# AIs @ School:
# the perception of the actors of the learning processes

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**Abstract.** At a historical juncture where AIs have become a 'must' in every form of communication and every form of activity, we have explored the perception that the actors of the educational processes - students, teachers, principals, and parents - have about the bouquet of technologies that are included in the definition of AI. Despite the discussions that have been stimulated at every level and the copious documentation produced (reviewed in the first section), the perceived level of information on the topic is below the sufficiency and seems to be fairly similar in all categories. Parents appear to be more inclined toward the use of AIs in educational processes in comparison to the actual use made by the students and by the teachers. The pros and cons of AIs perceived by the participants have been also investigated by the survey: participants appear to be more sensitive to critical aspects affecting, and potentialities connected with, the immediate outcomes of AIs use, rather than the socially relevant consequences. The use of AIs seems confined to the generative ones. The purposes for which they are used, with a few exceptions, appear to be fairly trivial and predictable: carrying out searches, generating texts and translations, generating tests and their resolutions and, in rare case, generating images. Use of Ais aimed at stimulating critical reflection is rare, also among teachers.

**Keywords:** Awareness about AI, AI and learning processes, AI usage at school, perceived critical aspects of AI, perceived potentialities of AI

## 1    Introduction

The appearance of generative AI technologies has activated in the collective imagination the perception of being immersed in yet another gold rush, as has often happened in the history of science and technology. Inevitably, the two fronts that have always opposed each other at every discovery are unleashed: that of the techno-enthusiasts and that of the technophobes who, having often limited knowledge, fill a huge amount of web pages with their comments. The front of the techno-enthusiasts, moreover, is fuelled by commercial campaigns that stimulate the purchase of devices of all kinds equipped with AI technologies, often without even specifying what functionalities they

could offer and what problems they could solve. The wave of enthusiasm has also led to the development of marketplaces (such as the one set up by Open AI) where many researchers and practitioners try their hand at offering applications and functionalities based on generative AIs trained for specific tasks [1].

The noise generated by the media wave did not, however, prevent more thoughtful reflections that developed also at the highest institutional levels, with the formation of countless commissions that in turn produced positions taking, acts, declarations and recommendations. Very often such discussions have been conducted at a particularly high cultural level, implying philosophical, legislative and ethical considerations that are difficult to penetrate by the general public subjected also to the influence of the media wave, as well as by most of those who work daily in schools (teachers and principals) and those who benefit from the educational processes (students and families).

The result is a dichotomous landscape in which, on the one hand, expert discussions take place (also to promote the spread of AI-related skills and, thus, the training of appropriate human resources – i.e. specialised technicians and researchers) and, on the other hand, there are the potential end-users who struggle to understand how the latest technological fashion - i.e. the use of generative AIs - can be introduced into educational contexts to derive benefits from it. For a neophyte - as almost all principals, teachers and students may be considered, but also researchers who are not experts in the field - finding their way through the vast amount of documentation produced is very time consuming and complex, and that is why the remainder of this introductory section will be devoted to providing a broad framework of reference useful for orienting readers who want to try to disentangle themselves within such dichotomous landscape.

In the next sections, we describe a survey involving a sample of school teachers, principals, students and their parents carried out to take a snapshot of the state of the art, and thus of the impact generated by the communication, dissemination and training efforts - that can be associated also to the documentation described in the reminder of this section - might have had on the actors of the educational processes. The investigation has been realized within the framework of a collaboration between ANP (National Association of Principals and School High Professions) [32] and ASLERD (Association for Smart Learning Ecosystems and Regional Development) [33] and was conducted in January 2024, as part of a broader survey aimed at assessing the *smartness* [34-36], individual *well-being* [36-38] and *e-maturity* [38-39] of learning ecosystems, the results of which are currently under process. The outcomes of the subsection of the survey dedicated to the AIs will be described in section 3 and, where possible, in section 4, compared with the results of the survey carried out during the AI4T project whose outcomes are described in the *National Evaluation Report dedicated to Italy* [31].

## 1.1 The dichotomous nature of the documentation on AI.

**State of the art, statement of principles, declarations and recommendations**. The state of the art about high-level discussions and reflections on the topic of AIs is described in some official documents of the European Union [2,3], in review articles like [4], and in some books produced by academics - such as: *AI in Learning: Design the Future* [5], *Artificial Intelligence in Education* [6], *Handbook of Artificial Intelligence*

*in Education* [7] - and in proceedings of the conferences like those organised by the AIEd [8]. On the other hand the situation regarding the day-to-day operativeness in the schools and the level of knowledge/awareness about AIs achieved by the actors involved in the learning processes is not so well documented. Apart some efforts paid in trying to define what one should intend by *AI literacy* [41-46] – construct that has not yet achieved a shared and stable definition – and in trying to measure it – although always in very restricted contexts and by mean of tools [44], as far as we know, there are still no consolidated studies on the penetration of Ais into the schools and about how AIs are perceived by the actors involved in the educational processes (this is one of the reason why we have performed our survey that is intended to contribute to shed light on the present state of the art, limited to the Italian school context).

Going back to the available documentation, among the products of the aforementioned institutional discussions and the work of the various commissions, the most important is certainly the *EU Artificial Intelligence Act* [9-12], whose "*objective is to ensure that AI systems used within the European Union are fully in line with EU rights and values, guaranteeing human control, security, privacy, transparency, non-discrimination, and social and environmental well-being*". As far as the educational sphere is concerned, this act prohibits the use of applications capable of "*inferring emotions in educational institutions*" and requires that applications considered high-risk undergo a third-party conformity assessment. Note that high-risk applications in education include all "*AI systems determining access, admission or assignment to educational and vocational training institutions at all levels; evaluating learning outcomes, including those used to steer the student's learning process; assessing the appropriate level of education for an individual; monitoring and detecting prohibited student behaviour during tests*".

Although the recommendations of this act are essentially addressed to the AI-based technology providers, it is expected that end-users should also be fully aware of the risks in the use of Ais, and are indicated as partially responsible for the effects that the use of AIs might induce. Certainly, the recommendations of this act could be highly prescriptive and restrictive for educational research and would seem to collide with more realistic approaches that support the development of a human-centered AI [13] aimed at promoting quality of life [14]. Moreover, there is no doubt that the impact of this act could be particularly relevant to a large part of the research that has historically been carried out in the AIEd field, especially concerning the defined *Teacher supporting applications* [6] that include a large part of those dedicated to *Profiling and prediction* [4].

The consequences of the Artificial Intelligence Act, appear less significant for end-users whose main goal would be to understand how to use applications enriched by AIs in pedagogically meaningful ways and thus obtain evidence on the benefits that the AI-based systems could bring in education [15]. Despite that, many other documents drawn up in recent years by various institutions seem to have aims similar to those of the Artificial Intelligence Act. Among such documents the one containing the recommendations adopted by the UNESCO international conference at the end of 2021 on the *Ethics of Artificial Intelligence* [16], which, as far as the area of education and research is concerned, limits itself to recommending in a very general way, "*large and*

*interdisciplinary collaboration to work on the diffusion at all levels of an adequate AI literacy and awareness about ethical problems and impact that could be generated by AI*" and, in line with the EU act, "*to support an ethical use of AI in education, assessing the impact of AI technologies by avoiding profiling*". In a subsequent document of 2023, however, UNESCO provides specific *Guidance for generative AI in education and research* [17] in a human-centered perspective that could ensure ethical, safe, equitable, and meaningful use of it. This is a document whose content is much closer to the needs of end users. In fact, guidelines are provided for both institutions and individuals. In addition to the usual generic recommendations. The document also addresses aspects that concern day-to-day operativeness and recommends: "*the detection of plagiarism, to prioritize the human agency and a use of generative AI that make learning more effective; to consider the student age, their motivation and expectation, the target knowledge and problem; to support higher-order thinking and human accountability on decision making about AI-generated content; to support teaching or research strategies, and their impact on human behaviours*". Human-centered co-design strategies of AI tools involving teachers and learners are also highly recommended. In particular detailed guidelines are provided to support, through co-design: a) teachers in their daily activity; b) the use of genAI as 1:1 coach for the self-paced acquisition of foundational skills in languages, arts, and math/coding; inquiry and/or project-based learning; c) learners with special needs. In addition, further food for thought is provided on possible ethical and other problems, among them: the possible reduction of the relationships among humans; the stereotyping of human development and its possible psychological impact; the impoverishment of the human experience and the weakening of human skills; the problems related to the copyright of the material produced; the need to develop new skills to be able to interact with AIs.

To complete the present landscape of recommendations, we can mention also those elaborated by the Word Economic Forum, which has drawn up - targeting the end user - a list of seven principles that those who intend to use AIs in schools should respect [18]. In agreement with what has already been discussed above, to summarise, the WEF recommends: linking the use of AIs to educational goals for the benefit of all the actors involved in the learning processes, as well as to promote adequate AI literacy; to carry out a balance between the benefits and risks of the use of AIs; to keep control firmly in the hands of the human being; to continuously evaluate the effects of the use of AIs; to verify adherence to policies, including educational ones. The enunciation of these principles is accompanied by a toolkit (*AI Guidance for Schools Toolkit*) [19] that attempts to approach the needs of the end user, albeit still in a generic manner. The toolkit, in addition, proposes numerous links to other materials.

**Everyday teaching practice.** Recently, however, materials have appeared that are more specifically dedicated to everyday teaching practice. Among the documents characterized by a generic content the *Artificial Intelligence and Future of Teaching and Learning: Insights and Recommendation* [20], *ChatGPT and Artificial Intelligence in Higher Education* [21], *Ethical Guidelines on the use of Artificial Intelligence (AI) and data in teaching and learning for Educators* [22], *AI Toolkit for Educators* [23] and *AI for Teachers, an Open Textbook* [27] developed within the framework of a European

project funded by the Erasmus+ program: AI4T, Artificial Intelligence for and by Teachers [28] (https://www. ai4t.eu/). It is worth noting that within the framework of this project, an experimental training course was developed, mainly aimed at developing awareness about AIs. The course was attended by a few hundred teachers in France, Italy, Ireland, Luxembourg, and Slovenia during the time window of the project, but it seems no longer accessible. Publications and sites that stand out for proposing examples of AIs usage described and discussed in detail include: *100 Practical Applications and Use Cases of Generative AI* [24], *Profession-al Development for Teachers in the Age of AI* [25], the OpenAI blog *Teaching with AI* [26].

To complete the overview of existing documents, it is also worth mentioning a guide for policymakers [29] and an overview of AI curricula [30] promoted by UNESCO.

How much of what has been described above has been taken over by the end users and stimulated the use of AIs in the learning processes provided by schools is unclear. Obviously, the situation may not be homogeneous, even within the EU, where each government develops and encourages very different paths. In Italy, the country that is the object of our study, the Ministry of Education and Merit (MIM), in addition to promoting the dissemination of the results of the European AI4T project, promotes competitions aimed at stimulating a conscious use of generative AIs, and various training courses that are not yet been adequately systematized, not always accessible to all, and not always of a level appropriate to the average skills owned by teachers to support these latter in the integration of AIs-based tools within the learning processes carried on daily.

## 2    Survey: sample characteristics, design and aims

The survey involved a national sample of 139 teachers (109 F, 29 M, 1 not binary, average age 52.3 years), 141 principals (95 F, 45 M, 1 not binary, average age 57.3 years), and 129 parents (106 F, 19 M, 4 not binary, average age 46.4 years). Concerning the students, as it was not possible to carry out a nationwide survey, a sample of 122 students (79 F, 41 M, 2 not binary, age between 16 and 19 years old) attending the last three years of five high schools (2 scientific, 1 classic, 1 human science high schools, and 1 technical institute) located in the city of Rome was involved.

The geographical origin of teachers and principals is distributed over all Italian regions, although with a greater prevalence of Liguria (20.7%) and Lombardy (17.5%). Most of them are in the humanistic-linguistic field (48.8%), the remainder of the respondents are distributed between the technical-scientific field (20.8%), artistic field (10.8%), physical-motor field (1.7%), support to students with special needs (13.3%) and others (5%). 16% of them teach in primary schools (Y: 6-10), 18% in the secondary schools – I level  (Y: 11-13), 61% in the secondary schools – II level (Y:14-18), and 5% from other types of schools. Concerning parents, there is a prevalence of respondents from Lombardy (55%), Tuscany (20%), Abruzzi (11%) and Veneto (10%). Most of them are employed in the private sector (52% mother, 57% father), the remainder are distributed between the public sector (21% mother, 14% father), freelance or self-employed (8.5% mother, 20% father), and others; in the case of mothers, 10% are

housewives. 59% of the respondents are parents of secondary school II level students, 17% of secondary school I level students, and 16% of primary school students.

The small subsection of the survey specifically dedicated to the *perception about, and the use of AIs* proposed (see Appendix A): 3 questions to principals (1 question with numerical response on a 1-10 numerical scale, 2 multiple-choice questions), 5 questions to teachers (2 questions with numerical response on a 1-10 numerical scale, 2 multiple-choice questions 1 open-ended question), 6 questions for students (2 numerical response questions on a 1-10 numerical scale, 3 multiple-choice questions, 1 open-ended question) and 4 questions for parents (2 numerical response questions on a 1-10 numerical scale, 2 multiple-choice questions). The purpose of the subsection of the survey devoted to AIs was not to determine in all details the level of AI literacy possessed by actors participating and/or interested in school educational processes but more simply, as anticipated above, those of:

(a) return an initial snapshot on the level of awareness about AIs that the actors of the educational processes believe they possess;

(b) to ascertain how widespread the use of AIs is in schools and for what purposes;

(c) what aspects of AIs generate the most concern and those that make their use attractive at most.

Since the present one can be considered a preliminary and exploratory survey aimed at producing a snapshot of the status quo, and since we asked only few questions on Ais embedded within a rather lengthy questionnaire, we did not feel we needed to perform any sort of validation of the subsection of the survey and, as well, to push the analysis of the results obtained beyond a descriptive one. Certainly this can be considered a limitation of the present investigation to which subsequent studies may take due account.

## 3 Observed outcomes

### 3.1 Level of awareness about AIs

All respondents were asked on a scale of 1-10 how informed, i.e. aware, they felt about AIs and their usage. As can be seen from Fig. 1, the trend in the distribution of the answers given by the various categories is quite similar but not identical. It is interesting to observe that the students and the parents show the highest percentage of those who feel themselves less sufficiently informed (47,6%, integrated percentage on the values 1-5 of the scale), while the lowest percentage is found among the principals (41.8%); slightly more similar, although quite low, are the percentages of those who feel particularly well informed (13.1% for students, 13.5% for parents, 17.7% for teachers and 16.5% for principals; integrated percentage on the values 8-10 of the scale). The overall averages, however, are below the sufficiency for all categories of respondents (5.67 on the 1-10 scale for principals $p = 0.05$, 5.42 for teachers $p = 0.003$, 5.34 for students $p < 0.001$, 5.09 for parents $p < 0.001$). Only some of such differences among categories can be considered statistically significant: principals-parents ($p < 0.001$), principals-students ($p = 0.5$).
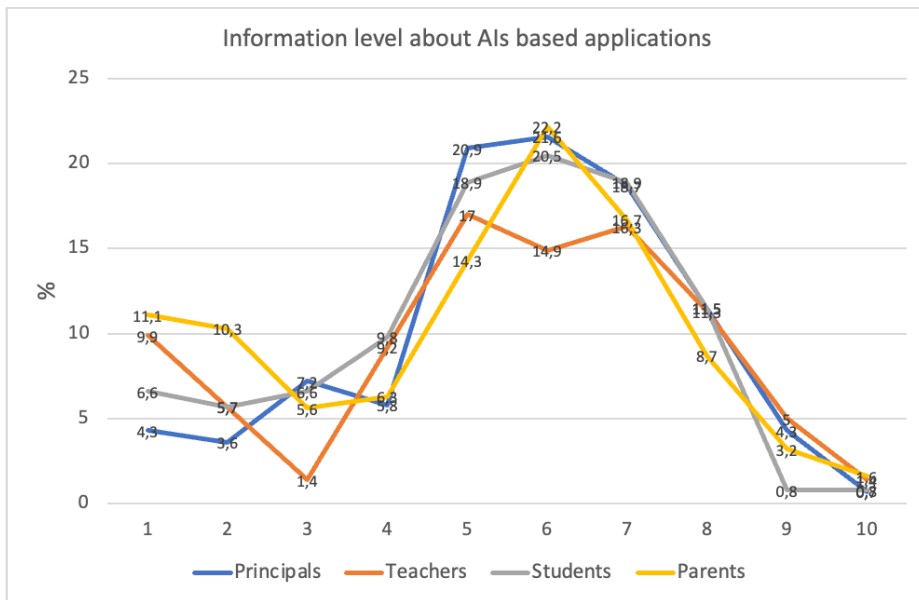
**Fig. 1.** Distribution of the perceived level of information about AIs and their usage by the categories involved and interested in the learning processes delivered by a school.

## 3.2 Ais usage

Teachers and students were asked how much, on a scale of 1-10, AI-based technologies are used within learning processes, while parents were asked how much, on a scale of 1-10, they find the use of AIs in learning processes interesting and desirable. Of course, we are perfectly aware that these are not equivalent and not directly comparable questions, but since parents do not play an operational role within the educational process they can only express desirability about the use of AIs. The distributions of the answers are shown in Fig. 2. In the case of the teachers, both the total distribution and that of the secondary- II level school teachers have been reported, to allow for comparison with the opinions expressed by the students attending the same level of schools. It is interesting to note that the level of the desirability of the AIs usage expressed by the parents appear to be higher (6.1 out of 10 in average) than the average of the detected teachers' utilisation of AIs, which appears - as one may expect - to be slightly higher in secondary schools 4.43 compared to 4.31 out of 10 found for all teachers, although this difference cannot be considered statistically significant. It is also interesting to note that students tend to be more likely than teachers to use AI-based applications (5,12 out of 10). This indicates that despite the perceived information deficit, the target categories of the learning processes (students and parents) seem to be more inclined to the use of AIs in education than those who design and deliver such processes (teachers). All such differences are statistically highly significant, p < 0.001.
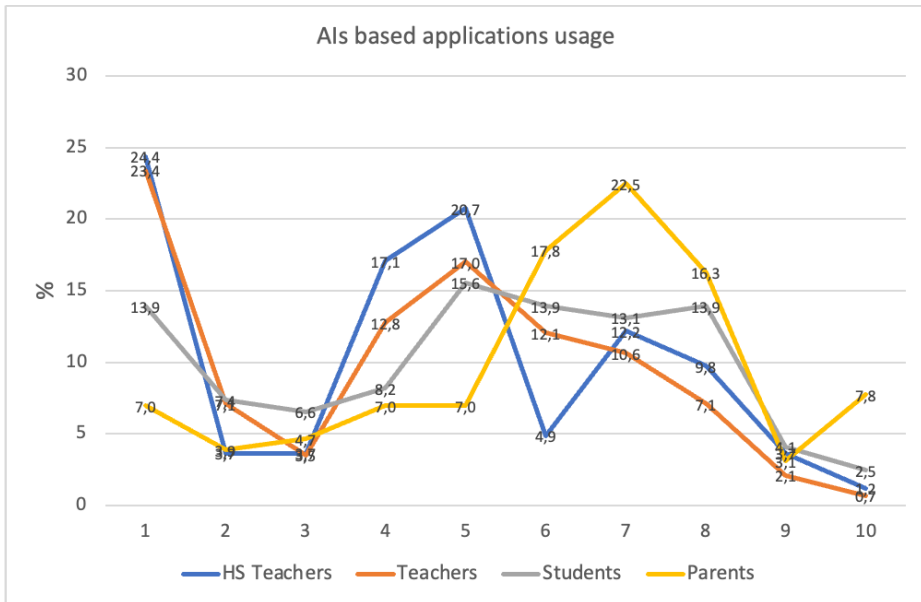
**Fig. 2.** Distribution of the level of usage of AIs in the learning processes in which students and teachers participate, or of the desirability level about the usage of AIs in such processes (parents).

The only open question answered by teachers and students was intended to investigate the type of use currently being made of AIs: 64 answers were given by students (52% of the respondents), 26 by teachers (18% of the respondents).

**Table 1**. Purposes for which AI-based applications are used by students and teachers.

| Purposes | Students | Teachers |
|---|---|---|
| Content Searches | 42% | 35% |
| Doing Homework | 58% | - |
| Texts generation | 23% | - |
| Generation of Exercises & Tests | - | 38% |
| Other Didactic Uses (production of didactic materials, translations, maps production, coding, etc.) | | 23% |
| Image generation | 3% | 12% |
| Explore AIs Potentialities including advising | 8% | - |
| Support the Development of the Critical Thinking (only secondary schools) | - | 15% |

From Table 1 it can be seen that usage of generative AIs remains mainly confined to the textual domain. Very few use them to generate images, carry out projects, or as a meta-tool to stimulate higher-order thinking (e.g. critical thinking) which still marks the difference between humans and AIs [40]. The students' usage of generative AIs is very well specified: 42% of the respondents use them to carry out research, i.e. as an intelligent filter of the content available on the web; 58% use generative AIs to carry out homework, i.e. to generate texts, summaries and reports, to carry out exercises and solve problems, to translate and correct texts; only 3% use them to generate images; only 8% use them to explore the potentialities of AIs, i.e. use a more critical and explorative approach.

Not dissimilar are the uses of AIs by teachers who - for the majority and across the various school levels - employ them to carry out research; another popular activity is the generation of exercises, tests and verifications; few use them to generate images or maps. Moving up the level of the course of study, emerges an attempt done by a limited minority to use AIs to stimulate critical thinking.

All this tells us of students who are more ready - at least in terms of percentage - than teachers to use generative AIs; this is because they have understood the potentialities of AI in assisting them and carrying out the tasks assigned to them by the teachers. The danger that might derive from this situation is that of an unguided and uncritical use of generative AIs by students: i.e. a usage of Ais that could create dependencies and dull their level of critical thinking. An eventuality that will end up requiring high effort on the part of teachers to identify original contributions and develop high-order thinking in students; much higher than that would be required if students were directed from the beginning to a critical use of generative AIs in a perspective of integration and complementarity of human capabilities and AIs.

### 3.3 Ais' Pros and Cons of AIs

The last part of the survey was aimed at identifying the aspects that currently generate major concerns in the respondents about the usage of AIs and, at the same time, the aspects that, on the other hand, could make such usage attractive and stimulating.

Even though we offered the respondents the possibility of including additional pros and cons, almost all of them chose only from the list of items offered by the multiple-choice answers. The few answers that also intended to provide a personal contribution were either repetitive in comparison to the set of possible choices offered by the multiple-choice answers or insignificant. An outcome, this one, that is in line with the perception of an insufficient level of awareness owned by the majority of the participants to the survey. Fig. 3 shows the distribution of the number of aspects considered to be critical by the respondents. Teachers and principals stand at an average value of 4.0 and 4.1 items respectively out of the 13 critical aspects presented by the multiple-choice answer. Slightly less concerned appear to be parents and students, who placed themselves at an average value of 3.7 and 3.0 respectively. Fig. 4 shows the distributions of the number of aspects considered attractive by the respondents. Those showing the most positive attitude appear to be the principals (on average 3 items chosen among the 9

proposed by the multiple-choice answer) followed by students (2.7), teachers (2.6), and parents (2.3).
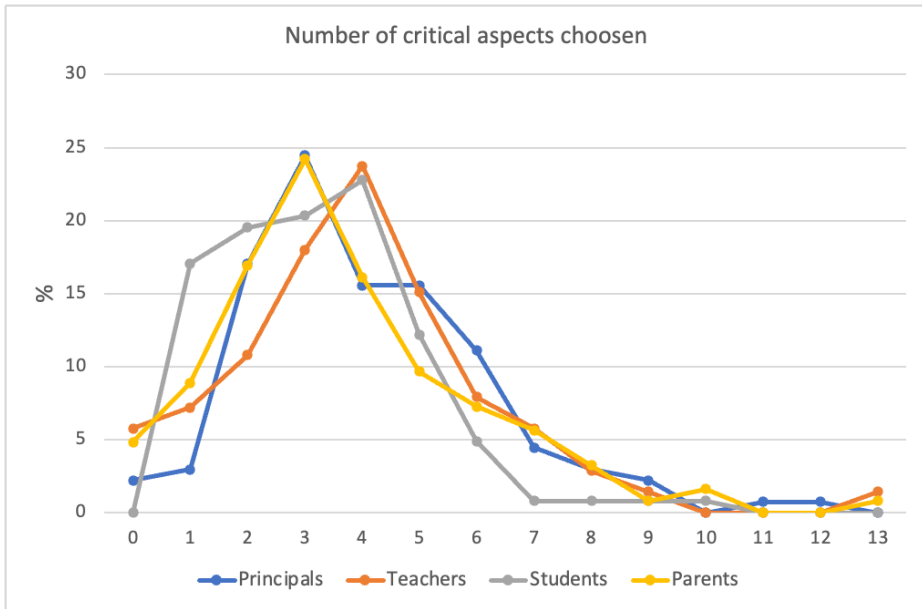


**Fig. 3.** Number of critical aspects chosen by the different categories of respondents
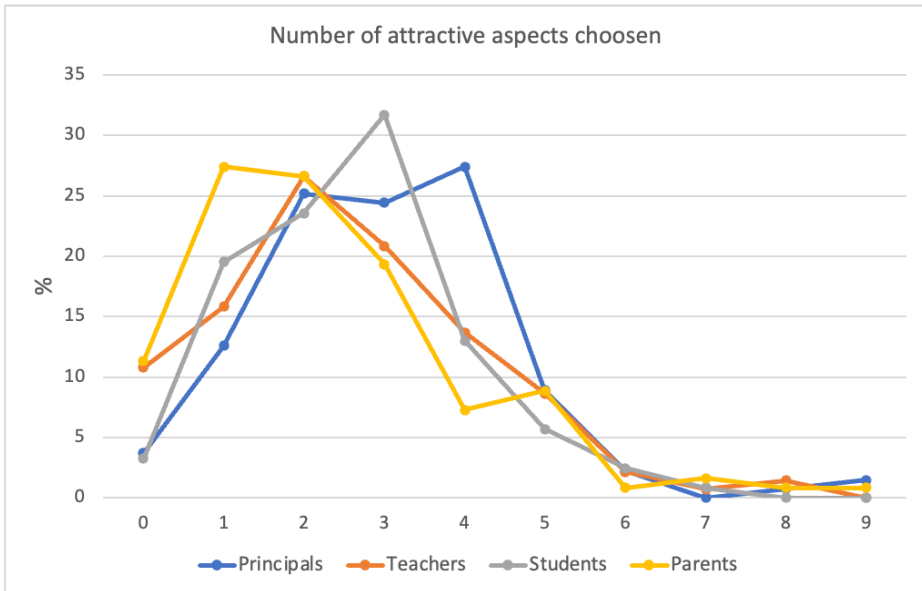


**Fig. 4.** Number of attractive aspects chosen by the different categories of respondents

The distributions shown by Fig. 3 and 4 tell us that among the respondents, the number of technophobes (i.e those that choose most or all the potential critical aspects and/or no attracting elements) and of techno-enthusiasts is very limited.

Figures 5 and 6 allow us to elaborate more on the respondents' indications and identify those aspects that concerned or attracted them at most.
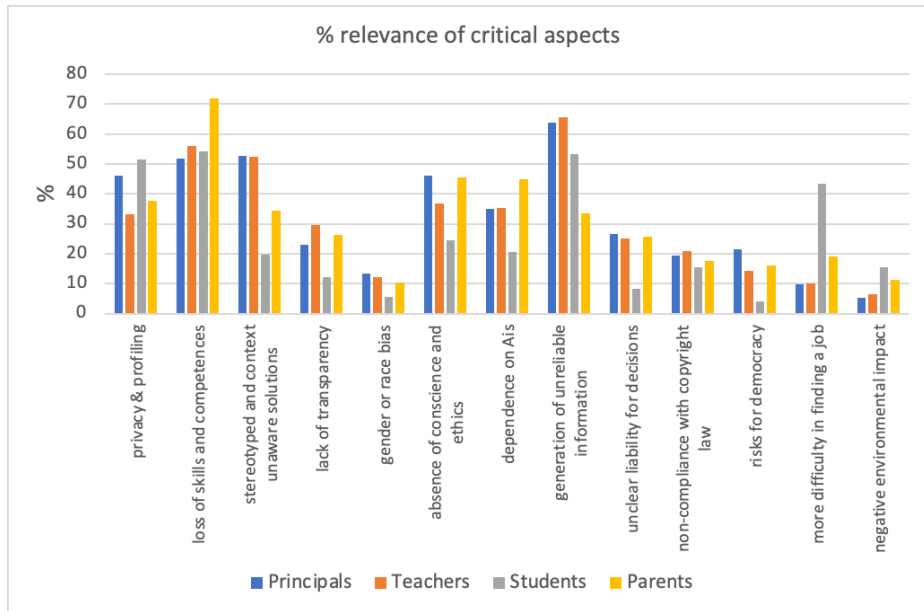


**Fig. 5.** Percentage relevance of critical aspects associated with the use of AIs

Amongst the aspects of least concern (<30% for all categories) appear those one that may affect the society as a whole: the possible gender/race bias (very much felt as critical in Anglo-Saxon countries), the risks for democracy, the lack of transparency on the functioning of AIs, the lack of clarity on the civil liability linked to their use, the possible environmental impact due to the energy-consuming nature of the AIs technologies, the non-respect of copyright. It is interesting to note that students are the least concerned about all the above-listed factors except environmental impact. Somewhat in contrast to this picture is the concern about the lack of awareness and ethics that characterize the AIs, which among parents and principals exceeds 40%.

In general, it can be stated that the dissemination of information on AIs has not fostered a civic awareness about possible consequences on society of AIs usage. These latter remain the main concern of those who write recommendations and lows, but these latter do not seem capable raise awareness in the end users who, on their side, are more focused on the practical consequences of their day-by-day usage of AIs.

Concerning the factors with the greatest impact at the individual level, there appears to be little concern about the greater difficulty in finding a job that in the future might derive from the spreading of AIs, except for students (>40%) who are the subject that will be more directly affected.

Very high concern on the part of parents (>70%) has been expressed for the potential deprivation/attenuation of skills and competencies that the usage of AIs could generate; a sentiment that correlates with the preoccupation about a possible addiction to AIs. The other categories of respondents are also concerned about such criticalities, although students appear to be the least concerned. Evidence that appears consistent with their higher propensity to use AIs. Students, on the other hand, appear to be the most concerned (50%) about possible privacy problems due to the tracking and profiling that AIs applications might operate. Teachers and principals place their greatest concerns on the responses that AIs provide to the various requests: the concern about the generation of possible false/unverified information is very relevant for over 60% of the respondents; and that about the provision of stereotyped solutions and/or lack of consideration of context is relevant for more than 50% of them. The latter factor appears to be of little concern to students who, however, seem to be more sensitive to the generation of false/unverified information (50% of the respondents).
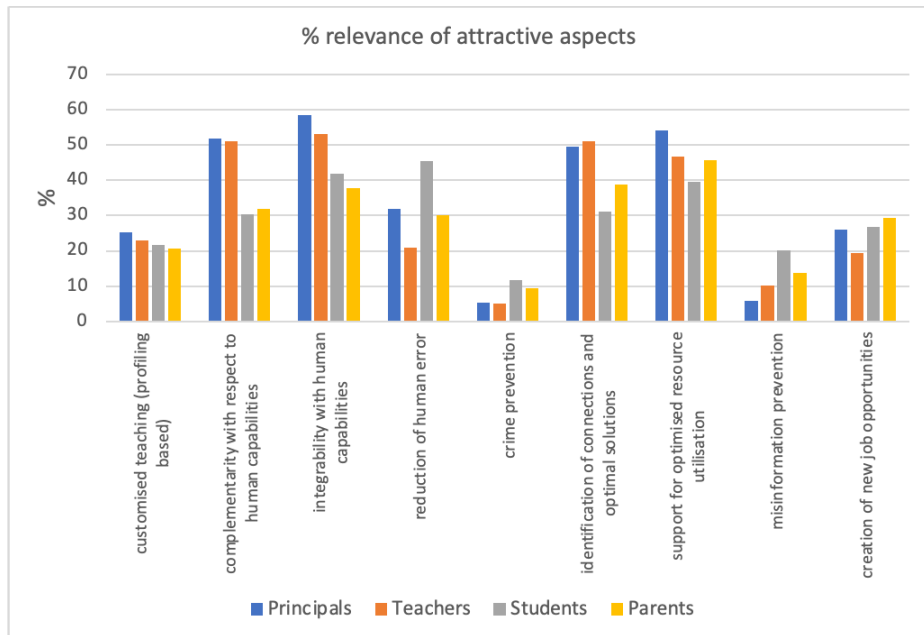


**Fig. 6.** Percentage relevance of attractive aspects associated with the use of Ais

Shifting the focus to the pros of the usage of AIs, there is, once again, little attraction exercised by those deserving broad social implications such as the possible prevention of misinformation and crime. Consistently with what has emerged about the cons, the

hypothesis that AIs can enable personalised teaching based on the profiling of students' behaviour does not appear particularly attractive. Slightly more stimulating (almost 30%) - but not for teachers (20%) - was the hypothesis that AIs could offer new job opportunities in the future. It is worth emphasising, however, that regarding this factor the positive expectations by students are far lower than the negative ones.

All categories, but especially teachers and principals - despite the mistrust shown towards the responses generated by generative AIs - recognise such technologies as having the capacity to identify very efficiently connections between various aspects and topics, offer optimised solutions, and supporting the optimal use of resources. The questionnaire does not allow us to understand whether they consider technologies more performant than humans, but certainly teachers and principals appear very attracted by the complementarity and integrability of humans and AIs. Much less attracted by the complementarity appear to be the students and one may wonder whether this could be due to an uncritical use of AIs.

## 4    Discussion and Final Considerations

The only possible comparison with the results found in this survey is with the *National Evaluation Report dedicated to Italy* (deliverable 3.3) [31] produced by the AI4T project regarding the initial level of awareness by teachers before they took part in the training activities proposed by the project. This report shows that about six months before our survey, 56.4% of teachers felt that they were not sufficiently informed about AIs. In our case, the percentage of teachers who felt they did not have sufficient knowledge about AIs (<6 on a scale of 1-10) was 43.2%, which may show that the situation has improved slightly, although not substantially.

The situation seems to be reversed as far as Principals are concerned, who in our case perceive to have a good level of knowledge of AIs for 41.8% of the respondents, whereas in the AIT4 report this percentage would seem to be much higher: 65.5%. We have no elements to explain such a large difference, apart from a possible high motivation of the principals to participate in the European project. In the case of students, the number of respondents that consider themselves to be sufficiently informed about AIs in [31] is quite similar: 58% in AI4T vs 52.5% in our case ($\geq$ 6 on a scale of 1-10).

The comparison with [31] can also be speculatively made on other aspects. For example, the statement by 49.1% of the principals, contained in [31], that the integration of AIs in the learning process is a priority only for a minority of the teachers seems to be quite in agreement with the very limited usage of AI based technologies by most of the teachers involved in our survey (63.8% declare an insufficient AIs usage (<6 on a scale 1-10). On the other hand, the statement that integrating AI in their school is a priority for 63.7% of the principals would suggest that in the case of the AI4T project a more techno-enthusiastic sample of principals than ours was recruited. Also in the case of the students, the analysis of their attitude towards AIs shows that the sample recruited by the AI4T project is decidedly more techno-enthusiastic (positive attitude well over 70%) than the one involved in our survey, although we can confirm a strong interest in the use of AIs by the students.

Despite the overall enthusiasm, [31] shows a quite high level of concern by the students about privacy (70% in AI4T vs. 50% in our case), accountability of decisions

(66.5% in AI4T vs. 8.2% concerning civic accountability in our survey) and transparency (53.3% in AI4T vs. 12.3%); less concerned but still much more than in our survey the students are about possible discrimination or bias (45% in AI4T vs. 6%). In practice, [31] tells us that the students involved in AI4T projects are more techno-enthusiastic with respect to our sample, but, paradoxically, at the same time also much more concerned (and, therefore, probably more aware) of the criticalities inherent in the use of AI.

In the case of the teachers, the comparison is less straightforward because the main purpose of the survey carried out within the AI4T project was to verify the impact of the AI course delivered to the teachers. The impression gained from the "initial perceptions" is that the teachers recruited by AI4T are also particularly enthusiastic about AIs (5.89 on a scale of 7) and not very anxious (2.91 out of 7). In the case of the teachers, therefore, the two surveys present much more contrasting results, and this could be explained by a possible positive bias inherent in individuals who applied for a training course on AIs.

Despite such a positive attitude only a limited percentage of teachers seem to use AIs based applications systematically (less than 30%) in agreement with what was found in our survey (63.8% declare little or no usage of AIs); however, a large majority of the teachers (95.3%) recruited by the AI4T project apparently intend to use AIs based applications in the next 5 years.

Coming back to the outcomes of our survey and summarising them, we can state that it reveals a situation in which, despite the rich documentation mentioned in the introduction, produced by supranational, national entities and researchers, the level of information and critical awareness detected in all the categories involved in learning processes does not appear to be sufficiently developed. Evidence of this is the limited consideration for both the positive and negative effects that AIs could generate on the society as a whole. The attention of the end-users of the technologies seems focused more on the practical consequences of their personal usage of AIs, which we have seen to be very much focused on helping them to search for information and perform tasks (for students) or to prepare tests, exercises and verifications (for teachers). Concern is expressed about privacy, which is not sufficiently compensated for by the promise of personalised teaching. Distrust is expressed about the answers provided by AIs to the questions proposed, but at the same time AIs are recognised to have the potential to optimise the search for connections and solutions and, also, the possibility of developing an alliance between humans and AIs (complementarity and integrability of skills and competences). This seems to indicate that, partially due to a lack of information and critical reflection, we are at a point when, at the level of individual use, coexist distrust and attractiveness, recognition of potentialities and fear of being deceived. There is great concern about the deprivation of humans skills and the possible emergence of addictions (although at the moment the use of generative AIs seems to be confined to information search and text generation). A concern that is more developed in adults, most likely due to their stronger level of critical thinking with respect to that of teenagers that have still to fully develop themselves. A consequence of this is the greater propensity to use AIs on the part of students, compared to teachers, who are more wary and most likely not yet ready to play the role of critical guide to the use of AIs for the new generations.

The above description of the state of the art does not perfectly coincide with the one emerging from the report drawn up within the AI4T project. Almost certainly, the differences concerning the teachers' perception are determined by a positive bias generated by the intentions to learn more about the nature and use of AIs, whereas those concerning the students could depend on the difference in the number and geographical origin of the sample as well as on the free choice to adhere to the survey (which usually indicates a more positive attitude towards the subject of the proposed survey).

On the whole, the results of the survey we carried out would seem to indicate the need to implement widespread actions aimed at informing and training teachers. In this respect, it is important to emphasise that the results of the survey conducted within the AI4T project show that direct involvement can induce a more positive and, perhaps, more objective perception. Teacher training is particularly important to foster them to take on a guiding and driving role in the use of AIs. A role that they do not yet seem able to play and may foster, above all, a critical usage of AIs, broaden the horizons of their possible usage, and stimulate a critical reflection on the potentialities and dangers inherent in the AIs technologies. Such actions should go well beyond demonstrative projects or actions and should be structured on a systemic level, as well as constantly updated according to the technological developments that will certainly interest the AIs.

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## Appendix A

| Question | Answer typology | Involved category |
|---|---|---|
| On a scale of 1 to 10 (max 10 - min 1), how informed do you feel you are about the use of AI (Artificial Intelligence)? | Likert scale | All categories |
| On a scale of 1-10 (max 10 - min 1), how much do you use AI in your teaching activities? | Likert scale | Teachers, Students |
| On a scale of 1 to 10 (max 10 - min 1), how useful do you think it is to use AI in teaching activities proposed by the school? | Likert scale | Parents |
| If you have used AI-based applications, have you done so for what purpose? | Open answer | Teachers, Students |
| Which of the following AI-related aspects are you concerned about ()? | Multiple choice | All categories |
| Which of the following AI-related aspects stimulate you? | Multiple choice | All categories |