

Articoli

Teachers' perceptions on the introduction of Generative AI in schools: A mixed-method study on the opinions of 1,223 teachers in the Veneto Region, Italy

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Abstract

Generative Artificial Intelligence (GenAI) is gaining momentum in schools as a means of support to the teaching and learning process. However, its use poses several controversial questions, especially in lower school grades, and teachers might often face ethical or intellectual obstacles preventing them from using AI in their classes. This study explores the perceptions of a sample of 1,223 teachers across subjects of instruction from 572 schools in the regional context (nursery, primary, lower and upper secondary), using a mixed-method approach. Results suggest that there is a widespread confusion on the possible applications of GenAI in education, possibly leading to reduced teachers' intention to integrate these tools in their practices. Results also point towards a general need for more CPD on the topic. Age, level of school and subject of instruction were found to moderate the effect of teachers' perceived readiness to use GenAI. Regarding possible negative implementations of GenAI, teachers showed to have mixed opinions, from open contrast to unreserved enthusiasm. Limitations of the study and future research lines are also addressed.

Key words: AI in school education; teachers' perceptions of AI

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1. Introduction

The unexpected arrival of ChatGPT at the beginning of 2023 marked a breaking point in the old paradigms of Artificial Intelligence conceiving, especially as far as the quality of its performance and its availability outside research labs were concerned. This has fostered its spreading among all social contexts and the first experiments in teaching and learning: ChatGPT seems to be the most widely used nowadays, with almost 200 million users (Duarte, 2024), even if there is an ever-growing offer including such other effective tools as CoPilot, Gemini or Claude.

AI prospective usage in educational and training contexts seems to imply interesting opportunities. Students, for example, will be able to benefit from tools providing expert tutoring for personalized learning (Hwang et al., 2023) (Dogan, 2023) helping them not only within, but also outside traditional school settings, adapting to their learning needs in the ways and timeframes they prefer, in an interactive, immediate and exciting way (Pratama et al., 2023). On the other hand, teachers will be able to be supported in the following aspects: creating effective learning materials for their specific subject matters; designing well-structured teaching strategies (Ellerani and Ferrari, 2024) (Ooi, et. Al, 2023); simplifying and adapting assessment to their classes (Gligorea et al., 2023), transforming it more and more into constant predictive and formative assessment throughout students' learning pathways (Hopfenbeck, 2023) (Farazouli et al., 2024) (Shadid et al., 2024); finally, teachers will have the possibility to exploit AI in their specific Continuous Professional Development (al-Zyoud, H.M., 2020).

2. Teachers' perceptions and attitudes towards AI introduction

Even if theoretical perspectives seem very positive, the perceptions, attitudes and emotional responses of those who will actually have to take part in this revolution are still unclear. Several surveys have researched students' perceptions (Idroes, 2023) (Zhou, 2024), which are certainly important, though teachers' ones are even more so, considering that their perceptions will influence the way and effectiveness in which these tools will be adopted and used.

Relevant literature seems to highlight that several teachers are actually experimenting with AI in their classroom practice, even though in often contrasting ways and *sentiment*, depending on the level of instruction and on their knowledge of the tools. Galindo-Domínguez et al. (2024), for example, noticed how primary and lower secondary school teachers seem to favour AI in

content creation such as presentations, texts or videos, without letting their students use it, whereas upper secondary school teachers try to teach their students how to use AI and let them test it directly by themselves. Though generally trusting AI potentials, teachers show some reserve on its effective impact on learning (Nazaretsky et al., 2022) and they do not feel adequately prepared to effectively use AI in their classrooms (Menekse, 2023). Choi (2023) reports that teachers with a constructivist approach show a higher probability to use AI as compared to teachers with traditional instruction orientations, suggesting that pedagogical beliefs play a crucial role in AI acceptance. Other studies used the Technology Acceptance Model (TAM), a useful framework to analyse how people decide to accept and use technology.

In the context of teachers' propensity to use models of generative AI in their classrooms, analysis with the TAM model in some studies confirms a high level of acceptance of AI among teachers (Chocarro, Cortiñas and Marcos-Matás, 2023), particularly STEM ones (Al Darayseh, 2023; Wardat et al., 2024). It is noteworthy that the studies registered minimal differences in perceptions among different levels of instruction, with high school teachers only showing a slightly higher propensity to use AI as compared to primary school teachers. The most important factors emerging from the above-mentioned studies are the following ones:

- 1) *perceived usefulness*: Artificial Intelligence is considered particularly useful to personalize learning and for the support in teaching and class management it can convey;
- 2) *user-friendly*: IA tools are considered quite user-friendly and simple to use;
- 3) *self-efficacy in AI use*: teachers' confidence in their ability to effectively use AI improves their positive attitudes and their propensity to use it (Wang and Chuang, 2024), also generally reducing their preoccupation about potential risks, even though there are significant differences from a cultural point of view (Viberg et al., 2023);
- 4) *age, teaching experience and level of instruction* do not seem to have a significant impact nor influence the other variables in the model (Wang, 2024; Jatileni et al., 2023).

Finally, concerning the important topic of ethics in AI usage, research highlights the need to always activate processes of critical thinking and, above all, to develop and share specific ethical frameworks to reduce the risks connected to potential bias that may be present in the data used to train several Large Language Models (Warr, Oster, and Isaac, 2023). Moreover, AI introduction in educational contexts often raises worries on students' and teachers' privacy: therefore, it is very important to try and balance AI benefits with personal data protection and decision-making autonomy (Sperling et al., 2024).

3. Tools and methods of the survey

The survey, through cooperation with the Regional Education Authority of the Italian Ministry of Education, included 1,223 teachers from various grade levels across the region who were interested in voluntary sharing their perspectives on AI with the researchers. The main tool used in this survey was an online validated questionnaire: items and response options were crafted by drawing upon insights from prior research studies, first drafting a piloting version, that was sent out to a limited number of teachers (N. 30) and subsequently adapting the final version of the tool according to the answers that had been given by the limited sample.

Table 1. List and type of questions / variables in the tool “Artificial Intelligence at school”

N.	Question / Variable	TYPE
1.	How old are you?	QUAN
2.	How long have you been teaching?	QUAN
3.	Where do you teach?	QUAN
4.	What is your current position?	QUAL
5.	What is your main subject matter of instruction?	QUAL
6.	How would you rate your present knowledge of AI and its application in education?	QUAN
7.	Which potential benefits of AI integration in education are you most interested in or enthusiastic about?	QUAL
8.	Which role do you envision for AI in your teaching practices?	QUAL
9.	Which emotions do you associate with the growing integration of AI in education?	QUAL
10.	How prepared do you feel to integrate AI into your subject of instruction?	QUAN
11.	In which of the following ways would you be more inclined to use AI in your lessons?	QUAL
12.	How much have you already used AI in your teaching?	QUAN
13.	If you have already used AI in teaching, which Apps have you used?	QUAL
14.	If you have already used AI in teaching, in which way have you used it?	QUAL
15.	How can AI be used to improve students' learning experience?	QUAL
16.	Do you think AI should be used to develop tests, quizzes and assessment?	QUAN
17.	Do you think AI should be used to automatize students' assessment?	QUAN
18.	How worried are you about the fact that students may use AI to carry out homework?	QUAN
19.	How do you intend to address the problem of students using AI to carry out their homework?	QUAL
20.	If there were an expert AI tutor in your subject matter, would make it available to your students?	QUAL
21.	How important would it be for Educational Authorities to develop specific regulations on generative AI usage?	QUAN
22.	Does Generative AI have the potential to democratize education and make learning more inclusive and accessible to all students?	QUAN
23.	In your opinion, what is the biggest opportunity AI can provide in education?	QUAL
24.	What is your biggest concern about AI in education?	QUAL
25.	How important would it be to provide AI literacy to students?	QUAN
26.	How important would it be to provide AI literacy to teachers?	QUAN
27.	How much do you rate the importance of collaboration among educators, AI developers and education policy makers to promote a responsible use of AI in education?	QUAN
28.	How much do you think AI will impact on the role of teachers in the next five years?	QUAN
29.	Which kind of CPD course do you think necessary to effectively integrate AI in education?	QUAL
30.	Have you already attended some courses on AI usage in the classroom?	QUAL
31.	Which role do you envision for AI in your teaching practices?	QUAL

The final questionnaire, then, was made up of N. 31 questions, both closed

and open-ended ones, so as to collect quantitative and qualitative data alike. A list of all the questions can be perused in the following Table 1. The questionnaire was distributed in Italian (as was the cover letter in the e-mail message), to ensure the highest number of responses, but the questions have been translated into English for the readers of this article.

The survey was made available online for a month, from April 20 to May 20, 2024. Quantitative data analysis was carried out with the opensource software *Jamovi*, using the “R” programming language, to ensure transparency and portability of the data. The answers to open-ended questions have been qualitatively studied through a thematic analysis of the main emerging categories, with the help of the QDA Miner Lite software.

4. Analysis and Discussion of results

The survey collected a casual sample of N. 1,223 responding teachers, with N. 57 teachers working in Early Childhood Education and Care (ECEC), N.331 in primary school, N. 328 in lower secondary school and N. 507 in upper secondary school. Respondents were asked to choose one among four age ranges in a multiple-choice question, as detailed in the following Table 2.

Table 2. Age of respondents

<i>Age ranges</i>	<i>N.</i>	<i>%</i>
25-34 years old	139	11.40
35-44 years old	295	24.10
45-54 years old	416	34.02
55-64 years old or older	373	30.50

The regional sample shows an average age of about 48 years old (48.02), which is slightly younger than the teaching population in Italy (50.20 years old, according to the OECD, 2023) and can, therefore, be considered as relatively representative, especially considering that the majority of respondents (64.52%) belongs to the two older ranges. The difference of the sample can also be accounted for by the type of question, in which age ranges were preferred over a longer multiple choice, with all possible ages involved, to avoid making the questionnaire too long. Each age range, therefore, had to be mapped to its midpoint before calculating the weighted mean age of respondents.

The answers to question 2. “How long have you been teaching?” show the presence of teachers with a long or very long teaching experience in the sample, with 20.7% (N. 257) reporting more than 26 years of being in the position and

11.6% (N. 146) selecting the 21-25 years range, which is coherent with the age of respondents.

The vast majority of respondents (98%) holds a teaching position (question n. 4), whereas the questionnaire also intercepted the opinions of a few principals (less than 2%), of some teachers with middle-management roles (less than 3%) and of some digital expert teachers (“Animatori Digitali”, less than 2%), who were not statistically relevant and whose responses have been considered, for the scope of the present study, as included in the larger group of teachers.

Subject areas of respondents show a prevalence of the Humanities area, followed by “Other subjects” (probably chosen by ECEC and primary school teachers, whose subject matters are usually undivided), then by Science and Maths, ICT, Art, and finally by PE and vocational subjects.

Table 3. Subject matters taught by respondents

<i>Subjects taught</i>	<i>N.</i>	<i>%</i>
Italian/Foreign Languages/Law/ Philosophy/History/Geography	433	35.40
Other subjects	321	26.24
Maths/Physics/Chemistry/Biology/Sciences	257	21.01
Technology/Informatics/Mechanics	81	6.62
Visual Arts/Music/Design	72	5.88
Physical Education	38	3.10
Vocational subjects	21	9.41

The question about the respondents’ self-evaluation of their previous knowledge of AI proposed a 5-point Likert scale, from 1. - no knowledge - to 5. - confidence. Answers distribution shows that the majority of teachers in the sample has a very limited knowledge of AI integration into teaching and learning practices.

Table 4. Knowledge of AI and of its application in school

<i>Level</i>	<i>N</i>	<i>%</i>			
1	316	25.8			
2	423	34.6			
3	358	29.3			
4	110	9.0			
5	16	1.3			
<i>N</i>	<i>Sum</i>	<i>Average</i>	<i>Median</i>	<i>Mode</i>	<i>S.D</i>
1223	2750	2.25	2.0	2.0	0.98

On average, teachers have rated their previous knowledge of AI and its application in the classroom as slightly above level 2. on the Likert scale (mean = 2.25), while the standard deviation seems to point towards a moderate distribution of the answers, with the majority of ratings between 1.27 and 3.23 points.

An ANOVA was carried out to see the correlation of respondents' age groups with three dependent variables: AI previous knowledge (question 6); teachers' perceived readiness to integrate AI into their practice (question 10); level of actual previous use of AI in classroom practice (question 12), all based on a 5-level Likert scale: Table 5 shows a summary of the results.

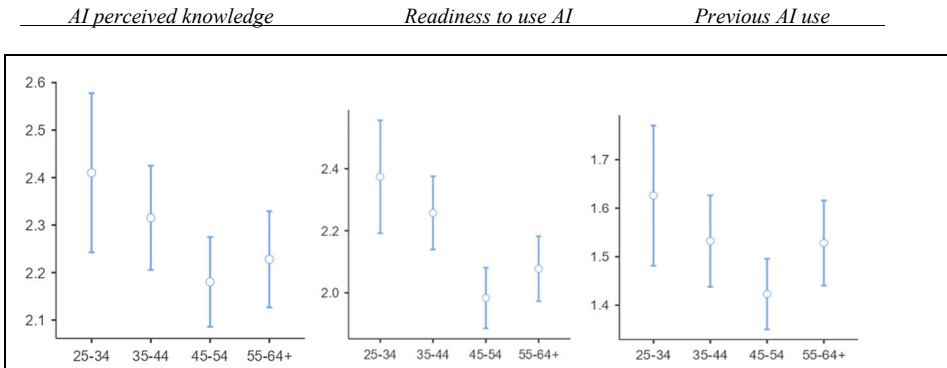
Table 5. ANOVA of teachers' age and AI knowledge, AI readiness and AI previous use

	Age	N	Media	SD	SE
How much would you rate your present knowledge of AI and its application in education?	25-34	139	2.41	0.999	0.0847
	35-44	295	2.32	0.958	0.0558
	45-54	416	2.18	0.979	0.0480
	55-64+	373	2.23	0.994	0.0515
How prepared do you feel to integrate AI into your subject of instruction?	25-34	139	2.37	1.085	0.0921
	35-44	295	2.26	1.031	0.0600
	45-54	416	1.98	1.017	0.0498
	55-64+	373	2.08	1.028	0.0532
How much have you already used AI in your teaching?	25-34	139	1.63	0.862	0.0731
	35-44	295	1.53	0.824	0.0480
	45-54	416	1.42	0.757	0.0371
	55-64+	373	1.53	0.863	0.0447

The overall self-reported knowledge of AI is relatively low across all ages, as the means ranging from 2.18 to 2.41 show. This is consistent with the replies to question n. 10 (How prepared do you feel to integrate AI into your subject of instruction?), showing that over 66% of respondents feel they are not at all, or very little, ready to integrate AI into their teaching practices (selecting 1 or 2 on the 5-level Likert scale).

It is also consistent with the results of question n.12 – “To what extent have you already used AI in your teaching practices?”- showing that over 86% of respondents declared no or little previous use of AI in their classrooms. The resulting graphs are displayed side by side in Figure 1 below, to make the variance among the group means more evident.

Figure 1. Comparing graphs in One-way ANOVA



Furthermore, an ANOVA was carried out to find a correlation between the respondents’ subject of instruction and their level of readiness to integrate AI into teaching practices (on a 5-point Likert scale, question n.10). Results show the highest means in ICT (2.88), Music, Design & Arts (2.28) and Maths & Science (2.22), as summarised in Figure 2 and Table 6 below.

Figure 2. ANOVA on Level of AI readiness by Subject of instruction

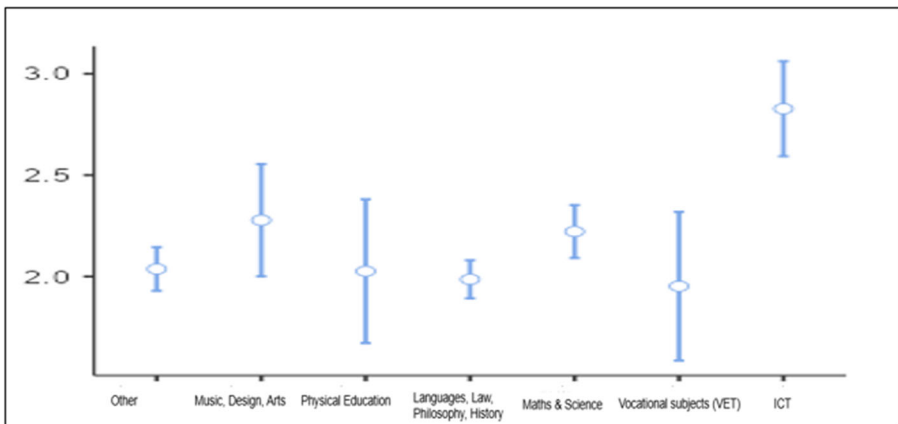
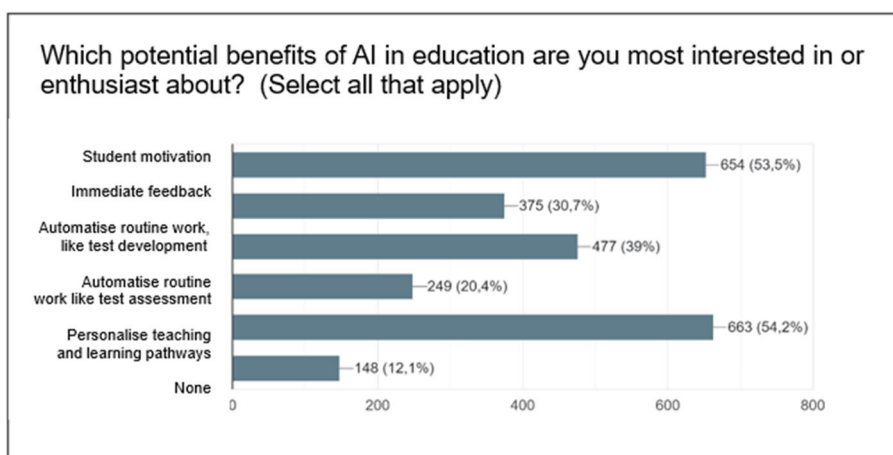


Table 6. ANOVA on Level of AI readiness by Subject of instruction

Variable	F	gof1	gof2	p
How prepared do you feel to integrate AI into your subject of instruction?	8.33	6	153	< .001
Subject matter	N	Media	SD	SE
other subjects	321	2.04	0.977	0.0545
Music and Performing Arts	72	2.28	1.178	0.1388
Physical Education	38	2.03	1.078	0.1748
Italian / Foreign Languages / Law / Philosophy	433	1.99	0.993	0.0477
Maths & Sciences	257	2.22	1.061	0.0662
Vocational subjects (VET)	21	1.95	0.805	0.1756
ICT	81	2.83	1.058	0.1176

Turkey's Post Hoc Test confirms the most significant differences to be observed between the ICT teachers and all other groups, with p-values ranging from $p < .05$ ($p = 0.016$, as compared to Music & Performing Arts teachers) to $p < .01$ ($p = 0.001$ as compared to Humanities teachers and $p = 0.009$ as compared to VET subjects), to $p < .001$ as compared to the remaining groups (Maths & Science, PE teachers and other subjects).

When asked which potential benefits of AI integration in education they were most interested in, or enthusiastic about (question n. 7, with multiple options selection possible, Fig. 3), teachers were equally divided between the improvement of students' motivation and commitment (53.5%, N. 654) and the possibility to personalise teaching and learning pathways according to student's individual needs (54.2%, N. 663).

Figure 3. Potential benefits of AI in education

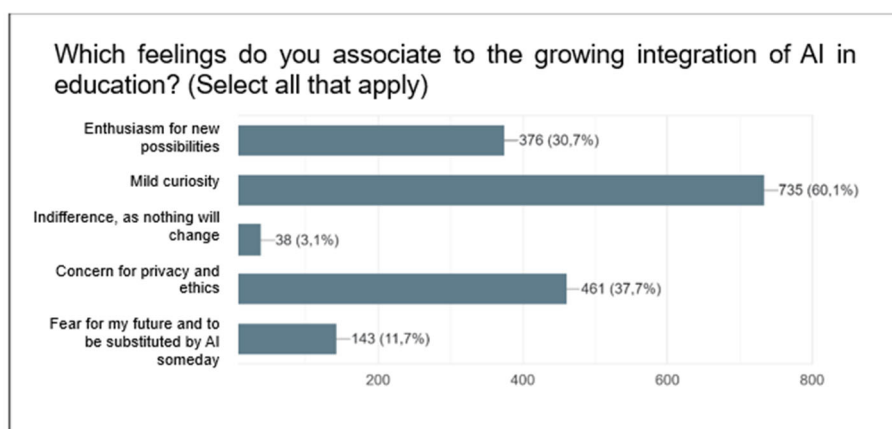
These results seem coherent with the answers of the respondents to the following question, concerning the envisioned role of AI in their teaching practices (question n. 8) as synthesised in Table 7 below.

Table 7. Envisioned role of AI in future teaching practices

Statements	N	%
Making learning experiences more interactive and exciting	748	61.2
Personalise learning on students' individual needs	555	45.4
Help teachers automate test creation	453	37.0
Improve the presentation of lesson content	516	42.2
Improve the development of lesson contents	310	25.3
Limited or no use at all	232	19.0
Help teachers automate students' assessment	193	15.8

When asked to select the feelings they associate with a growing integration of AI in education (question n. 9, Fig. 4), most teachers signalled a mild curiosity (60%, N. 735), whereas two almost equivalent groups seemed to disagree between a positive feeling of enthusiasm for new possibilities (30.7%, N. 376) and a negative concern for privacy issues and ethical questions (37.7%, N. 461).

Figure 4. Feelings associated to the growing integration of AI in education



With regard to students' learning experience, teachers were asked to freely give their opinions in question n. 15, focussing on the ways AI could improve this specific aspect. Table 8 tries to synthesise the main categories and themes emerging from the analysis of qualitative data in QSA Miner. Three main categories emerged:

1. teachers considering AI as a digital (ICT) tool;
2. teachers' general attitudes towards AI, and
3. AI as a tool to develop students through different learning approaches.

In the first large category, teachers described AI as a digital support that could help them:

- automatise paperwork (classroom management),
- test creation (immediate feedback to students),
- lesson contents development and presentation, or as an ICT subject worth to be integrated in all the other disciplines of the syllabus, but above all
- a tool to be used autonomously by students to find useful and rich information.

Table 8. Qualitative analysis of question 15: "How can AI improve students' learning experience?"

Category	Code	Description	Count
ICT	Automatisation	Avoid repetitive tasks	54
ICT	Content creation	Lessons or texts	39
ICT	data bank/information retrieval	Research tool	48
ICT	Integration	AI as a subject matter	146
Teachers' attitudes	Awareness	Importance of CPD	13
Teachers' attitudes	Negative attitude	AI useless or harmful	130
Teachers' attitudes	Uncertainty	Lack of AI knowledge	272
Learning approaches	Competence building	Realistic tasks	9
Learning approaches	Creativity	Widening possibilities	18
Learning approaches	Critical thinking development	Comparing outputs	34
Learning approaches	Inclusion and support	Special needs / weak	92
Learning approaches	Interactive and engaging learning	VR / full immersion	155
Learning approaches	Motivation	Willingness to commit	20
Learning approaches	Non-formal and informal learning	Less demanding	1
Learning approaches	Personalisation	Adapting to levels	102
Learning approaches	Problem solving / PBL	Soft skills	9
Learning approaches	Team working / Peer learning	Group activities	15

In the wider category of teachers' attitudes towards using AI for students' learning, the most recurrent theme emerging from the survey is a lack of knowledge (N. 272, 22.2%) preventing respondents to apply AI to enhance students' results, followed by a large number of answers (N. 130, 10.6%) showing a negative attitude towards AI, as potentially harmful or utterly useless for students' development. Considering the third category emerging from responses, teachers believe that AI can make students' learning experience more interactive and engaging (N. 155, 12.7%), and also that it can help personalise tasks and contents to students' different levels (across classes or in the same class), with a specific focus on tailor-made support for weak students

or more inclusive tasks for kids with special needs (N. 92, 7.5%). Some respondents also highlight their vision of AI as a means to develop critical thinking in students (N. 34, 2.7%), especially by comparing its outputs with human ones, or as a means to motivate students in a better way (N. 20, 1.6%).

These results seem to be confirmed by the themes emerging from analysis of open-ended responses to question n. 23 (biggest perceived opportunity of AI use in education) and question n. 24 (biggest perceived concern posed by AI use in education), whose qualitative analysis, however, is still ongoing and is not presented in this article.

Questions n.16 and n. 17 investigate further into teachers' ideas about using AI for the automation of tests creation and for assessment, both asking respondents to rate their level of agreement to these potential purposes of AI on a 5-level Likert scale. Figures 5 and 6 below show the dispersion of replies in correlation with teachers' grades of employment, as testing is supposed to become more and more demanding the higher the school grade involved.

Comparison between the two graphs seem to suggest that across all school grades teachers are generally more open to using AI for creating tests, quizzes and schoolwork papers rather than for automating student evaluation. The difference is most pronounced in secondary schools and the least in preschools: such variation across school grades might reflect different needs and concerns at various educational levels.

Figure 5: Dispersion of replies to question n. 16 by school grade

Do you think AI should be used to develop tests, quizzes and evaluation tasks?

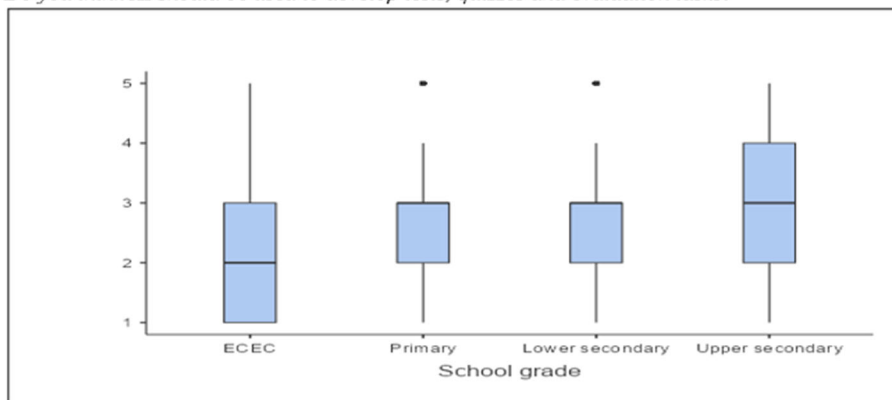
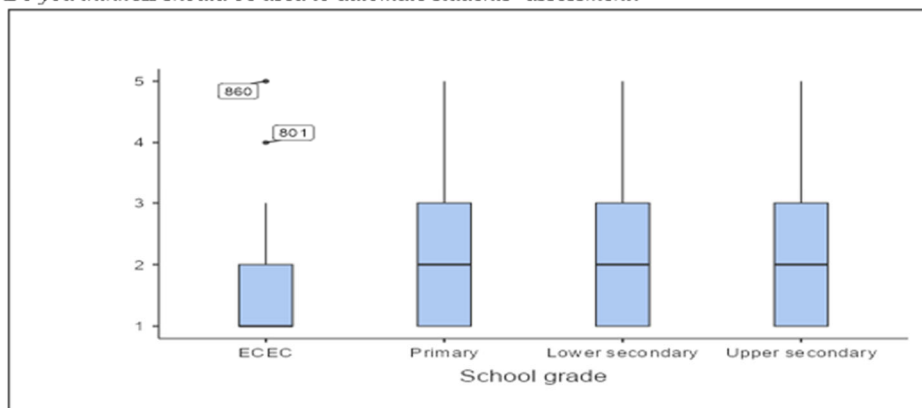
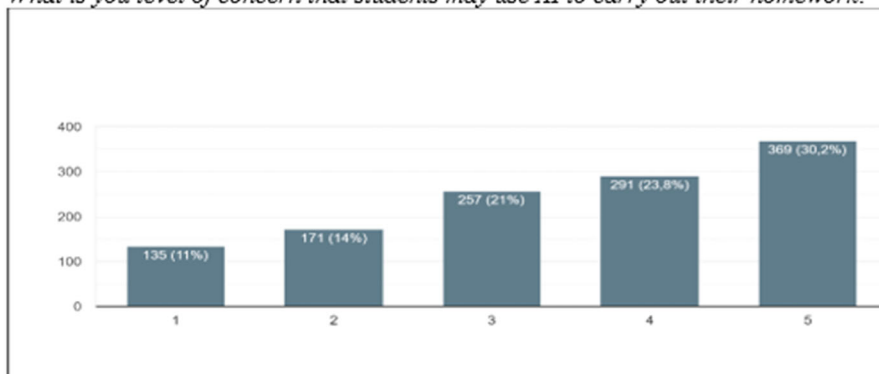


Figure 6: Dispersion of replies to question n. 17 by school grade*Do you think AI should be used to automate students' assessment?*

Teachers' views on such a controversial aspect (related to assessment) as students cheating were analysed through both quantitative and qualitative data, collected from questions n. 18 and n. 19. Over 54% of respondents indicated a very high level of concern about this issue (levels 4 and 5 on the 5-points Likert scale), as summarised in Figure 7.

Figure 7: Teachers' concern on students using AI for cheating*What is your level of concern that students may use AI to carry out their homework?*

Respondents were also asked to further elaborate on the ways they could devise to face and address such a potential issue: the results of the qualitative analysis of replies to open-ended question n. 19 are displayed in Table 9 below. Some categories overlap with the previous QUAL analysis (Table 8), such as the intention to integrate AI in classes, so as to train students to understand how LLMs work and how they can be used in a more conscious way. Teachers'

awareness of AI includes educators who reported not being worried about AI use for homework, either because of the young age of their students (ECEC or primary school), as well as teachers considering AI as a resource rather than a threat capable of substituting their students' work. However, the large number of responses coded as "uncertainty" ("I don't know" or "I haven't considered this issue as yet") confirms the general lack of knowledge on the subject, possibly reinforced by the fact that over 30% of the sample did not respond to this question.

Teachers' negative attitude appears again, though far less heavy than before, in the form of intended prohibition of AI use (N. 44, 3.6%), perhaps to be paired with the intention of using AI detecting software (N. 30, 2.4%). However, the majority of responses is focussed on competence building (N. 218, 17.8%), as teachers would allegedly assess students through reality tasks to be carried out at school or through personalised tasks, adapted to the students' levels and to be performed in an experience-based, hands-on style. Another recurring theme is the importance to develop critical thinking in students (N. 151, 12.3%), letting them interact with AI to be supported in their assignment, but asking them to compare the outputs of AI with human results, so as to understand the potential bias (or hallucinations) of AI use.

Table 9. Qualitative analysis of "How to tackle students using AI for homework assignments?"

<i>Category</i>	<i>Code</i>	<i>Description</i>	<i>Count</i>
ICT	Integration in lessons	AI as a subject matter	134
ICT	Anti-plagiarism software	Detecting AI use	30
Teachers' attitudes	Awareness	AI as a resource	76
Teachers' attitudes	Negative attitude	Prohibition of AI use	44
Teachers' attitudes	Uncertainty	Lack of AI knowledge	156
Learning approaches	Competence assessment	Reality tasks at school	218
Learning approaches	Critical thinking development	Comparing outputs	151
Learning approaches	Personalisation of tasks	Adapting to levels	47

The survey also explored teachers' behavioural intention (BI) to use AI in their classroom and to let students use an AI tutor in their discipline, if available, through two multiple choice questions (n. 11 and n. 20), whose results are shown in detail in Table 10.

Table 10. Teachers' BI to use AI in classroom and AI tutor for students

<i>In which way would you use AI in your classroom?</i>	<i>N</i>	<i>%</i>
Both with teachers' support and autonomously, depending on the activity	497	40.6
With my constant support and supervision during students' use of AI	417	34.1
I would not like to use AI in my lessons	283	23.1
Leaving the students interacting with AI by themselves in specific activities	26	2.1

<i>If there was an expert AI tutor in your subject, would you make it available to your students?</i>		
I would make it available with my supervision, to make sure it integrates with my traditional method of instruction	403	33
Only for specific subject matters, where AI can significantly contribute to solve complex problems	234	19.1
I would make it available to all students because I think it can significantly improve personalization and comprehension in my subject	188	15.4
I would hardly use it, only when human interaction is not possible, like distance learning or very large classes.	166	13.6
I would avoid it, due to ethical or privacy issues	131	10.7
I would not use AI in my lessons, as I fear it could replace human teachers	101	8.3

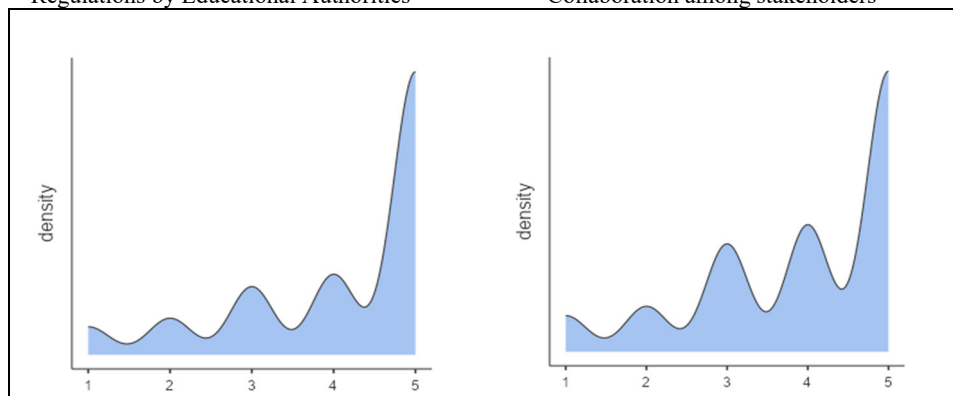
As clearly highlighted by the respondents' choices, there is a significant percentage of teachers (from 20% to 23%) who report being strongly against AI integration in education, either out of ethical or privacy-related concerns, or, as 8.3% pointed out, because they are afraid to be replaced by Artificial Intelligence.

The importance of policy-makers to promote a responsible use of AI in education - either by issuing specific regulations as School Authorities, or by cooperating with educators and AI developers - is strongly remarked by all respondents, as can be clearly seen in the density of replies to questions n. 21 and n. 27, shown side by side for comparison in Figure 8. Again, teachers were asked to rate their opinions on a 5-level Likert scale.

Table 11: Perceived relevance of policy-makers to foster AI responsible use

	<i>Mean</i>	<i>Median</i>	<i>SD</i>
Q. 21: "How important would it be for Educational Authorities to develop specific regulations on generative AI usage? (left)	4.12	5	1.22
Q. 27: "How important do you think collaboration among Instructors, AI developers and policy makers is to promote a responsible use of AI in education?" (right)	3.96	4	1.22

Figure 8: Compared density of relevance of policy-makers to foster AI responsible use
 Regulations by Educational Authorities Collaboration among stakeholders

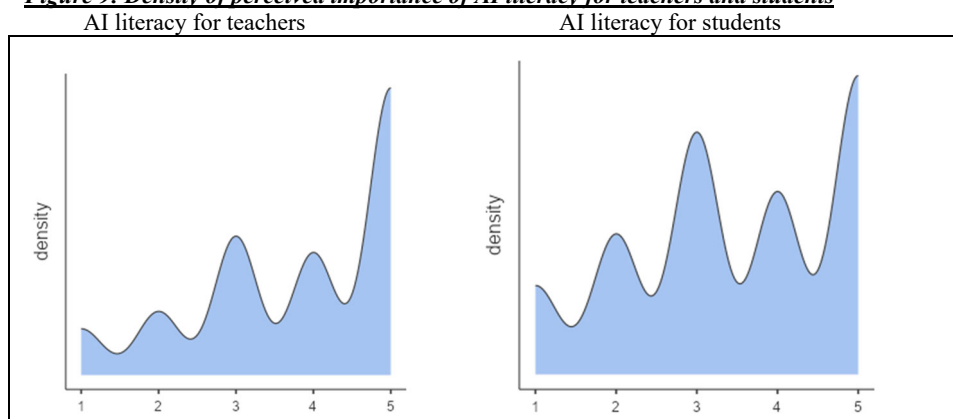


Policy-makers are usually also responsible for supporting teachers' and students' training on technology use: in Italy, this purpose has been fostered by the Ministry of Education and by Regional Districts through European Structural and Recovery Funds and other initiatives. Teachers' opinions on the importance of AI literacy for both educators and students were collected through questions n. 25, n. 26, n. 29 and n. 30: the results from the former two questions are presented together in Table 12 and side by side in Figure 9, showing that over 43% (mean 3.82 on the 5-points Likert scale) of respondents think it is very important to provide CPD for teachers on AI literacy (left), while a slightly lower percentage of respondents (31.4%, mean 3.49) think the same about including AI literacy in students' curricula (right).

Table 12. Perceived importance of AI literacy for teachers and students

	Mean	Median	SD
Q. 25: "How important would it be to provide AI literacy to students?" (right)	3.82	4	1.28
Q. 26: "How important would it be to provide AI literacy to teachers?" (left)	3.49	4	1.32

Finally, questions n. 29 and n. 30 deepen teachers' considerations about the necessity to be provided with specific courses to enable them to integrate AI in their practices and the type of courses on the topic, if any, they had already attended. The results from these two multiple-choice questions show that the large majority of teachers think it is crucial to be able to access specific professional development, especially on syllabus-related content (64.3%, N. 786), general AI tools (61.8%, N. 756) and ethical issues (49.1%, N. 600).

Figure 9: Density of perceived importance of AI literacy for teachers and students

However, there is still a large percentage (61.7%, N. 754) reporting never attending courses on AI provided by their own school or other institutions, nor profiting from the ever-growing amounts of resources available on the web.

5. Conclusion

The integration of Artificial Intelligence in education represents a transformative shift that holds both promise and challenges for the teaching profession. Our study provides a picture of educators' readiness, perceptions, and concerns regarding AI adoption in their professional practice.

A key finding of our research is the generally low level of AI knowledge among teachers. This result aligns with other studies observations about teachers' perceptions of self-efficacy towards AI use (Menekse's, 2023). Such a knowledge gap underscores the critical need for comprehensive professional development programs focused on AI literacy and community support (Yang et al., 2024).

Interestingly, younger teachers (aged 25-34) and those specializing in ICT demonstrated higher levels of AI readiness. While some studies, such as Al Darayseh (2023) and Wardat et al. (2024), have reported higher AI acceptance among STEM teachers broadly, our study suggests that direct experience with technology, rather than a general STEM background, may be one of key factors in AI readiness among teachers.

Considering the topic of assessment, our results indicate a new mindset among teachers: across all grade levels, showing more openness to using AI for test creation rather than for automating students' assessment. This finding reflects the ongoing debates in the field, as discussed by Farazouli et al. (2024)

and Shahid et al. (2024), highlighting the complex considerations involved in integrating AI into assessment processes.

A significant number of teachers (37.7%) expressed concerns about privacy and ethical issues related to AI integration. This aligns with Sperling et al.'s (2024) work, emphasizing the crucial need to address ethical considerations in AI literacy education for both teachers and students and the importance of developing clear ethical guidelines for AI use in educational settings. The strong request for professional development, particularly customized AI training for specific subject areas (expressed by 64.3% of teachers), supports Al-Zyoud's (2020) findings on the importance of tailored AI professional development for educators. This underscores the need for a differentiated approach to AI training that considers the unique contexts and needs of various subject areas and grade levels.

Our findings can have several important implications for policy and practice. First, there is an urgent need for comprehensive, subject-specific AI literacy programs for educators. Second, the development of clear ethical guidelines for AI use in educational settings is crucial. Third, the integration of AI in assessment processes should be approached carefully, considering teachers' preferences and concerns.

6. Limitations of the study

The study is limited to a very specific context, that is the Italian North-eastern region of Veneto, and results might be influenced by national and local regulations and practices. For example, not all countries might have the presence of ICT teachers in schools, which may lead to different results in the relevance of subject matters on teachers' readiness to use AI. Additionally, the self-reported nature of the data may introduce some bias in the assessment of AI knowledge and readiness. Moreover, due to the prevalence of female teachers in all school grades, gender was not included as a variable in the present study.

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