand out most clearly, particularly those from general and specialized schools. This indicates that the course content is particularly relevant to educational contexts where topics such as the use of AI, critical thinking, assessment, academic integrity, and student AI literacy are directly linked to daily pedagogical practice.

Participants with no or limited prior experience also demonstrate significant engagement, suggesting that the course can function as an introductory program. For this group, however, more initial orientation, clear instructions, and support in the early modules are likely needed.

Participants with a high level of prior experience may need a more differentiated or advanced track, including more practical case studies, real-world school scenarios, choices, and more in-depth tasks.

5.6 Summary of the Profile Analysis

The profile analysis of the entire cohort of 284 real participants shows that the Bulgarian pilot reached diverse groups of teachers, but the most stable final engagement was observed among **participants with basic and moderate experience with AI** and among secondary school teachers.

This does not mean that the program is unsuitable for the other groups. Rather, it indicates that different profiles require different types of support:

- beginner participants need stronger orientation and a more gradual introduction;
- participants with basic and intermediate experience seem to best fit the current course structure;
- advanced participants may need more in-depth and differentiated tasks;
- primary school teachers need more age-appropriate examples;
- self-registered and on-site participants need clearer follow-up support.

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The main conclusion is that PAIDEIA should not be positioned solely as an introductory course for beginners or as specialized training for advanced learners. The most accurate positioning is as **a structured professional development program for teachers who already recognize the significance of AI and are seeking pedagogical, ethical, and practical ways to integrate it into education**.

6. Engagement and Completion of Activities

This section examines participants' engagement through completed activities in the individual modules. Unlike enrollment or access data, completed activities indicate a more tangible form of participation, as they reflect the completion of specific learning tasks, resources, tests, self-assessments, or other activities on the platform.

At the same time, completed activities are not used as the sole criterion for completing pilot participation. In this analysis, completed pilot participation is also determined by the submission of a final questionnaire form ID 5 or ID 12. Therefore, data on completed activities are considered an indicator of **the intensity of learning engagement**, rather than an administrative status of completion.

6.1 Completed Activities by Module

Module	Users with completed activities
Module 1	205
Module 2	166
Module 3.1	128
Module 3.2	103
Module 4	97
Module 5	116

Observed data:
A significant number of participants completed activities throughout the entire training program. The highest number was observed in Module 1, where 205 participants completed activities. After that, the number gradually decreases: 166 in Module 2, 128 in Module 3.1, 103 in Module 3.2, and 97 in Module 4. In Module 5, there is an increase to 116 participants who completed activities.

Interpretation:
The data show a dynamic typical of online training: high initial activity, followed by a decline in engagement in the subsequent stages. The most important transition

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lies between Module 1, Module 2, and Module 3.1, where the most significant reduction in the active group is observed.

The increase in Module 5 is particularly significant. It indicates that the final module attracted participants who engaged in final activities related to self-assessment, feedback, or certification opportunities. This confirms that participation did not proceed in a completely linear fashion for all users and that some of them followed different trajectories throughout the course.

6.2 Access and Completed Activities in Module 5

Indicator for Module 5	**Number**
Enrolled in Module 5	273
Accessed Module 5	130
Users who have completed activities in Module 5	116
Completed the course according to Moodle	0

Observed data:
273 participants are enrolled in Module 5. Of these, 130 accessed the module, and 116 completed at least one activity. However, the automatic Moodle indicator shows 0 course completions.

Interpretation:
The zero value in Moodle does not reflect the actual activity in the final module. It is the result of the lack of a reliably configured formal criterion for completing Module
5. Therefore, the Moodle status “course completed” cannot be used as a valid indicator of final participation.

More reliable indicators of final engagement are:

- access to Module 5;
- completed activities in Module 5;
- final feedback submitted via ID 5 or ID 12;
- use of the certificate option, when there is separate reliable data on this.

6.3 Ratio of access to completed activities

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Module	Access	Completed activities	Proportion of users with activities relative to those who accessed
Module 1	250	205	82.0%
Module 2	182	166	91.2%
Module 3.1	129	128	99.2%
Module 3.2	112	103	92.0%
Module 4	103	97	94.2%
Module 5	130	116	89.2%

Observed data:
Among the participants who actually accessed the respective module, the proportion of those who completed the activities is high in all modules. It is lowest in Module 1—82.0%, which is expected, since the first module also serves as an introductory orientation. In the subsequent modules, the proportion is very high, reaching 99.2% in Module 3.1.

Interpretation:
These data show that once participants move beyond initial access and actually enter a given module, a large proportion of them complete activities. **Therefore, the problem lies not so much in the motivation of participants who have already reached a given module, but in the transitions between modules—especially in the early part of the course.**

This supports the conclusion that future improvements should focus on:

- clearer instructions after Module 1;
- reminders to proceed to the next module;
- better visibility of progress;
- easier navigation in Moodle;
- explaining the connection between the modules, the final feedback, and the certificate.

6.4 Engagement, final feedback, and certification

Indicator	Number	Analytical role
Users with completed activities in Module 5	116	Final learning activity indicator

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Participants with final form ID 5	101	Learning path with certificate

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Indicator	Number	Analytical role
Participants with final form ID 12	22	Alternative final feedback
Total real participants with ID 5 or ID 12	123	Completed evaluation cycle of the pilot
Completed the course according to Moodle in Module 5	0	Invalid indicator due to lack of configuration

Observed data:
The data shows 116 participants who completed activities in Module 5 and 123 real participants who submitted final feedback via ID 5 or ID 12. This means that the final feedback covers a slightly larger group of participants than those reported as having completed activities in Module 5.

Interpretation:
This discrepancy confirms that final participation in the pilot cannot be reduced solely to Moodle activity indicators. Some participants provided final feedback via an alternative pathway or without being recorded as having completed an activity in Module 5 in the manner that Moodle tracks activity.

Therefore, the report must clearly distinguish between:

- **educational engagement**—measured by attendance and completed activities;
- **completed assessment cycle** — measured by the final ID 5 or ID 12 form;
- **certification pathway** — measured by Form ID 5;
- **certificate download** — a separate administrative indicator that must be tracked independently.

6.5 What the data on learning engagement shows

Data on completed activities show that participants who reach a given module are typically actively engaged with the content. This is a positive indicator of the course design because it suggests that the content and activities are meaningful enough to be completed by participants who have already entered the module.

The main vulnerability is not related to the activities within the individual modules, but to the transition between modules. The most significant drop in participation is observed in the early transition from Module 1 to Module 2 and Module 3.1. After this point, participants who continue demonstrate more stable engagement.

This is crucial for improving the course. Support should not be concentrated solely in the final stage or around certification. On the contrary, the most important support should

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be provided at the beginning of the course, especially after Module 1, when participants need to understand:

- what the logic of the learning trajectory is;
- what is expected of them in the following modules;
- how their progress is tracked;
- how the final feedback relates to the completion of the pilot participation;
- how they can take advantage of the opportunity to earn a certificate.

6.6 Summary

An analysis of the completed activities shows that the Bulgarian pilot has significant real learning engagement. 205 participants completed activities as early as Module 1, and 116 completed activities in Module 5. This indicates that the course was not merely formally accessible but was actively used by a significant group of teachers.

At the same time, the data confirm the need for a more precise distinction between the different types of completion and participation. The Moodle indicator for course completion in Module 5 is not valid, as it shows 0 despite the presence of 130 participants with access and 116 participants with completed activities. Therefore, final participation must be measured through a combination of indicators, with the primary indicator for a completed evaluation cycle of the piloting remaining the submission of the final questionnaire form ID 5 or ID 12.

The main conclusion is that PAIDEIA succeeds in effectively engaging participants who reach the modules, but needs to improve support for transitioning between modules, the visibility of progress, and the clarity surrounding final feedback and certification opportunities.

7. Self-assessment and Evaluation

This section examines the results of self-assessment and formative assessment in the Bulgarian pilot. These data are not used as the sole criterion for completing pilot participation, but as an indicator of perceived progress, mastery of key concepts, and engagement with the course's assessment activities.

Self-assessment is particularly important in PAIDEIA, as the training is not focused solely on the technical use of AI tools, but on the development of professional readiness, critical understanding, ethical sensitivity, and pedagogically sound use of AI in education.

7.1 Self-reflection in Module 1

Self-reflection in Module 1 functions as an adaptive mechanism for the initial assessment of participants in the training program. Participants who achieve

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a score above 70% in a given step are given the opportunity to move on to the next step of self-reflection. In this way, each subsequent step facilitates the more precise guidance of participants toward a differentiated learning trajectory within the course.

Consequently, the lower number of participants in the later steps of self-assessment in Module 1 should not be interpreted as early discontinuation. It reflects the underlying logic of adaptive guidance, in which only participants who have met a certain self-assessment threshold proceed to the next level.

Interpretation:
This logic is valuable because it allows for the initial positioning of participants according to their self-assessed readiness and knowledge. At the same time, it needs to be explained more clearly to participants so that it is not perceived as a standard test or as a "pass/fail." Self-reflection in Module 1 should be clearly presented to teachers as a tool for orientation and guidance, not as an assessment with a punitive function.

7.2 Self-assessment in Module 5

Self-assessments in Module 5 are part of the final phase of the training cycle. Their purpose is to support participants in making sense of the progress they have made and in reflecting on their own readiness to use AI in an educational context.

Due to the lack of a formally configured criterion for completing Module 5 in Moodle, self-assessments and final survey forms are more appropriate indicators of final participation than the automatic Moodle "course completed" status. This is particularly important because Moodle reports 0 course completions for Module 5, even though 130 participants accessed the module and 116 completed at least one activity within it.

Interpretation:
The self-assessment in Module 5 should be viewed as part of the final reflection, not merely as a technical step prior to certification. It contributes to the validation of the pilot model because it shows how participants perceive their own development after going through the training content or after participating in a specific trajectory of the pilot.

7.3 Self-assessment of competence development

Area	Pairs of users	Average score for Module 1	Average score for Module 5	Average increase
Step 1: Fundamentals of Artificial Intelligence	96	68.36	84.72	+16.36

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Field	Pairs of users	Average value for Module 1	Average value for Module 5	Average increase
Step 2: Integrating artificial intelligence into practice	31	88.33	93.09	+4.76
Step 3: Supporting students' AI literacy	28	87.20	94.64	+7.44
Step 4: Legal, ethical, and communication aspects	24	87.04	94.68	+7.64

Observed data:
The greatest self-reported improvement was observed in the area of basic understanding of artificial intelligence. In Step 1, "Fundamentals of Artificial Intelligence," 96 comparable pairs of responses show an average increase of +16.36 points—from 68.36 in Module 1 to 84.72 in Module 5.

Positive increases are also observed in the other areas, albeit more moderate:
+4.76 points for integrating AI into practice, +7.44 points for supporting students' AI literacy, and +7.64 points for legal, ethical, and communication aspects.

Interpretation:
The strongest self-reported impact of the course is on the basic understanding of artificial intelligence. This is an important result because it shows that PAIDEIA contributes to building a fundamental orientation regarding the role, possibilities, limitations, and risks of AI in education.

The smaller increases in Steps 2–4 should be interpreted with caution. In Module 1, only participants who passed the 70% threshold had access to the subsequent steps of the self-assessment. Therefore, the participants included in these pairwise comparisons already had relatively high initial scores. This limits the potential for very large additional growth but does not diminish the significance of the positive change.

Conclusion:
The self-assessment data confirm that the course has the strongest added value for building a foundational and systematic understanding of AI. This also aligns with the profile analysis, according to which PAIDEIA appears particularly suitable for teachers with basic and intermediate prior experience—participants who already have an interest in or initial exposure to the topic but need structure and pedagogical guidance.

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7.4 Results from formative assessments

Module	Assessment	Users	Average rating
Module 2	Formative Assessment	128	86.32
Module 3.1	Formative assessment	96	82.90
Module 3.2	Formative assessment	95	85.23

Observed data:
Participants who took part in the formative assessment achieved high scores in all three assessments. The average score was 86.32 in Module 2, 82.90 in Module 3.1, and 85.23 in Module 3.2.

Interpretation:
The results show that participants who reach the formative assessments generally perform well on the assessment activities. This supports the conclusion that the content is accessible to the active group of participants and that the assessment does not act as a major barrier for those who have already reached the respective modules.

The average score in Module 3.1 is slightly lower than in the others. This may mean that the content or the assessment activity in this module was more demanding. This conclusion should be treated as a hypothesis until it is confirmed through a more in-depth analysis of the tasks themselves and through qualitative feedback from the participants.

7.5 The Relationship Between Self-Assessment, Assessment, and Participation Trajectories

Self-assessment and formative assessment serve different functions within the course. Self-assessment helps participants reflect on their own development, while formative assessments provide information on the mastery of specific parts of the content.

These indicators should not be confused with administrative completion or certification. A participant may have completed a self-assessment or formative assessment without necessarily having taken advantage of the certification option. Conversely, a participant may submit final feedback and complete the piloting evaluation cycle of the piloting without Moodle recording formal completion of the course in Module 5.

Therefore, the analysis must maintain a clear distinction between:

Type of indicator	What it indicates
Self-assessment	Perceived progress and professional reflection
Formative assessment	Mastery of specific content and completion of assessment activities

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Completed activities	Actual learning activity on the platform

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Type of indicator	What it indicates
Final survey form	Completed evaluation cycle of the pilot
Certificate	Use of the opportunity for formal acknowledgement of participation

7.6 Summary

The data from the self-assessment and formative assessment paint a positive picture. The most pronounced self-assessed improvement is in the area of basic understanding of AI, where the average score increased by +16.36 points. This confirms that the course successfully helps participants build a more systematic understanding of artificial intelligence in education.

Formative assessments also show a high level of performance among participants who completed the respective assessment activities. Average scores above 82 points in Module 2, Module 3.1, and Module 3.2 indicate that active participants have mastered key elements of the content.

The main conclusion is that PAIDEIA has a clear impact on participants' self-assessed competence and professional orientation, particularly regarding the fundamentals of AI. In future versions of the course, it is recommended to retain the adaptive logic of self-reflection, but to explain it more clearly to participants. Module 3.1 also requires further analysis, as it shows a slightly lower average rating and may require a review of the content or assessment tasks.

8. Feedback from Participants

This section analyzes the final feedback from participants in the Bulgarian pilot. In accordance with the updated methodological framework, the two final forms—**ID 5** and **ID 12**—are viewed as two forms of completed assessment participation, rather than as a dichotomy between "completed" and "uncompleted."

Form **ID 5** is linked to the certification pathway and collects feedback from participants who have gone through the final process related to the possibility of certification. Form **ID 12** collects alternative final feedback from participants with a different participation pathway. Both forms are important for validating the pilot model because they provide an assessment of the structure, content, applicability, and conditions for wider implementation of PAIDEIA.

8.1 Feedback Datasets

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Feedback dataset	Respondent group	Available data	Analytical role
Final Form ID 5	Participants in the certification track	103 users; 101 real participants after excluding 2 test/service accounts; 91 individual responses exported for detailed analysis	Final feedback related to certification
Final Form ID 12	Participants with an alternative final trajectory	22 individual responses	Alternative final feedback

Observed data:
A total of 123 real participants submitted one of the two final survey forms. Of these, 101 are in the certification track via ID 5, and 22 submitted the alternative final form ID 12.

Interpretation:
The two groups should not be viewed as "successful" and "unsuccessful" participants. They represent different ways of final participation in the pilot. Form ID 5 provides more complete information about participants who went through the certification track, while ID 12 adds an important perspective from participants who took a different path through the training or did not take advantage of the certification opportunity.

8.2 Feedback from participants in the full training pathway — Form ID 5

Participants who completed the final Form ID 5 rated the program very positively on nearly all indicators.

Indicator	Average Rating	Positive responses
The program helped participants understand the role of AI in education	4.73	97.8%
Overall positive contribution to understanding and professional development	4.72	97.8
The workload was manageable	4.67	97.7
The structure of the modules facilitated the gradual assimilation of the material	4.67	97.8

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Indicator	Average rating	Positive responses
The platform effectively supports learning	4.64	97.8%
The program structure was clear and consistent	4.63	97.8
The pilot project contributed to professional development	4.63	97.8
Confidence to try AI-supported approaches	4.62	97.7
The platform was easy to navigate	4.62	97.7
The balance between theory and practice was appropriate	4.55	97.7
The learning activities were relevant to the participant's context	4.53	97.7

Observed data:
Ratings are very high across all key indicators. The highest ratings were given to the program's contribution to understanding the role of AI in education, its overall contribution to professional development, and the clear structure of the training.

Interpretation:
The data from ID 5 show that participants in the certification track perceive PAIDEIA as a professionally relevant, well-structured, and useful program.
The high rating of confidence in trying out AI-supported pedagogical approaches indicates that the course has contributed not only to raising awareness but also to building practical readiness.

8.3 Barriers identified by participants in the certification track

Barrier	Average rating	Positive responses
Institutional or organizational barriers	2.61	35.7%
Time constraints	3.17	56.8
Political or regulatory factors	2.59	34.8

Observed data:
The most clearly expressed obstacle is time. More than half of the participants in the certification pathway indicate that time constraints have affected their ability to experiment with new pedagogical approaches and apply what they have learned in practice.

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Interpretation:
Time and professional workload are the main practical constraints to applying what has been learned. Institutional and regulatory barriers are less pronounced but are also present in the responses of approximately one-third of the participants. This indicates that teachers' individual motivation is not sufficient for the sustainable implementation of AI in the school environment; organizational support, clear rules, and appropriate conditions are necessary.

Topics from the open-ended responses regarding barriers

Theme	**Approximate frequency among open-ended responses**
Time / workload	30 responses
Policy, regulation, ethics, or safe use	24 responses
Technical infrastructure / access to devices or tools	23 responses
Need for additional training or better skills	19 responses
No significant barriers reported	4 responses

Interpretation:
The open-ended responses confirm that the broader implementation of AI in education requires attention not only to teachers' individual readiness but also to environmental conditions. Among these, technical infrastructure, safe and ethical use, regulatory clarity, and the need for ongoing professional support stand out.

8.4 Added value of PAIDEIA

The open-ended responses from participants who completed ID 5 highlight several dimensions of the program's added value.

Topic of added value	**Approximate frequency among open-ended responses**
Practical application and tools for artificial intelligence in teaching	36 responses
Ethics, critical thinking, and responsible use of AI	35 responses

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Topic on added value	Approximate frequency among open-ended responses
Confidence and motivation	20 responses
Structured/systematic understanding of AI in education	17 responses
Awareness of the role and potential of AI	13 responses

Interpretation:
The most significant added value of PAIDEIA goes beyond the technical mastery of artificial intelligence tools. Participants view the program as an opportunity for more comprehensive professional development, as it provides them with practical ideas, an ethical framework, a more structured understanding, and greater confidence for pedagogical experimentation.

This confirms that the course is not perceived solely as training in the use of specific digital tools, but as a broader educational pathway for teachers' professional development in the context of the integration of artificial intelligence into education.

8.5 Potential for Expansion According to Participants

Participants who completed ID 5 strongly support the idea that the program can be used beyond the pilot group.

Indicator	Average rating	Positive responses
The program is suitable for teachers outside the pilot group	4.48	97.7%
The approach can be adapted to different school contexts	4.46	96.6
Wider implementation requires additional institutional support	4.34	90.8

Priorities for scaling up from open-ended responses

Scaling topic	Approximate frequency among open-ended responses
Infrastructure and access to tools	30 responses

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Scaling topic	Approximate frequency among open-ended responses
Institutional support and policy coordination	28 responses
Time and workload planning	16 responses
More practical examples / hands-on training	14 responses
Differentiation based on the educational context or target group	14 responses

Interpretation:
Participants see strong potential for scaling up PAIDEIA, but do not view it as a process that can rely solely on teachers' individual motivation. Wider implementation requires institutional support, technical resources, realistic time planning, access to appropriate tools, and more practical examples adapted to different educational contexts.

8.6 Feedback from participants with personalized learning trajectories — ID 12

Form ID 12 was completed by 22 participants. In this analysis, this group is not considered "early discontinuations" but rather participants who submitted alternative final feedback.
Their perspective is particularly important because it shows how the program is perceived by participants with different learning trajectories throughout the course and/or the reasons behind their choices.

Indicator	Average rating among participants with an alternative final trajectory
The approach can be adapted to different school contexts	4.23
The program helped in understanding the role of AI in education	4.23
The overall structure was clear and consistent	4.23
Wider implementation requires institutional support	4.18
Confidence to try AI-supported approaches	4.14

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Indicator	Average rating among participants with an alternative final trajectory
The pilot project contributed to professional development	4.09
Overall contribution to understanding and professional training	4.05
The program was relevant to the professional role	4.05
Balance between theory and practice	4.05
The platform effectively supported learning	4.00
The platform was easy to navigate	3.59
Time constraints limited experimentation	3.41

Observed data:
Ratings from participants with an alternative final trajectory are positive across all key indicators. The highest ratings were given to the approach's adaptability to different school contexts, its contribution to understanding the role of AI, and the clarity of its structure. The lowest rating was for platform navigation—3.59. Time constraints also remain a significant factor, with an average rating of 3.41.

Interpretation:
The data from ID 12 show that the alternative trajectory does not imply rejection of the program. On the contrary, participants in this group also recognize the value of PAIDEIA, its professional relevance, and its potential for wider application.

At the same time, more moderate assessments indicate that this group encountered more difficulties, particularly with regard to navigation, time management, and likely the clarity of the course structure. This is an important indication that, for some participants, the problem lies not in the course content but in the organization of the course, technical orientation, and communication regarding the final steps.

8.7 Summary of Feedback

Feedback from the two final cohorts indicates that PAIDEIA is viewed positively by participants. Group ID 5 gives exceptionally high ratings for the structure, applicability, professional value, and support for understanding the role of AI in

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education. Group ID 12 also evaluates the program positively, albeit more moderately, while highlighting practical and navigational difficulties more clearly.

The main strengths of PAIDEIA, confirmed by the feedback, are:

- clear and consistent structure;
- professional relevance;
- support for understanding the role of AI in education;
- the ethical and critical focus;
- practical applicability;
- the potential for adaptation to different school contexts. The main

challenges are related to:

- time constraints;
- navigating the platform;
- technical and infrastructure conditions;
- the need for institutional support;
- clearer communication regarding the final steps and the possibility of certification;
- the need for more practical examples adapted to different educational contexts.

The overall conclusion is that the feedback validates PAIDEIA as a professionally relevant and applicable model for training teachers on the topic of artificial intelligence in education. The differences between ID 5 and ID 12 should not be interpreted as a division between success and failure, but rather as an indication of different needs for support, guidance, and participation tracking.

9. Comparative Interpretation of the Results from the Two Forms

This section compares the two groups of participants who submitted final feedback: participants in the certification track via Form **ID 5** and participants with an alternative final track via Form **ID 12**. The comparison does not aim to contrast them as “completers” and “non-completers,” but rather to show how different participation pathways are associated with different levels of satisfaction, different challenges, and different support needs.

In the updated methodological framework, both groups are considered participants who have completed the pilot evaluation cycle, as both have provided final feedback on the program.

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9.1 Comparative table of the two trajectories

Dimension	Full training trajectory from Module 1 to Module 5 — ID 5	Different participation trajectory — ID 12
Analytical role	Final feedback related to the certification process	Final feedback from participants with different participation paths
Number of real participants	101 real participants in the certification pathway; 91 individual responses for detailed analysis	22 individual responses
Overall evaluation of the program	Very positive	Positive, but more moderate
Understanding of the role of AI in education	Very highly rated	Highly rated
Professional relevance	Very high	Positive
Structure and consistency	Very highly rated	Highly rated
Balance between theory and practice	Highly rated	Rated positively
Platform navigation	Very highly rated	**The lowest-rated indicator in the group**
Time constraints	Major obstacle	Visible obstacle
Scaling potential	Strongly supported	Strongly supported
Key analytical signal	The program is perceived as clear, useful, and professionally applicable	The program is rated positively, but the need for guidance, support, and clearer navigation is more apparent

9.2 What the two groups have in common

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Both groups rate PAIDEIA positively. This is an important finding because it shows that the program is perceived as valuable not only among participants who have completed the certification track but also among those who have followed a different path of participation.

The common positive elements are:

- the program helps participants understand the role of AI in education;
- the training structure is perceived as clear and consistent;
- the content is rated as professionally relevant;
- participants see potential for applying the model in various school contexts;
- the need for institutional support for wider implementation is confirmed by both groups.

Interpretation:
This means that the core pedagogical logic of PAIDEIA is validated by both final trajectories. The differences between them do not call into question the value of the course, but rather indicate that the individual groups of participants have different needs regarding orientation, navigation, time, and support.

9.3 Where the main differences are observed

The main difference between the two groups lies in the intensity of their positive ratings. Participants from ID 5 gave very high ratings on nearly all indicators. Participants from ID 12 also rated the program positively, but their ratings were more moderate.

The clearest difference is observed in platform navigation. Participants in ID 5 rated the platform very highly, while in ID 12, navigation was the lowest-rated indicator—3.59. This suggests that for participants with an alternative trajectory, the difficulties are not primarily related to the value of the content, but rather to the way the platform is navigated and the clarity of the next steps.

Time constraints are also present in both groups. For participants in ID 5, time is the most clearly identified obstacle to practical implementation. For participants in ID 12, time is also a significant factor, but it is combined with more pronounced navigational and organizational difficulties.

Interpretation:
The differences between the two groups can be explained not so much by differing assessments of the content itself, but rather by varying degrees of clarity, support, and confidence throughout the course. This means that improving navigation, progress tracking, and communication regarding the final steps can increase engagement and satisfaction among participants with more unstable or non-linear trajectories.

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9.4 Certification as a separate analytical indicator

Form ID 5 is closely linked to the choice to download a certificate, but the certificate should not be viewed as the sole criterion for completing pilot participation. In this analysis, the certificate is understood as an additional opportunity for formal verification of participation.

This distinction is important because a participant may have provided final feedback and completed the pilot evaluation cycle without downloading a certificate. The reasons for this cannot be reliably determined from the available data alone. Possible explanations include technical difficulties, an unclear procedure, lack of time, lack of interest in formal acknowledgement of participation, or simply an oversight.

Interpretation:
Therefore, future reporting must clearly distinguish between:

- completion of pilot participation;
- module completion;
- submission of final feedback;
- inclusion in the certification process;
- actual certificate issuance.

This is the only way to avoid confusion between pedagogical engagement, evaluative participation, and administrative certification.

9.5 The alternative training pathway as a source of improvement

Form ID 12 provides particularly useful information because it shows how the program is perceived by participants who did not follow the standard certification track or who took a different path through the course.

This group should not be viewed as “failures.” On the contrary, the fact that 22 participants completed an alternative final form means they were engaged enough to provide feedback. Their responses are valuable because they more clearly highlight areas where the model can be improved.

The most important takeaways from this group are:

- the need for clearer navigation within the platform;
- a better explanation of the next steps;
- more visible progress tracking;
- clearer information about the connection between the final survey, the certification option, and downloading the certificate;

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- additional support for participants who do not follow a linear learning path.

Interpretation:
ID 12 should be used as a diagnostic tool to improve the course. It indicates not so much a weakness in the content as a need for better organization of the user experience, clearer communication, and better facilitation of the path through Moodle.

9.6 How Different Trajectories Change the Understanding of "Completion"

The most important methodological shift in the analysis is that completion is no longer understood as a singular, linear, and administrative category. In the context of the pilot, it is more appropriate to speak of **a completed evaluation cycle of the piloting**, which is evidenced by submitted final feedback.

This allows for the recognition of various real forms of participation:

Form of Participation	How it is recorded	What it means
Modular participation	Access and completed activities	The participant has engaged with the learning content
Final module participation	Access or activities in Module 5	The participant has reached the final phase of the course
The complete learning path	Form ID 5	The participant has completed the path associated with the certificate
The personalized learning path	Form ID 12	The participant has provided final feedback via a different path
Administrative verification	Certificate download	The participant has exercised their right to a certificate

Interpretation:
This logic is more suitable for evaluating a pilot project whose goal is not only to report formal completion but also to validate a training model, gather feedback, and determine under what conditions the course can be scaled.

9.7 Summary of the comparative interpretation

The comparison between ID 5 and ID 12 shows that PAIDEIA was positively evaluated by both groups of participants. Participants in the certification track gave very high ratings and confirmed the model's strengths: clear structure, professional relevance, ethical focus, practical applicability, and support for understanding the role of AI in education.

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Participants in the alternative final track also recognize the program's value, but their responses highlight certain practical challenges—primarily navigation, time, the organization of the process, and the clarity of the final steps.

The main conclusion is that the different participation trajectories should not be interpreted as success versus failure. They indicate different support needs. For the future implementation of PAIDEIA, it is necessary to maintain the course's strong pedagogical and ethical framework, but to improve navigation, visibility of progress, communication regarding certification, and support for participants who progress through the course in a non-linear manner.

10. Key Findings

Finding 1: The Bulgarian pilot achieved high initial engagement

The Bulgarian pilot successfully engaged a significant group of participants. After excluding test/service accounts, the analytical sample includes 284 real participants, of whom 250 accessed Module 1. This indicates strong initial interest in the topic of artificial intelligence in education and the pilot's ability to attract teachers to the learning platform.

Finding 2: The main challenge is maintaining sustained progress through the early modules

The data show that the greatest decline in activity occurs between Module 1, Module 2, and Module 3.1. This means that the critical point is not the initial enrollment of participants, but the transition from initial orientation to sustained participation in the learning process.

Once participants reach Module 3.1, the group of active participants stabilizes. This suggests that the early phase of the course needs to be supported more strongly through clearer instructions, reminders, visibility of progress, and a better explanation of the next steps.

Finding 3: Completed pilot participation should be acknowledged through final feedback, not just through a Moodle status or certificate

Module 5 does not automatically record completion in Moodle, as no reliable formal completion criteria have been configured. At the same time, 130 participants accessed Module 5, and 116 completed at least one activity within it. This indicates that the zero Moodle indicator does not reflect actual final activity.

Therefore, in this analysis, completed pilot participation is defined by the submission of the final questionnaire form ID 5 or ID 12. Based on this criterion, 123 real participants completed the pilot evaluation cycle.

Finding 4: The certificate should be viewed as an additional option, not as the sole criterion for completion

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The data shows that some participants submitted final feedback, but not all of them necessarily took advantage of the opportunity to receive a certificate. This should not automatically be interpreted as non-completion. The certificate is a form of administrative certification, while completed pilot participation is demonstrated through final feedback and participation in the evaluation cycle.

Future reports must clearly distinguish between: module completion, submission of final feedback, the certification process, and an actual certificate obtained.

Finding 5: PAIDEIA is most attractive to teachers with basic and intermediate experience with AI

The profile analysis shows that the strongest final engagement is observed among participants with basic and intermediate prior experience with artificial intelligence. This indicates that the course is particularly suitable for teachers who already have a basic orientation or practical exposure to AI but need a more structured pedagogical, ethical, and methodological framework.

The course should not be positioned solely as introductory training for complete beginners or as specialized training for advanced learners. Its greatest added value lies for teachers who already recognize the significance of AI and are seeking a professionally grounded way to integrate it into their pedagogical practice.

Finding 6: Secondary school teachers are the most strongly represented among final participants

By school profile, secondary school teachers stand out most clearly, especially those from general and specialized secondary schools. This suggests that the course content is particularly relevant to educational contexts where topics such as AI, assessment, academic integrity, critical thinking, and student AI literacy are directly linked to a teacher's daily work.

At the same time, the participation of teachers from elementary and middle school indicates that the course has potential for earlier educational stages as well, though greater differentiation of examples and tasks may be necessary there.

Finding 7: Participants who complete the individual modules demonstrate high actual learning engagement

The ratio of module access to completed activities is high across all modules. This means that participants who actually enter a given module typically complete activities within it. Therefore, the main challenge is not a lack of interest in the content within the modules, but rather the transition between modules and maintaining consistent engagement.

This is an important conclusion for the future design of the course: support should be directed specifically toward transitions between modules, rather than just the content of individual modules.

Finding 8: Self-assessment shows the strongest improvement in basic understanding of AI

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The greatest self-reported improvement is observed in “Fundamentals of Artificial Intelligence,” where 96 comparable pairs of responses show an average increase of +16.36 points. This confirms that the course makes a strong contribution to building a fundamental understanding of the role, capabilities, limitations, and risks of AI in education.

The more moderate improvements in the following areas should be interpreted with caution, as the participants who achieved them already had higher initial scores.

Finding 9: Formative assessments show good learning among active participants

Participants who reached the formative assessments achieved high average scores: over 82 points in all analyzed assessments. This indicates that active participants have mastered key elements of the content.

Module 3.1 has a slightly lower average score compared to the others, which may suggest greater difficulty in the content or the assessment task. This should be considered a hypothesis and verified through further analysis of the tasks and qualitative feedback.

Finding 10: Feedback validates PAIDEIA as a professionally relevant model

Feedback from participants in the certification track is overwhelmingly positive. They highly value the program’s structure, its professional applicability, the balance between theory and practice, the platform’s usability, and its contribution to understanding the role of AI in education.

Participants with an alternative final track also evaluate the program positively. Their evaluations are more moderate, but they confirm that the program is valuable even for participants who followed a different path during the pilot.

Finding 11: Different participation trajectories should not be interpreted as success versus failure

The data show that participants went through the course in different ways. Some followed the certification track, others submitted alternative final feedback, and still others engaged with content in individual modules without necessarily following a completely linear sequence.

This is important for interpreting the pilot. Different trajectories do not necessarily indicate a lack of interest or rejection of the course. They show that participants have different needs, different time constraints, and different levels of readiness for online learning.

Finding 12: Navigation, progress visibility, and communication regarding the final steps are key areas for improvement

The most significant practical difficulties relate to time, navigation within the platform, technical conditions, and the clarity of the final steps. This is particularly evident

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among participants with an alternative final trajectory, for whom navigation is the lowest-rated indicator.

Therefore, future improvements to the course should include clearer instructions, better visualization of progress, reminders, easier navigation within Moodle, and clear information regarding the relationship between participation, final feedback, certification eligibility, and certificate download.

Finding 13: Scaling up requires institutional and organizational support

Both groups of participants support PAIDEIA's potential for wider implementation, but the data clearly show that scaling up cannot rely solely on teachers' individual motivation. Institutional support, technical infrastructure, access to tools, realistic time planning, and more practical examples adapted to different educational contexts are needed.

Finding 14: PAIDEIA is a validated model with high appeal, but it needs clearer pathways for participation

In summary, the Bulgarian pilot validates PAIDEIA as a valuable model for teachers' professional development in the field of artificial intelligence in education. The model's strengths include its clear pedagogical structure, ethical focus, practical applicability, and support for a more systematic understanding of AI.

The main challenges are not related to a lack of interest, but to the organization of the course progression: early transitions between modules, navigation, progress tracking, and the distinction between participation, final feedback, certification, and certificate download.

11. Recommendations

The recommendations follow from the main conclusion of the analysis: PAIDEIA has been validated as a professionally relevant and attractive model for training teachers on the topic of artificial intelligence in education, but for future implementation and scaling, a clearer distinction is needed between the different forms of participation, progress, final feedback, and certification.

11.1 Recommendations for recording and tracking participation

1. Clearly distinguish between the different indicators of participation

Future reports should distinguish at least the following indicators:

Indicator	What it should measure
Registration	Users enrolled in the course or modules

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Indicator	What it should measure
Actual access	Users who have actually logged into the relevant module
Completed activities	Users who have completed learning activities on the platform
Module progression	Participants' progression through Module 1, Module 2, Module 3.1, Module 3.2, Module 4, and Module 5
Final feedback	Participants who submitted the final questionnaire form ID 5 or ID 12
Certification path	Participants who have completed the form or procedure related to the certificate
Certificate Retrieved	Participants who have actually exercised their right to certificate download

This distinction is necessary to avoid conflating pedagogical engagement, technical navigation of the platform, evaluative feedback, and administrative verification.

2. Introduce a robust indicator for "completed pilot participation"

For pilot and validation activities, the most appropriate key indicator is the submission of final feedback. Therefore, it is recommended that a clear definition be used in future pilots:

Completed pilot participation = final questionnaire submitted.

When there is more than one final form, as in the Bulgarian case, they should be treated as different final trajectories, rather than automatically as "completed" versus "uncompleted."

3. Track certificate download separately

The certificate should be reported as a separate administrative indicator. Whether or not a certificate is downloaded should not automatically be used as the sole criterion for completion of pilot participation.

It is recommended that future reports include a separate table:

Indicator	Number	Comment
Submitted final feedback		Completed the evaluation cycle of the piloting
Eligible for certification		Participants eligible for a certificate
Downloaded certificate		Participants who have exercised their right

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Indicator	Number	Comment
Did not download certificate		Requires further clarification of the reasons

The reasons for not downloading a certificate must be further investigated, as the available data does not allow for a reliable conclusion as to whether this is due to a technical issue, an unclear procedure, a lack of interest in certification, a lack of time, or another factor.

11.2 Recommendations for Moodle configuration and platform reporting

1. Configure a reliable completion criterion for Module 5

Module 5 must have clearly defined completion conditions in Moodle. These may be related to:

- a completed final self-assessment;
- a submitted final questionnaire;
- a completed final activity;
- access to the certificate page;
- fulfillment of minimum participation requirements.

This will prevent a situation where Moodle reports 0 completions despite actual activity in the final module.

2. Improve the visibility of progress for participants

Participants should clearly see:

- which modules they have started;
- which activities they have completed;
- what remains to be done;
- how to get to the final feedback;
- how to use the certification option.

This can be achieved through a more visible progress tracker, clear markers for completed activities, brief instructions at the beginning and end of each module, and automatic notifications upon reaching key milestones.

3. Create a common standard for national reporting

For future national pilots and to scale the model, it is recommended to use a common reporting standard that includes:

- a stable, anonymous user identifier;

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- country / language version / group;
- participant profile;
- registration channel;
- access by modules;
- completed activities by module;
- formative assessments;
- self-assessments;
- final feedback;
- certificate eligibility;
- actually issued certificate.

This will allow for a more reliable comparison between national pilots and reduce the risk of differing interpretations of "completion."

11.3 Recommendations for Course Design

1. Strengthen support in the early modules

The greatest decline in activity is observed in the transition from Module 1 to Module 2 and Module 3.1. Therefore, it is necessary to add stronger support specifically at the beginning of the course.

Appropriate measures include:

- a short orientation video after Module 1;
- a clear explanation of what follows after self-reflection;
- reminders to move on to Module 2;
- brief messages outlining the objectives of each subsequent module;
- a visual map of the entire course;
- a clear explanation of the final steps right at the beginning.

2. Explain the adaptive logic of self-reflection more clearly

Self-reflection in Module 1 should not be perceived as a standard test or a barrier. Participants should understand in advance that it serves for orientation and guidance.

Recommended wording for the platform:

This self-reflection is not a test. It will help you determine your starting point and understand which parts of the course are best suited to your needs.

3. Review Module 3.1

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The formative assessment in Module 3.1 has a slightly lower average score than the other assessments. This is not a problem in itself, but it indicates that the module could be more challenging.

It is recommended to review:

- the clarity of the instructions;
- the wording of the assessment tasks;
- expectations for open-ended responses;
- the balance between theory and practice;
- whether the criteria for an acceptable answer are clear enough;
- whether the tasks support reflection without hindering progress.

4. Add more practical examples

Participants highly value the practical applicability of the course. For future versions, it is recommended to add more examples, differentiated by:

- educational stage;
- school subject;
- school profile;
- age of students;
- level of digital readiness;
- type of teaching situation.

Particularly useful would be brief classroom case studies, examples of AI use in lesson preparation, assessment, feedback, differentiated instruction, and the development of critical thinking.

5. Develop differentiated learning pathways

The profile analysis shows that the course is most suitable for teachers with basic and intermediate experience with AI, but it also includes both complete beginners and more advanced participants. Therefore, a future version of the course could include different tracks:

Participant Profile	**Recommended support**
Beginners	More introductory explanations, glossary of terms, slow initial pace
Basic experience	Practical examples and structuring of previous experience

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Participant profile	Recommended support
Intermediate experience	Case studies, teaching scenarios, ethical dilemmas, implementation planning
Advanced	Elective tasks, project work, analysis of real-world school policies and practices

This way, the course can maintain its overall framework while being more flexible to accommodate different entry levels.

11.4 Recommendations for supporting participants

1. Introduce regular reminders

Automatic or facilitated reminders can help with the transition between modules. They should be brief, clear, and focused on the next step.

Example:

You have completed Module 1. The next step is Module 2, where you will explore the basics of AI and its connection to education.

2. Provide clear information about the certificate

Participants should know from the very beginning:

- whether the certificate is mandatory or optional;
- what the requirements are for obtaining it;
- where it is located;
- how to download it;
- what to do in case of a technical issue;
- whether they can submit final feedback without downloading a certificate. This will

reduce confusion between completing participation and downloading a certificate.

3. Provide support for self-registered participants

Self-registered participants have a more unstable trajectory and a higher risk of dropping out. For them, it is recommended to have:

- an automatic welcome message;
- a brief “how to get started” guide;
- a reminder after the first login;
- instructions on how to proceed after Module 1;

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- contact information for technical or organizational assistance.

4. Provide follow-up support after in-person orientation

In-person onboarding can be effective for initial activation, but it is not sufficient on its own. It must be followed by online support:

- follow-up emails;
- brief check-in messages;
- guidance on upcoming modules;
- technical assistance;
- deadlines and reminders;
- a clear connection between the in-person introduction and the online track.

11.5 Recommendations for scaling PAIDEIA

1. Maintain the core pedagogical framework of the course

Feedback confirms that participants highly value PAIDEIA's structure, ethical focus, professional relevance, and practical applicability. Therefore, when scaling up, there is no need to change the core concept of the course.

Rather, the following should be improved:

- orientation;
- navigation;
- the sequence of support;
- differentiation;
- participation tracking and certification.

2. Ensure institutional support

Wider implementation cannot rely solely on individual teacher motivation. The following are necessary:

- support from school leadership;
- inclusion in professional development plans;
- recognition of training time;
- technical support;
- alignment with digital education and AI policies;
- clear guidelines for safe and ethical use.

3. Plan realistic time commitments

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Time is the main obstacle cited by participants. Therefore, for future implementation, it is important to plan for:

- realistic deadlines;
- opportunities for asynchronous learning;
- smaller learning steps;
- clearly specified expected time for each module;
- catch-up periods;
- facilitated support at key moments.

4. Develop practical resources for school implementation

To translate what has been learned into real teaching practice, the course can be supplemented with:

- templates for AI-supported lessons;
- examples of school policies for AI use;
- a checklist for ethical use;
- examples of student activities;
- scenarios for critical thinking discussions;
- case studies on assessment and academic integrity;
- guidelines for working with parents and school communities.

11.6 Recommendations for future analysis and research

1. Analyze the reasons why certificates were not downloaded

The next stage of the analysis should examine why some of the participants who are eligible for a certificate have not downloaded it. This can be done through a brief follow-up questionnaire or a technical report.

Possible questions:

- Did you know that you were eligible to download a certificate?
- Were you able to find the certificate on the platform?
- Did you encounter a technical problem?
- Did you need a certificate?
- What would help you complete the process?

2. Track the actual application of what was learned

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The pilot training shows high perceived value, but a future analysis could examine the extent to which participants actually apply what they have learned in the classroom.

Possible indicators:

- AI tools used after the course;
- developed learning activities;
- changes in lesson planning;
- working with students on AI topics;
- ethical guidelines or school policies;
- need for follow-up support.

3. Conduct a more in-depth analysis of the open-ended responses

Open-ended responses contain valuable information about barriers, added value, and conditions for scaling up. It is recommended that they be systematically coded by topic, for example:

- practical applicability;
- ethical framework;
- technical conditions;
- time constraints;
- need for examples;
- need for institutional support;
- difficulties with the platform;
- expectations for future training sessions.

4. Improve participant profiling

For future pilots, it is important to collect more complete information on:

- location;
- school type;
- educational stage;
- subject area;
- previous experience with AI;
- digital confidence;
- channel of engagement;
- motivation to participate.

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This will allow for a more reliable analysis of which groups the course is best suited for and where adaptations are needed.

11.7 Summary of Recommendations

The main recommendation is that PAIDEIA be developed as a flexible model for professional development, in which the different forms of participation are clearly distinguished:

- modular progression;
- learning engagement;
- final feedback;
- certification pathway;
- certificate issuance.

The course has a strong pedagogical foundation and high perceived value. Therefore, future improvements should focus not on a radical change in content, but on better organization of the learning path: clearer navigation, stronger support in the early modules, better progress tracking, more precise certification assessment, and better differentiation based on participants' profiles.

12. Final Summary

The Bulgarian pilot of PAIDEIA shows that the program has high appeal and clearly recognizable professional value for teachers. The data show strong initial engagement, a significant number of participants with genuine learning commitment, and 123 active participants who completed the pilot's evaluation cycle by submitting final feedback.

PAIDEIA's main strength is that it is not perceived merely as a course on working with specific AI tools, but as a broader professional development program. Participants highly value its structure, ethical focus, practical applicability, and contribution to a better understanding of the role of AI in education.

The profile analysis shows that the course is particularly suitable for teachers with basic to intermediate prior experience with AI. These are participants who already recognize the importance of the topic but need a more systematic pedagogical, ethical, and methodological framework. The strongest applicability is observed in the context of secondary education, where topics such as AI, assessment, critical thinking, academic integrity, and student AI literacy are directly linked to pedagogical practice.

At the same time, the pilot implementation shows that participants do not follow a single linear trajectory. Some of them complete the certification track, others submit alternative final feedback, and still others engage more selectively with individual modules.

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This should not be automatically interpreted as failure or early discontinuation, but rather as a characteristic of actual participation in online professional training.

The most important methodological conclusion is that future reporting must clearly distinguish between module completion, completed activities, final feedback, the certification pathway, and an actual certificate obtained. Mixing these indicators can lead to inaccurate conclusions about completion and engagement.

The main challenges relate to progression through the early modules, navigation within the platform, visibility of progress, time constraints, and clarity regarding the final steps and the certificate. These challenges do not call into question the value of the course, but they do indicate where the model needs to be improved before wider scaling.

In summary, the Bulgarian pilot validates PAIDEIA as a robust and applicable model for training teachers in the pedagogically, ethically, and critically sound use of artificial intelligence in education. For the next phase, it is necessary to retain the core pedagogical concept while improving navigation, support in the early modules, differentiation based on participants' profiles, and technical tracking of completion and certification.

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