

# ARTIFICIAL INTELLIGENCE IN VOCATIONAL TRAINING

Opportunities and risks





Núria Vallès Peris, Tenured Scientist. Artificial Intelligence Research Institute,  
Spanish National Research Council (IIIA-CSIC).

Víctor Bermejo Gil, PhD Student and Research Assistant. Artificial Intelligence  
Research Institute, Spanish National Research Council (IIIA-CSIC).

# Table of Contents

|                                                    |           |
|----------------------------------------------------|-----------|
| <b>INTRODUCTION</b>                                | <b>8</b>  |
| Presentation and objectives                        | 9         |
| Contents of the report                             | 10        |
| State of the art: AI and education                 | 11        |
| Controversies surrounding AI in education          | 14        |
| <b>IDENTIFICATION OF DEBATES AND CONTROVERSIES</b> | <b>18</b> |
| 1. Review of scientific literature                 | 19        |
| 1.1. Introduction                                  | 19        |
| 1.2. Methodology                                   | 19        |
| 1.3. Results                                       | 21        |
| 1.4. Conclusions                                   | 27        |
| 2. Expert interviews                               | 29        |
| 2.1. Introduction                                  | 29        |

|                                                          |           |
|----------------------------------------------------------|-----------|
| 2.2. Biases and reproduction of inequalities             | 30        |
| 2.3. Motivation and evaluation                           | 32        |
| 2.4. Guidance and support                                | 34        |
| 2.5. Administrative processes and educational planning   | 34        |
| <b>USES OF IA AMONG TEACHERS</b>                         | <b>36</b> |
| 3. Survey of VT teachers                                 | 37        |
| 3.1. Description of the response sample                  | 38        |
| 3.2. Activities with digital devices by type of activity | 39        |
| 3.3. Use of AI among teachers                            | 41        |
| 3.4. The need for AI learning                            | 43        |
| 3.5. Training or information on AI in the classroom      | 44        |
| 3.6. Perception of GAI use by students                   | 46        |
| 3.7. Assessment of the impact of AI on education         | 48        |

|                                                      |           |
|------------------------------------------------------|-----------|
| 3.8. Conclusions                                     | 52        |
| 4. VT teacher interviews                             | 53        |
| 4.1. Introduction                                    | 53        |
| 4.2. Uses of AI among teachers                       | 54        |
| 4.3. Perception of the uses of AI among students     | 59        |
| 4.4. Student guidance                                | 65        |
| 4.5. Conclusions                                     | 67        |
| <b>USES OF IA AMONG STUDENTS</b>                     | <b>70</b> |
| 5. Survey of HVT students                            | 71        |
| 5.1. Description of the response sample              | 72        |
| 5.2. Use of various resources to prepare assignments | 74        |
| 5.3. Probability of using GAI to prepare assignments | 77        |
| 5.4. Use of GAI                                      | 78        |

|                                                                                             |     |
|---------------------------------------------------------------------------------------------|-----|
| 5.5. Probability of using the GAI for work if the student uses other resources.             | 81  |
| 5.6. School information on AI                                                               | 83  |
| 5.7. Professional guidance                                                                  | 83  |
| 5.8. Probability of using GAI for career/training guidance if students use other resources. | 87  |
| 5.9. Assessment of AI in education                                                          | 89  |
| 5.10. Conclusions                                                                           | 92  |
| 6. Interviews with Basic and Intermediate Vocational Training students                      | 94  |
| 6.1. Introduction                                                                           | 94  |
| 6.2. Formative context of AI use                                                            | 94  |
| 6.3. Consideration of AI by students                                                        | 99  |
| 6.4. Uses of AI                                                                             | 103 |
| 6.5. Guidance                                                                               | 106 |

|                                                                |            |
|----------------------------------------------------------------|------------|
| 6.6. Conclusions                                               | 109        |
| <b>OPPORTUNITIES AND RISKS</b>                                 | <b>112</b> |
| 7.Main conclusions                                             | 113        |
| 8.Recommendations                                              | 120        |
| 9. Bibliographic references                                    | 124        |
| <b>ANNEXES</b>                                                 |            |
| A1.List of publications included in the bibliographic analysis |            |
| A2.Survey on the uses of AI among VT teachers                  |            |
| A3.Survey on the uses of AI among the HVT students.            |            |

# INTRODUCTION



# Presentation and objectives

Artificial intelligence (AI) is today an emerging technology and its rapid development is facilitating the emergence of new applications and possibilities, which can use this datafication to respond to important challenges and problems in today's educational community. However, like any technology, AI is not a neutral tool, but is shaped and co-produced by society, and its objectives and implications cannot be viewed solely from a technological perspective, but have to do with politics, economics, power relations and various interests. Emerging technologies are characterized by their novelty, uncertainty and rapid growth, as well as by their expectations and performative function. Not all groups have the same opportunities to participate in the shaping of AI, and AI can lead to the reproduction of existing inequalities and the exclusion of disadvantaged groups.

Therefore, alongside the potential opportunities that are outlined, AI inevitably brings with it multiple risks and challenges. In recent years, for this reason, AI has received considerable attention from social and humanistic studies and various international and national bodies stress the need to develop specific policies to ensure that AI is developed in the service of human

welfare while leaving room for experimentation. In the field of education, bodies such as UNESCO call for a human-centered approach to AI, putting on the political and developer agenda the role of AI in addressing current inequalities in relation to access to knowledge, research and diversity of cultural expressions, to ensure that AI does not widen existing social gaps and inequalities.

**In this context, this research focuses on the study of AI in vocational education and training (VT), with special emphasis on everything related to guidance and educational transitions, considering that these issues are especially important in the trajectory of students and a key element to ensure an inclusive and equitable education.**

From this perspective, the general objective of this research is to study the opportunities and risks of AI in VT (BVT, IVT, HVT).

This general objective is broken down into a series of specific objectives (SO):

- SO1. To identify the main debates and controversies surrounding the development of AI in VT.
- SO2. To know the teachers' uses of AI systems to support the educational process of VT students.
- SO3. To know the uses of VT students of AI systems.

- SO4. To develop conclusions and recommendations.

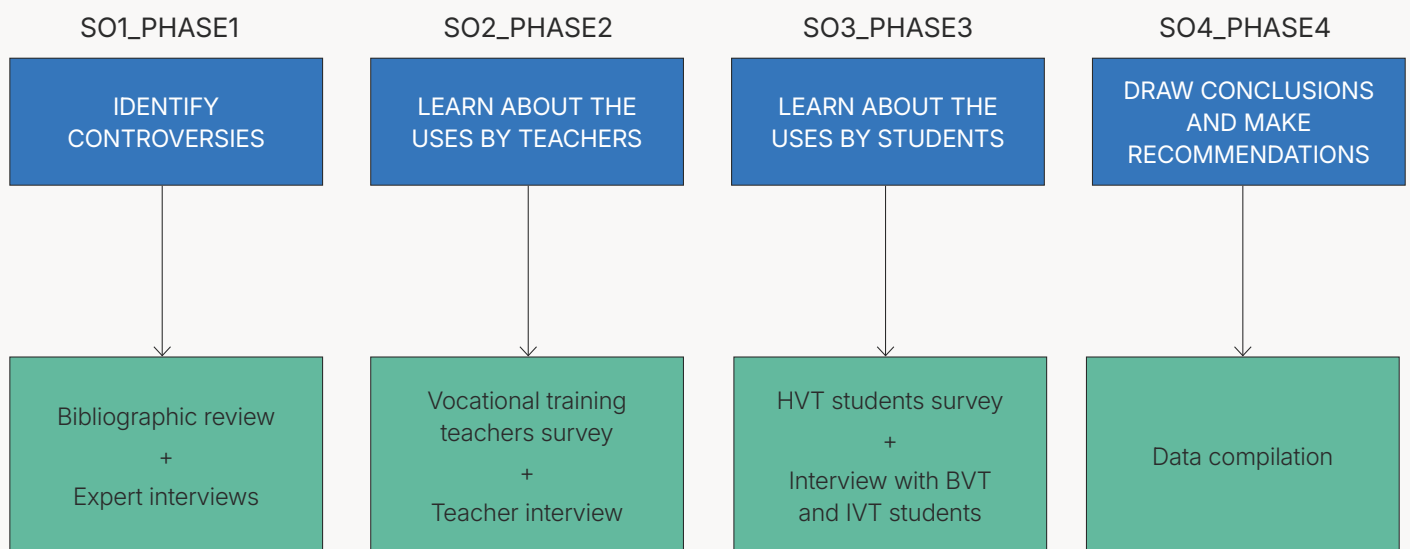
Phase 1. Identification of debates and controversies (SO1)

- **Bibliographic review of the specialized academic literature** (chapter 1). Systematic search on the scientific evidence and contrasted studies on the effects of the use of AI systems in VT. Identification of articles in the Web of Science (WoS) database.
- **Expert interviews** (chapter 2). Conducting semi-structured, face-to-face (online or face-

## Contents of the report

In order to achieve these objectives, the research was carried out in four successive phases:

This document has been prepared in accordance with this work process and consists of four sections:



to-face) informational interviews regarding VT policy, research in technology and education, and VT and educational transitions.

#### Phase 2. Uses of AI by VT teachers (SO2)

- **Results of the survey of VT teachers** (chapter 3). Design, distribution and analysis of the survey distributed online (using the LimeSurvey platform) to BVT, IVT and HVT teachers, on the uses of AI and the students' perception of its uses.
- **Results of the interviews with VT teachers** (chapter 4). Conducting and analyzing interviews with teachers of basic vocational education and training, IVT and HVT, in order to understand the context of these specific uses and to assess opportunities and risks. Semi-structured, face-to-face interviews (online and face-to-face) were conducted and analyzed using the thematic analysis methodology.

#### Phase 3. Uses of AI by VT students (SO2)

- **Results of the survey of HVT students** (chapter 5). Design, distribution and analysis of the survey distributed online (through the LimeSurvey platform) to HVT students on the uses of AI and assessment of opportunities and risks.

- **Results of the interviews with students in BVT and IVT** (chapter 6) on the use of AI and assessment of opportunities and risks (for ethical reasons of consent from guardians, who must authorize the participation of minors in the research, we have opted to conduct interviews instead of surveys in these educational stages).

#### Phase 4. Opportunities and risks (SO4)

- **Main conclusions** (chapter 7) of the use of AI systems in VT, systematizing all the results obtained, with special emphasis on guidance and educational transitions.
- **Recommendations** (capítulo 8). Elaboration of a decalogue of recommendations.

## State of the art: AI and education

After the COVID-19 pandemic, the OECD highlighted the importance of shaping a strong digital infrastructure in education that can be accessible to all students as one of its principles for an effective and equitable education recovery (OECD, 2021a). Under this perspective in the OECD *Digital Education Outlook* report (OECD, 2021b) both the benefits that the implementation

of artificial intelligence (AI) technologies could have in the educational environment, enabling a more personalized and individualized education based on comprehensive data analysis, are raised. These opportunities, as well as risks and guidelines to be taken into account, are included in the *Opportunities, guidelines and guardrails for effective and equitable use of AI in education report* (OECD, 2023), highlighting the need for an ethical and humane approach that ensures data protection and security, that focuses on respect for students and teachers and that does not reproduce inequalities related to access to digital technology.

In the year 2022, in view of the growing importance of the development and application of AI technologies, UNESCO drafted the *Recommendation on the Ethics of Artificial Intelligence* report with the aim of creating a comprehensive and global reference framework focused on respect for human dignity and multiculturalism and respect for ecosystems and the environment that takes into account all aspects that AI technologies can influence both positively and negatively.

While the report mentions education as one of the key areas where AI can have a major impact, UNESCO had already delved into this topic two years before its release. In 2019, representatives from Member States, international organizations, academia, civil society and the

private sector adopted the *Beijing Consensus on AI and education* (UNESCO, 2019). The *Beijing Consensus* is the first document to provide guidance and recommendations on how best to respond to the opportunities and challenges linked to AI to accelerate progress in achieving Sustainable Development Goal 4 of the Sustainable Development Goals (SDG4): 'Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all'. Later, the agreements embodied in the Beijing Consensus would be further elaborated in the *Artificial Intelligence and Education. A guide for policy makers* report (UNESCO, 2021).

Both documents present strategic recommendations on AI in education to achieve this goal in five areas:

1. management and implementation of education;
2. the empowerment of teachers and their teaching;
3. learning and evaluation of results;
4. the development of the values and skills necessary for life and work in the AI era; and
5. as a way to provide lifelong learning opportunities for all.

In parallel, this document also establishes a series of cross-cutting recommendations to be taken into account in each of these areas: promoting an equitable and inclusive use of AI in education; promoting AI that respects gender equity and favors gender equality; ensuring an ethical, transparent and verifiable use of data and algorithms in education; and establishing monitoring, evaluation and research mechanisms that account for both the progress and challenges arising from the application of AI in education.

Despite the appearance of these plans as roadmaps for the application of AI in educational environments, the rapid development and expansion of AI tools, especially with the launch of ChatGPT in 2022, made it necessary to review the postulates of the previous reference and legislative frameworks in order to contemplate the effective changes that were occurring in the educational environment due to the use of these technologies. With this objective in mind, UNESCO published in 2023 its *Guide for the use of Generative Artificial Intelligence in education and research* (UNESCO, 2023). In this regard, it stresses the need to promote a responsible use of artificial intelligence that supports students but does not negatively affect their creative, cognitive or social skills, encouraging their autonomy and motivation through the promotion of diversity of ideas and approaches.

In the same year, UNESCO conducted a comparative analysis of the different AI curricula for preschool, primary and secondary education approved by the governments of the Member States (UNESCO, 2023). Among the most important conclusions were that: the presence of AI in teaching curricula remains limited; most of the approved AI curricula are optional or included as part of other disciplines; the desirability of providing activities that do not require connection to ensure that access to technology is not a barrier; project-based learning is a commonly used and appropriate methodology for AI curricula; and that linking AI learning to specific brands or technologies should be avoided, applying AI principles and processes rather than teaching the use of particular programs or platforms.

For its part, the European Union (EU) established in 2018 the *Coordinated Plan on Artificial Intelligence* (EU, 2018), revised in 2021 (EU, 2021). It establishes the objective of making the EU the leading region in the development and implementation of Artificial Intelligence technologies. To this end, a two-pronged approach is embodied in the *White Paper on Artificial Intelligence* (EU, 2020a): on the one hand, to obtain an "ecosystem of excellence" and on the other to build an "ecosystem of trust". The first of these ecosystems, the ecosystem of excellence, seeks to make Europe a leading power in artificial intelligence and data economy throughout its value chain "from selected hardware

manufacturing sectors to the deployment of software all the way to services" (EU, 2020a). For its part, the "ecosystem of trust" refers to the need to establish an AI technology development that ensures ethical and legal commitments to regulations and the rights of EU inhabitants.

For the development of both approaches, the important role of education in developing the skills and competencies needed to realize the goal of making the EU an AI powerhouse is highlighted. To this end the *Digital Education Action Plan 2021-2027* (EU, 2020b) focuses on promoting education in AI and data science that is able to prepare European society for the challenges of these technologies and is capable of driving their development.

However, despite highlighting the need to apply AI technologies in the field, the EU also warns of their risks. This is recorded in the *Artificial Intelligence Act* (EU, 2023), where in amendment 65 it warns that "AI systems used in education or vocational training should be considered high risk" especially those technologies in charge of performing assessments, admissions or qualifications of students as "when not properly designed and used, these systems may especially encroach upon and violate the right to education and training, and the right to be free from discrimination, as well as perpetuate historical patterns of discrimination" (EU, 2023).

At the national level, the Spanish government published its *National Artificial Intelligence Strategy* (ENIA) in 2020 (Government of Spain, 2020) to meet the requirements of leadership and promotion proposed by the EU and to place Spain at the forefront of AI development. Among the proposed measures, strategic axis 2 stands out, aimed at "promoting the development of digital capabilities, boosting national talent and attracting international talent", in which education takes on a special role to train and promote the population's AI skills. To this end, it is proposed to promote vocational training, increase the supply of specialized training in AI and promote throughout the training process "the understanding of computational, critical and creative thinking of the fundamentals and dilemmas of AI".

## Controversies surrounding AI in education

Although it may seem a relatively recent phenomenon, the history of the application of AI to education can be traced back to the 1960s and 1970s when "Intelligent Tutoring Systems" and "Computer Assisted Instruction" began to be developed (Williamson and Eynon, 2020). However, the history of artificial intelligence in education is neither clear nor linear, but is composed of a series of parallel developments

and technological advances that have been integrated under the term AI.

These complexities in studying the history of AI in education diverge from the fact that its implementation is not only a goal of educational data scientists and learning scientists, but integrates a wide variety of actors involved in its development and application from very different contexts and positions. The integration of AI tools in the educational environment is also a major commercial concern of educational technology companies, which have tried to bring multiple forms of AI-based products to the market, related to strong investment programs to support startups and large companies as part of the development of personalized and adaptive learning software (Selwyn 2019).

In the current landscape the incorporation of AI into educational systems is marked by the increasing production of (digital) data and algorithms, the intensification of the narrative of technological solutionism (Morozov, 2016), and increasing social polarization. The COVID-19 pandemic has increased the use and narrative around digitization in many areas of everyday life, including education. This scenario raises numerous conflicts and concerns, often intensifying issues already raised in the past.

In this context, from an educational perspective, digital technologies are often presented as the

solution to complex problems. The promotion of Generative AI since the end of 2022 has highlighted the ultimate promise of this technology to transform education, and public administrations around the world have expressed a clear intention to enhance the expansion of this type of technologies in education (Davis et al, 2021). In this regard, a number of potential benefits are proposed for the implementation of AI, enabling more personalized and individualized education based on comprehensive data analysis (OECD, 2021b).

In mainstream discourse, digital technologies in general, and AI in particular, are often presented as a means to address problems such as inadequate student-teacher ratios, fraudulent assessment practices, human decision-making biases, traditional or outdated teaching and learning methods, or limited access to education in disadvantaged and remote areas (Holmes et al., 2023). The promises range from using AI to deliver personalized learning, detect, measure and intervene in student behaviors, equalize access to education, reduce educational achievement gaps, innovate pedagogies, save time for teachers and institutions, or make learning more efficient. However, so far there is little empirical evidence that these technologies can "improve" education and the educational system (Perrotta and Selwyn, 2020), beyond the study of applications in very specific cases or experimental pilot programs.

## The COVID-19 pandemic has increased the use and narrative around digitization in many areas of everyday life, including education.

In this regard Perrotta and Selwyn (2020) point out that AI techniques, such as pattern recognition and correlational analysis, are based on a mechanistic and inductivist epistemology that assumes that all patterns can be interpreted in a standardized way, without considering cultural and contextual differences. In addition, this epistemology implicit in educational AI tools integrates the specific contingencies of the professional, economic and political contexts of their development. Thus, despite the objective appearance, the application of AI to education is marked by politics, values and power distributions, with direct implications on educational processes.

Following this approach, the current hyperbole around AI misses some of the fundamental dilemmas surrounding its use. Perrotta (2024) identifies these as issues that should be introduced into the debate:

- the limitations of statistically modeling and quantifying educational processes;
- the risk of AI perpetuating inequalities and negatively affecting minority students;

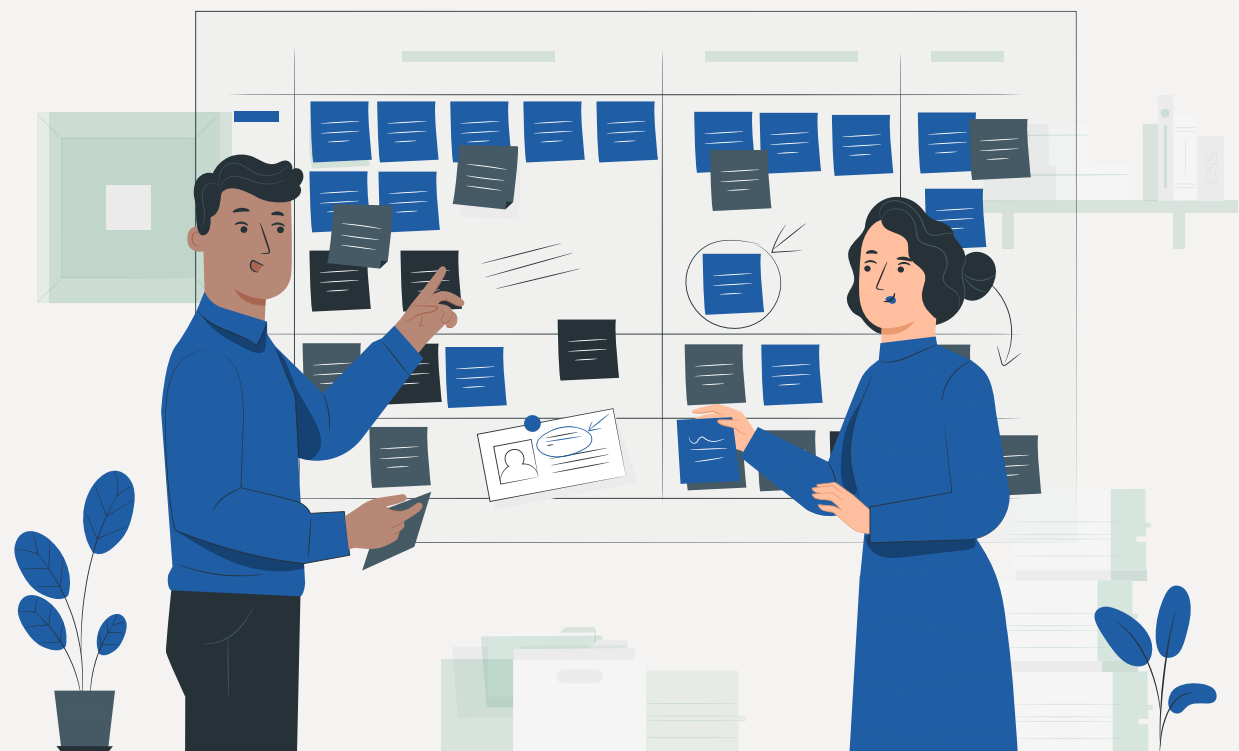
- the impact of adapting education to make it more "machine-readable", with the possible loss of essential aspects of learning; and
- the ecological and environmental costs associated with the intensive use of data and devices in AI systems.

Parallel to the advancement of AI within the educational community and the dilemmas that arise from its use, various controversies and tensions also arise within the educational community around the possible harmful impacts of digital technologies on students, such as the detrimental effect on relationships and cognitive development due to the use of smartphones (Williamson and Eynon, 2020), or the concern for the values of social justice and equity in a context where the reconstruction of education is led by the global EdTech industry and its local turnover network (Ball and Grimaldi, 2021). Moreover, defining what "improvement" in education means, who benefits from such improvements, and who defines the direction of change are issues contentious and always controversial in democratic societies (Vallès-Peris and Domènech, 2023a).

The various opportunities, as well as the risks and guidelines to be taken into account, are set out in the *Opportunities, guidelines and guardrails for effective and equitable use of AI in education report* (OECD, 2023), emphasizing the need for an ethical and human approach that guarantees data protection and security, focuses on respect for students and teachers, and does not reproduce inequalities related to access to digital technology.

# PHASE I:

## IDENTIFICATION OF DEBATES AND CONTROVERSIES



# 1. Review of scientific literature

## 1.1. Introduction

A systematic literature review was conducted in order to delve into the **effects of the use of AI in VT and to identify controversies from the scientific evidence**. Given that the use of AI systems and tools are a relatively new and controversial phenomenon, the aim of the review is to understand the ways in which these technologies have been applied to the specific contexts of VT classrooms and to identify the main debates, paying attention to the ethical dilemmas and recommendations proposed by the academic community.

## 1.2. Methodology

The literature review was performed following the *Preferred Reporting Items for Systematic Reviews and Meta-Analyses* (PRISMA) methodology (Figure 1). To address this literature review, the documents included in the Scopus database were selected, with the aim of obtaining a corpus of relevant academic publications on the incorporation of AI into VT.

The search queries TITLE-ABS-KEY ("artificial intelligence" AND "vocational education"

OR "vocational training") and TITLE-ABS-KEY ("artificial intelligence" AND "Career and Technical Education") were chosen to access a broad base of articles that took into account the differences in the designation of VT in different countries. From this first search, two exclusion processes were carried out and was screened. First, only documents in the form of articles, conference papers, books and book chapters were selected. In this initial screening, documents that had been retracted and duplicates were excluded. Secondly, a more meticulous process of initial reading of the articles was carried out, in which those that did not directly address the subject of the study were discarded.

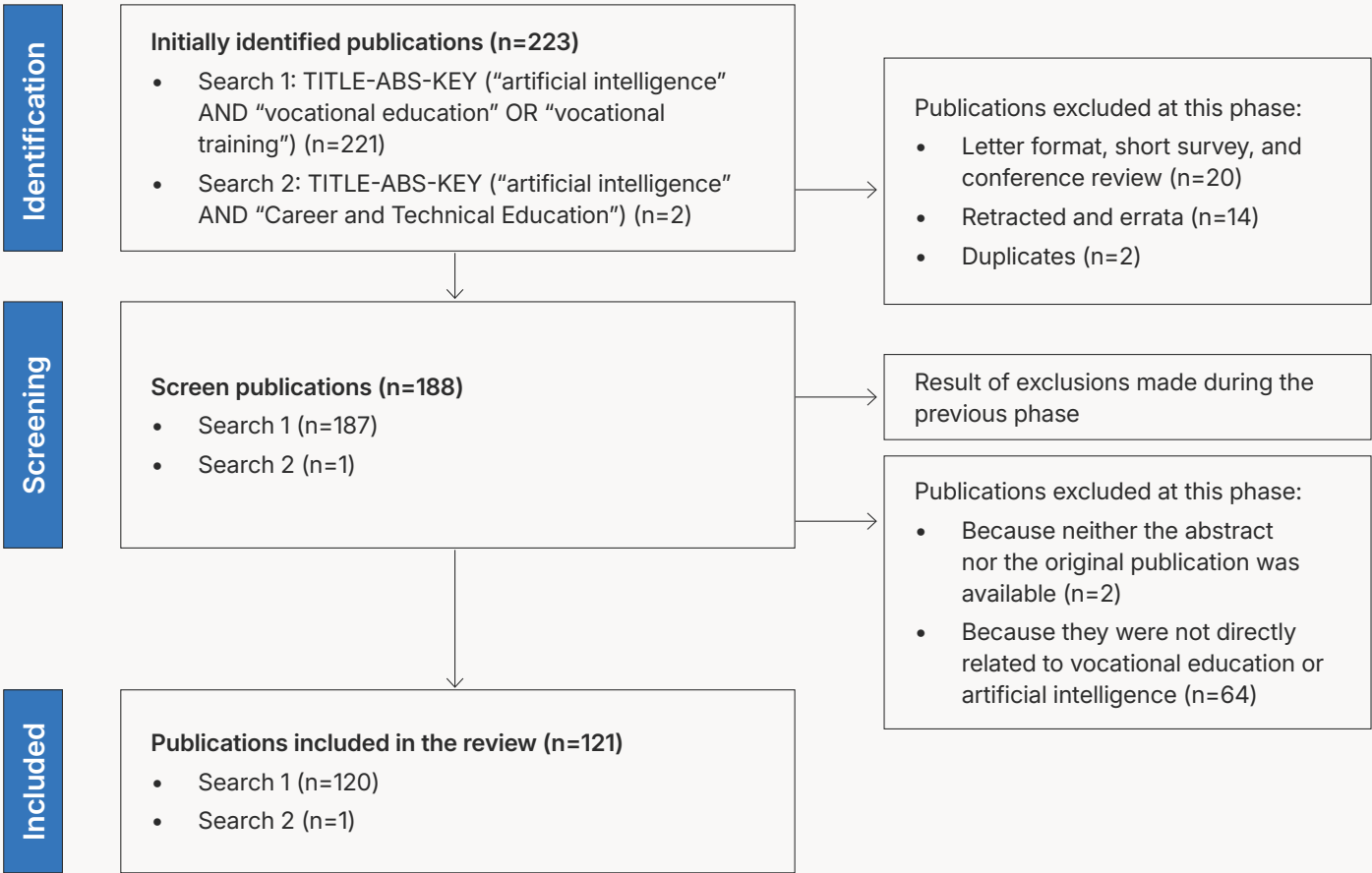
The first criterion used to carry out this screening was the need to refer to some area of VT. In this regard, publications referring to other levels of education or to programs outside formal education, for the acquisition of skills or competencies through specific courses, were excluded. However, we have included those documents that, although they deal in a general way with education or integrate information from other educational levels, explicitly take VT into account.

Similarly, a second criterion was established whereby the selected publications had to refer to the use of AI. The publications that were chosen for analysis made specific mentions of the use of some form of AI or machine learning (ML).

We also selected publications that, although they do not directly mention AI, do mention the use of technologies that incorporate it, such as recommendation systems, virtual or augmented reality and some forms of big data and data mining.

In the same way, and although it is obvious, we have discarded all those publications in which, despite talking about AI and education, they are treated as separate topics without any relation between them.

Figure 1. Bibliographic search and selection process according to the PRISMA method



Prepared by the authors based on PRISMA 2020

After this screening and once the final list of publications has been obtained, the abstracts are analyzed in two phases. In the first phase, the texts were classified according to their central idea, the way in which they empirically or theoretically justify the information provided, the technologies associated with AI, the educational sector to which they refer and the country in which the study was carried out. In a second phase, the articles are classified according to the different uses and the different ways of applying AI to VT. The advantages and disadvantages of its use at different levels are also identified. Through the combination of the two phases of analysis, the different dilemmas, challenges and impacts that the implementation of AI implies for VT are identified.

## 1.3. Results

From an initial selection of 223 publications through the screening process, **121 publications were finally included in the review process.** These publications were classified according to the procedures described in the previous section. A first classification responds to the country in which the research or development described in the publication has been carried out, a second one refers to the main topic reflected in the texts, followed by the technologies that are mentioned together with AI, a third one

focuses on highlighting the fields or sectors of education in which AI is applied, followed by the types of applications that have been developed and ending with the advantages and disadvantages that have been observed.

### 1.3.1. Distribution by country

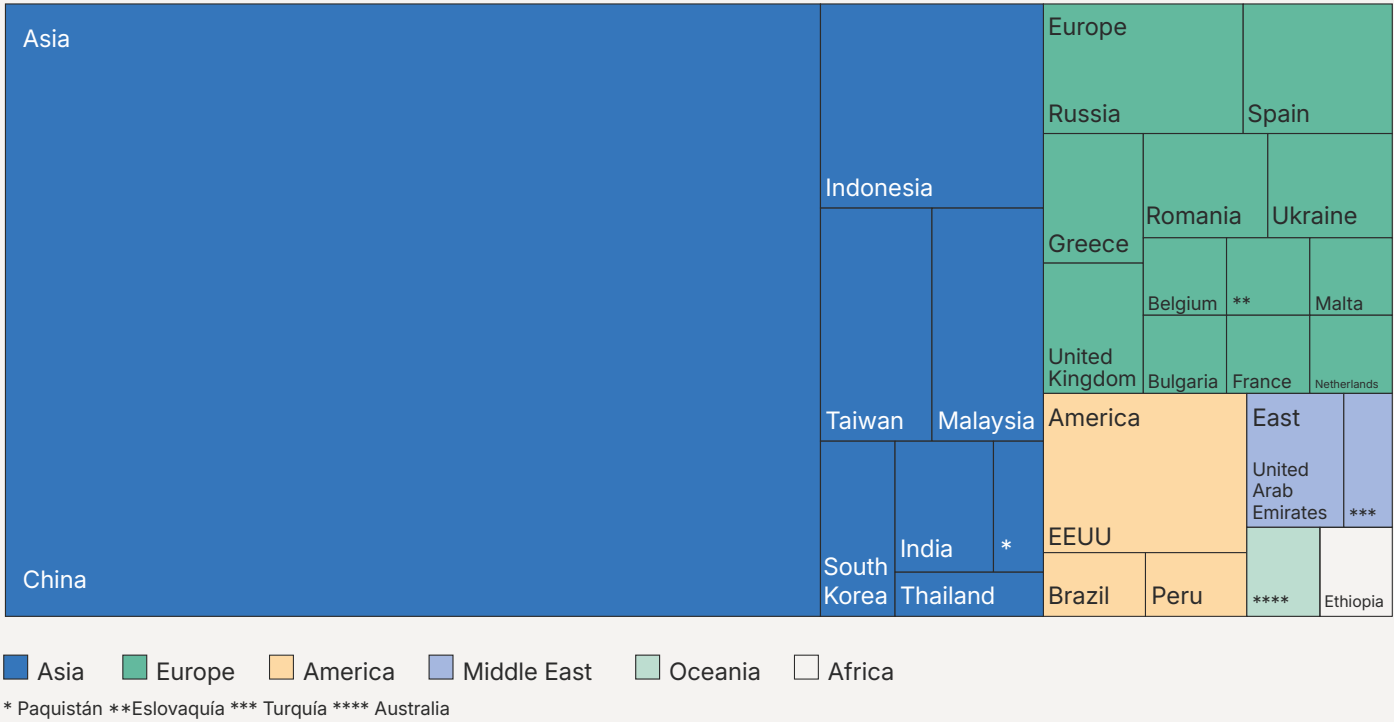
When looking at the distribution of the production of scientific publications by country, the high number of texts published on China is of immediate interest (Figure 2). There are 77 papers published on China, a higher number compared to any other country, the next country in number of publications being Indonesia with only 7.

There is a national interest in China related to promoting the use of AI in educational settings. This interest is not new, as the development and application of AI in education is an integral part of the country's educational, political and economic strategy (Knox, 2020).

### 1.3.2. Central theme of the publications

After classification by country, a thematic analysis of the 121 abstracts was carried out. Four major issues were identified:

Figure 2. Distribution of publications by country



- a) Present models and types of AI applications for FP (n=52);
- b) Promote and/or discuss the adaptation of AI technologies for FP(n=46);
- c) Evaluate the relationship between education and labor market in light of AI (n=13) and;
- d) Use AI to evaluate different factors related to PF development (n=10).

In the first of these topics, the presentation of new AI models for application in VT contexts, we find descriptive articles of a technical nature. In them, the authors focus on describing how they have developed AI models and the application they can have for VT. They are usually accompanied by a test of the model, either using control groups to measure the impact of the model or satisfaction surveys.

The second central idea seeks to consider the application of AI in VT contexts from different

social, economic and governance perspectives. Different positions are adopted in this area. On the one hand (in 25 of the 46 publications) the promotion of AI in education is considered uncritically. These publications consider that there is a need to invest in the development of AI to modernize education as a way to optimize and improve it and explore different ways to encourage its application. These articles leave aside the possible negative impacts that may arise and establish a relationship between AI and VT as an incentive to social and economic development in different areas. On the other hand (in 21 of the remaining 46 publications in this category), a more critical view is presented, focused on balancing the advantages and disadvantages. Although some tend to adopt a position that, as in the previous perspective, favors the promotion of AI, challenges derived from the absence of capabilities, equipment or infrastructure necessary for a universalized application of AI are identified, or the effects that the biases and inequalities that these technologies could cause when applied to

education are discussed. From this position, emphasis is placed on understanding the inclusion of AI technologies in education as the articulation of different sectors in terms of interests, needs and resource mobilization.

In the third group of publications, the central idea revolves around the debate on the effects that AI can have in promoting the employability of VT graduates. As in the previous group, there are two opposing narratives. On the one hand, there are those authors who argue that the inclusion of AI in VT processes will improve the employability of graduates through better management of the skills that the labor market demands and those that the education system provides. This idea is based on the argument about the ability of AI to encourage collaboration and rapprochement between private enterprise and educational institutions. On the other hand, many claim that the automation of jobs leads to serious difficulties for the education system to adapt to the promotion of talent. This is related to the increase in existing social inequalities, derived from the distribution of digital skills.

Finally, in the fourth group, 10 articles have been identified in which researchers use AI to study and analyze different issues related to the context of VT. In these publications, AI is not used as a tool available to the different actors involved in VT, but is used by the researchers themselves to analyze different aspects. In this case, AI adopts

## On the one hand the promotion of AI in education is considered uncritically.

a twist, instead of being understood as a tool for prediction and/or employability, it is used as a tool to understand the context, needs or problems of VT. Among those mentioned are: assessing the quality of the infrastructure of schools; measuring different aspects in students such as their satisfaction, their level of procrastination and even their moral values; and, finally, measuring career planning trajectories.

### 1.3.3. Technologies associated with AI

Most of the publications do not see AI as an isolated technology in education, but as part of the digitization process that has been going on for years. For this reason, we analyzed those other technologies associated with AI in the context of VT that appeared in the publications (Table 1).

The inclusion of AI systems is understood as part of the 4th industrial revolution, and its use goes

**Table 1.** Technologies associated with AI in VT

| Technologies associated with AI | Number of publications |
|---------------------------------|------------------------|
| Big data                        | 23                     |
| Cloud programming               | 12                     |
| Virtual reality                 | 9                      |
| Augmented reality               | 7                      |
| 4th industrial revolution       | 6                      |
| Internet of things              | 6                      |
| Blockchain                      | 4                      |
| 3D Printing                     | 2                      |
| 5G                              | 1                      |
| Internet of service             | 1                      |

hand in hand with many other advances and technologies. The most prominent among them is the use of Big data, given the momentum of GAI in education, a type of AI that needs large databases to be able to operate. Along with these, other technologies are of great importance, such as cloud programming, virtual and augmented reality, the Internet of things and blockchain technology, among others. The introduction of AI in VT is not a new process, but is part of a context of increasing digitalization, which has intensified in the education sector with COVID-19.

### 1.3.4. Teaching-learning applications

There are different ways in which AI applications have been developed in VT to support the

teaching-learning process, which shows us that we cannot understand the effects of AI in a univocal or homogeneous way, since there are a multiplicity of applications, of different types and with different functions (Table 2).

The AI application most discussed in the literature is that of performance assessment and problem detection. Of interest here is not only the ability of AI to measure student performance, but also a series of technologies and methodologies that, through the collection of large amounts of data from teachers, students or the school itself, can detect problems and vulnerabilities. These measurement capabilities include: the continuous measurement of student performance, interest and satisfaction; the quality of teaching by the teaching staff; identifying problems and

Table 2. Applications and functions of AI in VT

| AI applications                                   | Number of publications |
|---------------------------------------------------|------------------------|
| Performance evaluation and problem identification | 23                     |
| Online class                                      | 20                     |
| Learning platforms                                | 20                     |
| Virtual simulation                                | 12                     |
| Personal recommendations/ adaptive learning       | 11                     |
| Intelligent classroom/teaching model              | 10                     |
| Lesson/course planning                            | 10                     |
| Tutoring/assistance systems                       | 5                      |
| Gamification                                      | 4                      |
| Networking                                        | 4                      |
| Chatbot                                           | 1                      |

vulnerabilities in student trajectories; establishing orders of preference among the most relevant competencies to be taught; and evaluating different administrative aspects of the schools to optimize the organization or management of resources.

The possibility of online classes and distance learning systems is also very important. Here it is relevant to understand the consequences of the COVID-19 pandemic on the ways in which we understand education, being the possibility of guaranteeing distance education a key issue, being a challenge for VT in all those disciplines in which manual and/or practical learning is relevant. In this sense, hybrid methods, which complement face-to-face teaching with distance activities or classes, as well as teaching models based solely on distance learning, are relevant.

**The AI application most discussed in the literature is that of performance assessment and problem detection.**

In relation to the need to promote distance learning, the development of digital learning platforms also appears, among which the Learning Management Systems (LMS) stand out. These technologies consist of digital platforms for students and teachers to manage online

It also highlights the lesson planning as a resource for teachers to develop practical exercises, manage the syllabus and continuously update the contents.

documents, files, activities or forums and their evaluation. Many of these systems make use of other AI applications, such as assessment methods, personalized recommendation systems, online tutoring systems or gamification. We also find the label of classroom model or intelligent teaching, which is used in the literature to designate the joint use of several of these systems at the same time.

Virtual simulation systems are also acquiring great importance in the context of VT. These systems allow classes and practical activities to be carried out from different locations, facilitating both distance learning and saving costs on specific equipment, which is difficult to obtain or maintain.

Other technologies such as personalized recommendation systems, tutoring and assistance systems and chatbots appear with the aim of encouraging individualized education in which AI is able to provide constant feedback to the learner based on their interactions.

It also highlights the lesson planning as a resource for teachers to develop practical exercises, manage the syllabus and continuously update the contents in relation to the professional context in which the students are being trained.

Although less frequent, gamification and networking are also discussed. On the one hand, some authors advocate the introduction of AI to enhance gamification as a way to increase learner interest and participation. On the other hand, the use of AI to organize and manage relationships among students can help keep students connected with each other to solve doubts and collaborate with each other, as well as to contact companies for internships and to guide students towards their job performance.

### 1.3.5. Management and guidance applications

Apart from the aforementioned technologies focused on the learning process, other types of

AI applications are also developed to support administration (n=13) or to support guidance services (n=7).

In the context of administration, it has already been mentioned that the evaluation and problem identification services available to the schools stand out, in order to optimally manage or optimize available resources. These technologies are associated with support in student management tasks, or to promote measures to increase the security of the schools or adopt more sustainable policies.

It is also of interest to highlight the developments of AI applications that are being carried out in the field of guidance. The technologies related to guidance services presented in the analyzed articles focus on different ways of promoting the employability of students and encouraging them in their career decisions. Two groups of applications can be identified in this regard:

- Personalized guidance systems: continuous collection of large amounts of data on students' skills, together with information from recruitment processes by different companies, to make individual job and training recommendations.
- Virtual simulations: applications that allow students to explore career options in different types of professional opportunities.

## Gamification and networking are also discussed.

### 1.4. Conclusions

Although our objective through the analysis of academic literature was to identify the main debates and educational controversies arising from the application of AI in VT, the existing literature on this topic reveals a predominant tendency towards studies focused on the development and testing of specific applications. In most of these works, there is no analysis of the effects of AI at the educational level or on the educational or professional trajectory of students, or this issue is relegated to a secondary consideration.

It is relevant to consider this question in relation to the relevance in the academic literature of studies on the development of AI in VT in China. In the Chinese context the resulting scenario after the Covid-19 pandemic was a key catalyst for the expansion of technology companies in education, driving an unprecedented wave of investment. Massive school closures in the spring of 2020 generated an urgent demand for digital solutions, enabling companies such as Yuanfudao, which specializes in AI-based tutoring and homework, to raise \$1 billion in funding to apply their tools

in the education system. The growth of AI in education in China has been driven by strong state investment and venture capital interest in the development of AI-based educational products (Knox, 2020). This process is not only in response to private investment, but also to the growing interest of wealthier families in hiring tutoring and supplementary educational services, as well as active backing by the state. This interconnection between government, the market and technology companies has consolidated a model in which AI in education is developed primarily as a commercial product, with little attention to its pedagogical and ethical implications.

The expansion of AI in education in China has also raised serious concerns about the constant surveillance and accumulation of student data. The ability to record every student interaction allows technology companies and the state to accumulate a detailed history of each student's development. This formative approach can lead to extrapolating data over time, influencing a student's educational future, pigeonholing and stigmatizing them without the thoughtful intervention of a teacher (Liu, 2021).

There is a notable lack of analysis and scientific evidence on the effects of AI on the educational process and its impact on students, teachers and VT schools. In this sense, we identify the need to develop research independent of specific

technological applications and companies, which prioritizes the analysis of learning processes and the training and insertion trajectories of students, the transformation of the role of teachers, educational organization, or ethical controversies in the medium and long term, in order to promote the development of AI in a responsible manner.

We identify the need to develop research independent of specific technological applications and companies, which prioritizes the analysis of learning processes and the training and insertion trajectories of students.

## 2. Expert interviews

### 2.1. Introduction

In order to understand the main concerns about the uses, possibilities and risks of AI in VT, especially those related to guidance and educational transitions, a series of interviews were conducted with experts in vocational training, educational transitions and technologies.

Eight exploratory interviews were conducted with key informants (Table 1). The interviews were conducted face-to-face (in person or on-line), following a semi-structured open-ended script.

Based on the expert interviews conducted, the different concerns and potentialities have been grouped into four themes:

Table 1. List of expert interviews

| Identifier | Type of Institution  | Area of Expertise                    |
|------------|----------------------|--------------------------------------|
| Expert 1   | Public University    | Education and Digital Transformation |
| Expert 2   | Public University    | Education and School Transitions     |
| Expert 3   | Public University    | Design and Educational Technologies  |
| Expert 4   | Public University    | Education and Governance             |
| Expert 5   | Public University    | Pedagogy and Digital Technologies    |
| Expert 6   | Public University    | Education and School Transitions     |
| Expert 7   | Public University    | Economics Applied to Education       |
| Expert 8   | Private Organization | Education and New Technologies       |

- 1. Biases and reproduction of inequalities
- 2. Motivation and evaluation
- 3. Guidance and accompaniment
- 4. Administrative processes and educational planning

In this section we have tried to reflect those aspects that have appeared in the interviews as a whole, without going into individual controversies or assessments. Some experts have focused more on some issues and others on others. Thus, this section reflects the diversity of issues that appeared in the interviews, trying to balance the different perspectives by grouping them by topic and collecting the recommendations provided by the experts for each topic.

## 2.2. Biases and reproduction of inequalities

The element of AI that generates most concern when applied to the field of education refers to the **risks of intensifying existing inequalities in education**. In this regard, it warns of biases that may be due to gender, ethnicity, or socioeconomic status, and that may contribute to stigmatizing students. GAI systems can produce results that reproduce existing biases and forms of inequality, as is the case with other applications that use AI, which reproduce socially existing, highly unfair and unequal patterns.

**Insufficient digital competencies among students, families and teachers is a relevant issue when analyzing the risks of AI in the**

### **reproduction of biases and inequalities.**

Students, families and teachers require more training and skills on the limitations, functioning and ways of generating AI information.

It is believed that students tend to uncritically accept the information provided by GAI systems or other digital sources. This lack of skills to contrast and evaluate information results in an inadequate use of AI, which can intensify the polarization between students with better or worse academic results.

In the case of families, the different cultural and educational capital of families is also reflected in their digital competencies. Therefore, those families with more capital and resources will be able to better accompany their sons and daughters in the basic knowledge about the use of technological tools, and vice versa. This can aggravate inequalities in the access and correct use of AI and other digital resources, depending on the family context of the students.

Teachers also lack specific training in AI, its educational applications, operation and risks, which makes it difficult to identify these possible biases and reproduction of inequalities, as well as to transmit to students a critical and responsible use of these tools.

## **2.2.1. Recommendations**

- **From the educational system it is necessary to know and control the data** with which AI technologies used in schools are trained, to avoid biases and inequalities, **promoting the public development of these technologies.**
- **Ensure that students have the necessary digital skills.** Having digital skills not only implies the use of applications, but also knowing how to assess risks and opportunities, and using strategic thinking to decide when it is better to use a tool and when it is not. It is important to provide tools to encourage critical thinking in students so that they do not assume that all the information they obtain from the GAI is correct.
- It is also necessary **for teachers to be trained in AI** to be able to face the challenges that arise from the development and use of these technologies, to be able to adequately guide their students and to face the challenges posed by their integration in the classroom.
- **Do not disregard the expert judgment of teachers or other education professionals.**

# The ability of students to produce complex assignments and answers questions the relevance of traditional forms of assessment.

## 2.3. Motivation and evaluation

There is a general perception among teachers that students lack interest and commitment to their VT studies. This low motivation is associated with a greater use of GAI tools to perform academic tasks. **These forms of use do not encourage critical learning or the development of key competencies, perpetuating a cycle of demotivation and low performance.**

One of the most discussed issues about the application of AI in education is the need to adapt assessment to the widespread use of GAI. **The ability of students to produce complex assignments and answers questions the relevance of traditional forms of assessment.** Some experts emphasize that possible plagiarism with AI tools is not a new phenomenon. Although AI may pose a problem in detecting the authorship of assessment exercises and assignments, this is not a new phenomenon, but rather the modernization of "copy and paste". These uses are part of existing trends, such as the literal and uncritical

use of unreliable information found through web search engines.

However, this problem is magnified with the GAI and what seems to be a greater lack of motivation among students. This implies the **need to reflect and rethink the ways of linking students to their VT studies, as well as the ways of evaluating their educational process.**

### 2.3.1. Recommendations

- Relate theoretical knowledge with practical activities, proposing tasks that cannot be answered directly by the GAI and that imply the mobilization of the different skills acquired by the students.
- **Work on the responsible use of AI collectively** so that students understand the limitations of GAI and can use it critically (e.g., evaluate the answers that different types of GAI can give to questions on specific topics).

- Conduct **face-to-face exams in which students do not have access to digital devices** through which to use AI.
- **Do not completely restrict access to AI**, since these technologies are part of society and may be in demand in the labor market, and it is important for students to develop competencies in their responsible use.

## 2.4. Guidance and support

One of the key issues identified is the **capacity of AI systems to provide personalized and individualized attention**. This potential is associated with the lack of guidance resources and time, which makes it difficult for teachers to carry out all the individual tutoring that would be necessary to optimally guide and accompany students. However, **most experts agree that the automation of tutoring and support services through the use of GAI carries more risks than benefits**.

**The work of human accompaniment and personalized tutoring are fundamental requirements to avoid dropout and guarantee the correct educational development of students.** The ability of teachers to provide motivation and support, beyond their own specifically formative functions, is a key issue in the educational process. Delegating

formative functions directly to the GAI would result in isolating students from the human factor that teachers provide. As a result, students could become detached from the expressive component of their educational process.

**This type of guidance accompaniment is currently insufficient, generally speaking, in VT and needs to be encouraged.** However, a major risk of using GAI tools for this purpose is that of substituting the teachers' own professional judgment for that of the private entities dedicated to the development of the various AI software, which do not have specialized knowledge of the students' educational needs.

It is also emphasized that, far from implying a personalization of learning, **the use of GAI could result in a standardization of the accompanying and guidance information** received by students. As a result, this could lead to the appearance of biases, as mentioned in section 1.1 above. The professional judgment of teachers in their understanding of the educational process of each student is important, precisely in order not to reproduce stereotypes and prejudices found at the social level.

For these reasons, there is **widespread opposition to the use of AI for guidance**, considering its applications as an improved form of intelligence and personality tests that could be

used to determine which career path to follow. This type of use is discouraged because of the number of biases and risks to which these processes expose students.

## 2.41. Recommendations

- Faced with the difficulty and lack of resources of the guidance services to respond to the needs of VT students, the GAI can be used by teachers as a **tool to help organize the available resources and facilitate access to the necessary information.**
- The IA could collect data on information on the territory of the existing training offer. Given the difficulty for guidance counselors to keep abreast of changes in the labor market context and the different study options, **an AI is proposed that can present, analyze and categorize different information useful for understanding the possible study or work paths available** to students.
- However, **it is not recommended that it be used to automate the choice of itineraries** or that it be used without the support of the professional criteria of the guidance services.

## 2.5. Administrative processes and educational planning

The use of AI in VT schools **poses significant challenges in terms of privacy and data protection.** The schools handle highly sensitive information, such as academic records, medical data and family history, which requires ensuring strict compliance with the regulations of the Organic Law on Data Protection. **Any AI implementation must have robust security and transparency systems in place** to prevent breaches that could jeopardize student data protection.

By ensuring all data protection issues are addressed, **AI can be used to streamline bureaucratic processes in schools.** From enrollment management to timetable planning, AI-based tools have the potential to drastically reduce the administrative burden, freeing up time for staff to focus on more strategic and pedagogical tasks.

It may also be of interest to use AI to organize and analyze data that is routinely generated in schools to identify needs and plan more efficiently the distribution of educational resources in a given school, facilitating the management of public policies and educational governance.

## Any AI implementation must have robust security and transparency systems in place to prevent breaches.

The teachers themselves are usually already aware of the social problems of their students and the socioeconomic context of the school. However, **automated tools can be used to obtain quantitative evidence of the situation**, relieving schools and teachers of the responsibility of solving more structural problems.

### 2.5.1 Recommendations

- AI has great potential to **automate bureaucratic processes in schools (enrollment management, timetables or data analysis)**. However, its implementation must be ethical, transparent and supervised by humans, ensuring that it does not pose a barrier for families and students with fewer digital skills.
- In addition, AI can contribute to educational governance, analyzing data to identify specific needs, always guided by educational criteria and public policy experts.

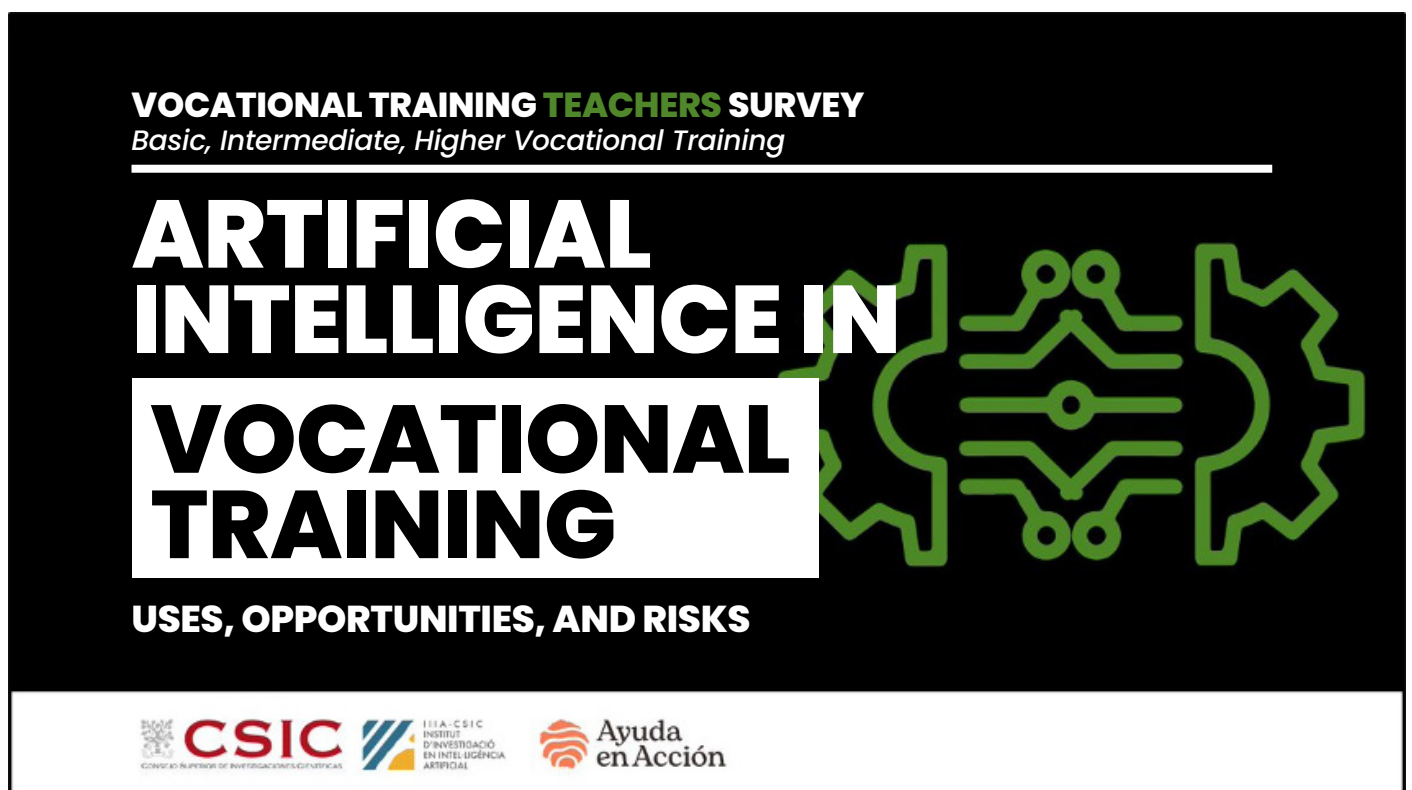
PHASE II:

## USES OF IA AMONG TEACHERS

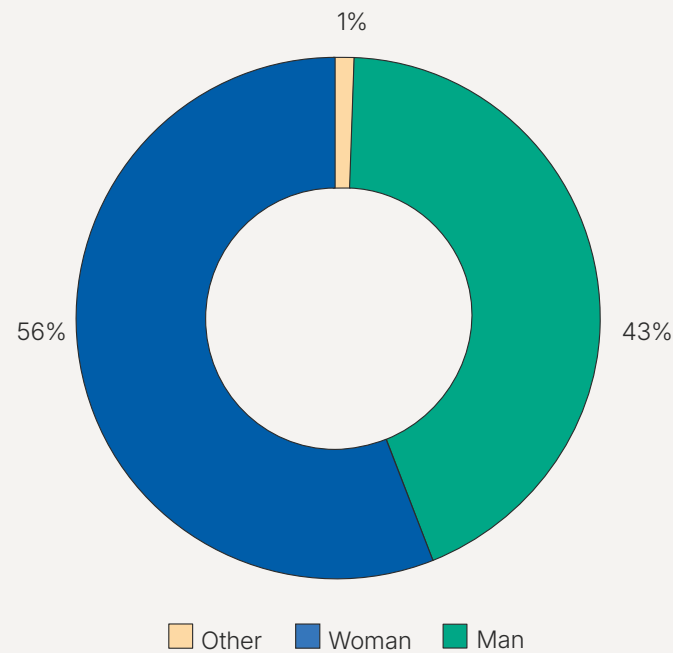


### 3. Survey of VT teachers

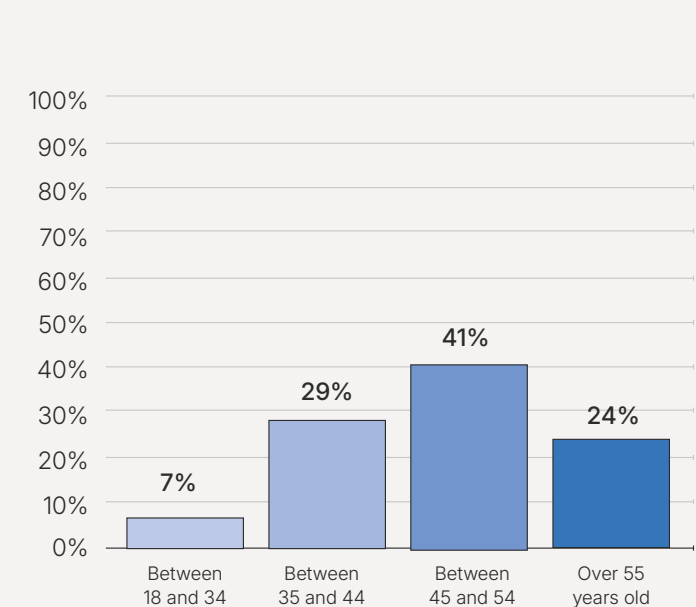
An online survey was distributed to BVT, IVT and HVT teachers. A total of **355** teachers responded to the survey.



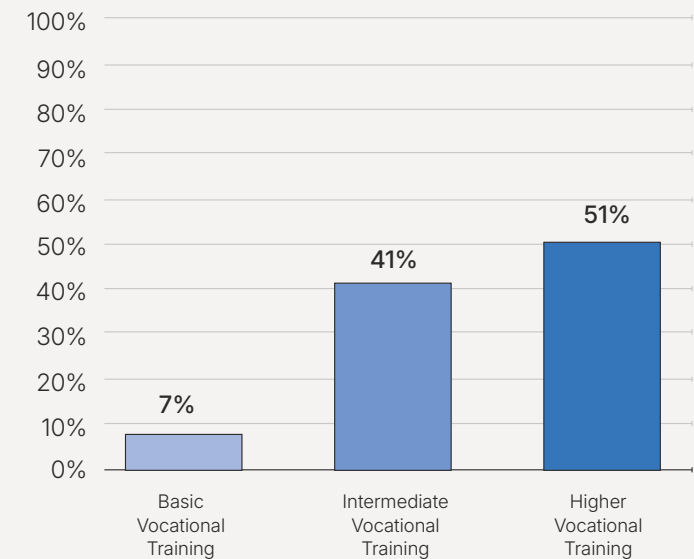
Graph 1. Gender



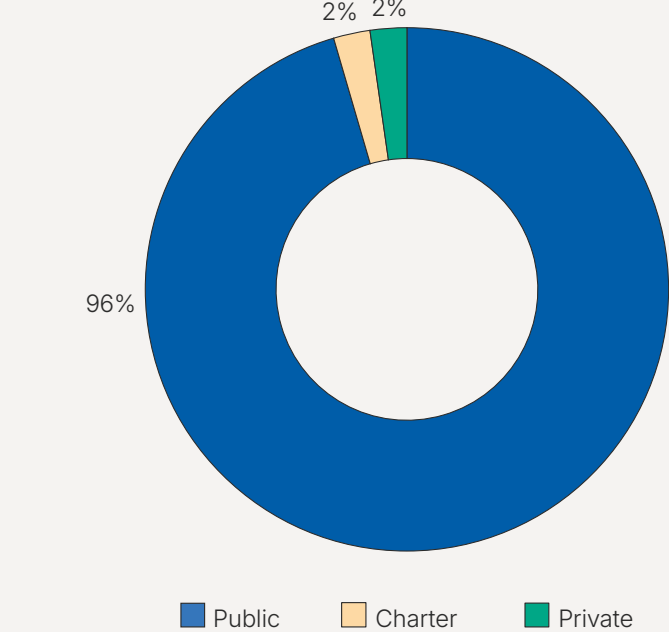
Graph 2. Age groups (%)



Graph 3. Level of vocational training in which the most hours are taught



Graph 4. School type



### 3.1. Description of the response sample

Women accounted for 43% of the responses and men for 56% (graph 1).

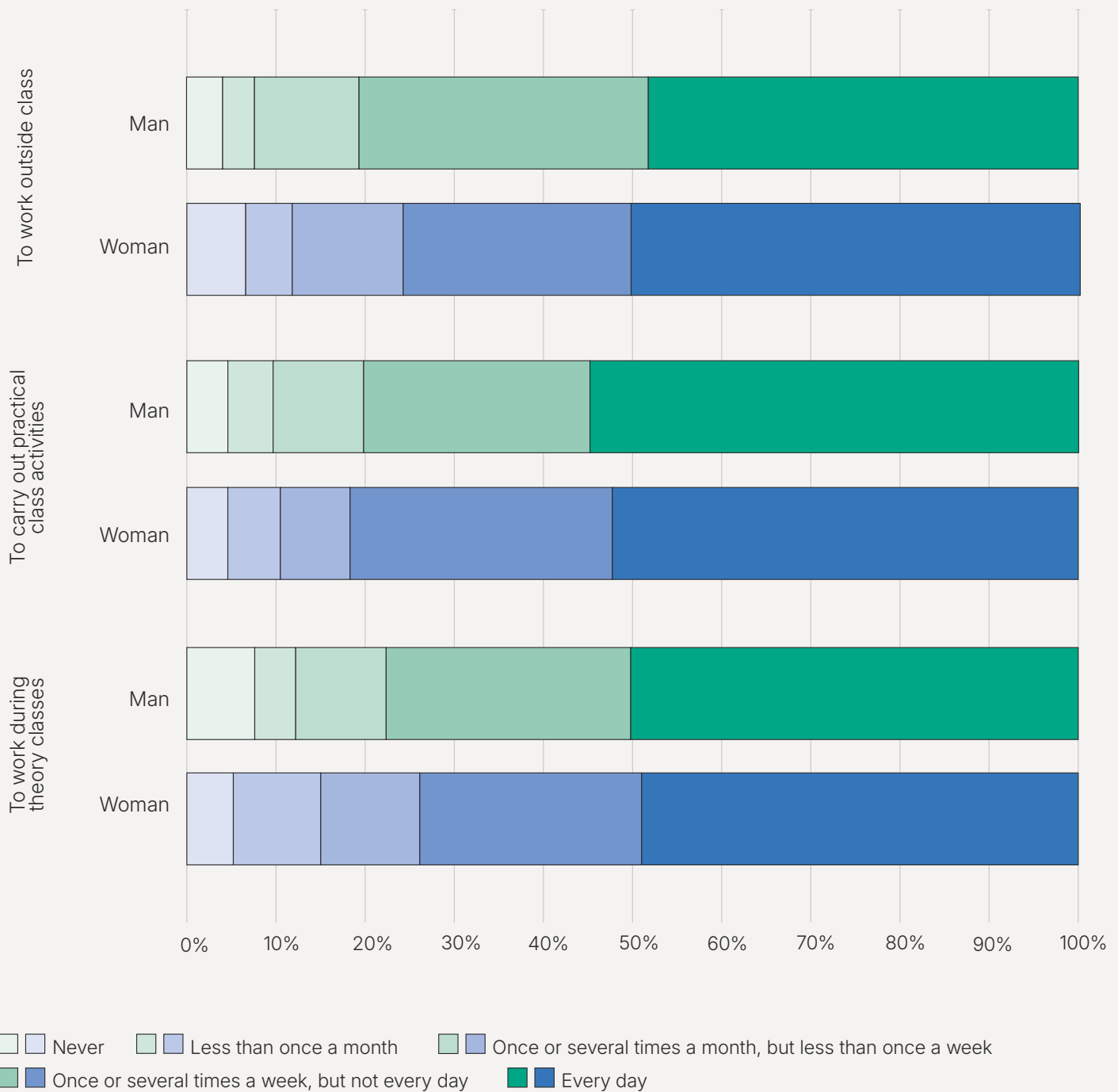
Most of the teachers who responded to the survey are between 45 and 54 years old (41%), followed by the group between 35 and 44 years

old (29%), over 55 years old (24%) and, finally, between 18 and 34 years old (7%) (graph 2).

Of those surveyed, 51% are vocational training teachers at higher level, 42% at intermediate level, and 8% at basic level (graph 3).

Almost all of the responses came from teachers in public schools (graph 4).

Graph 5. How often should your students use digital devices (computer, tablet, mobile) for each of the following? By gender



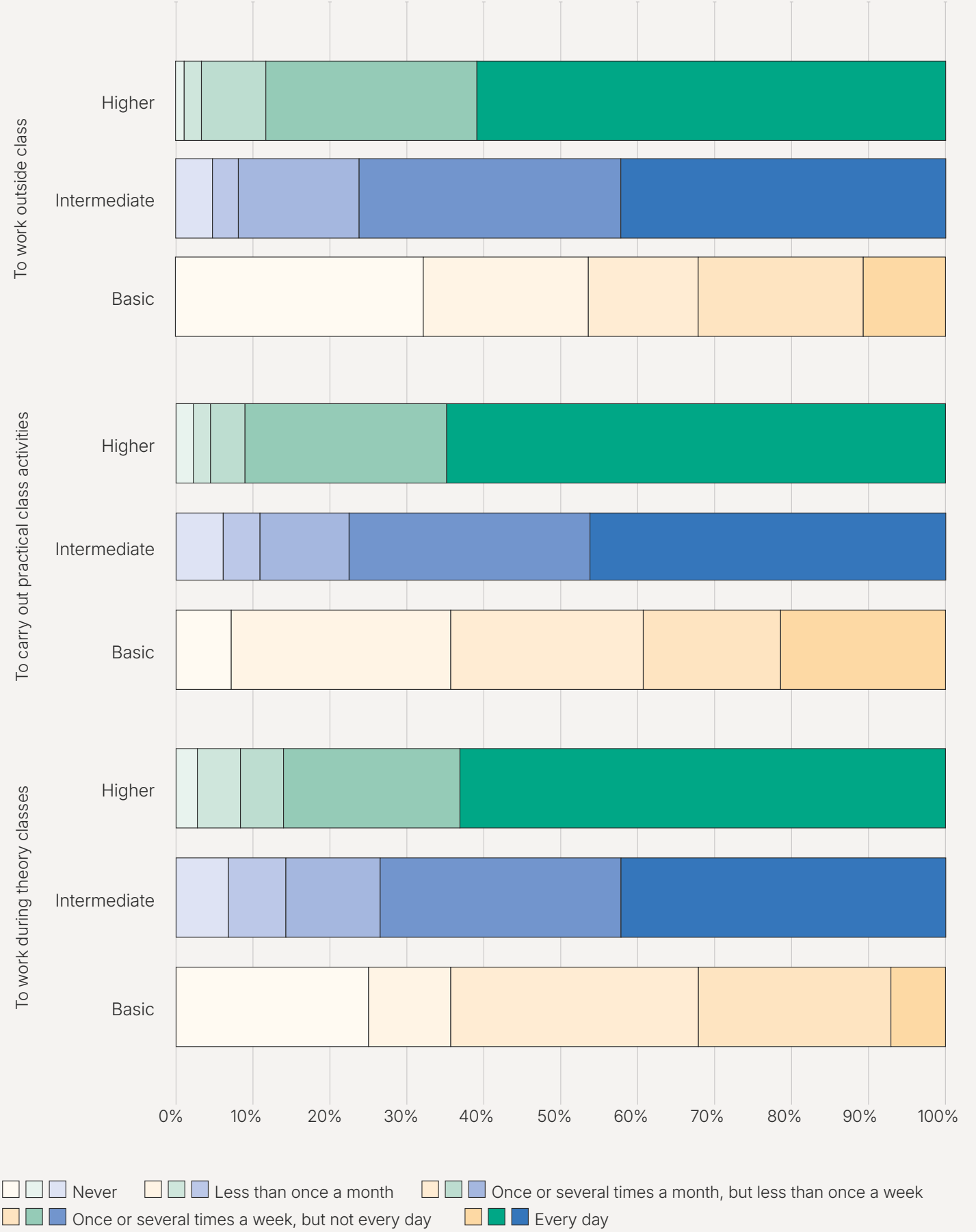
### 3.2. Activities with digital devices by type of activity

The graph shows that the required use of digital devices by the students of the teachers surveyed is very high, with no difference according to gender. Around 50% of the teachers surveyed state that their students must use these devices every day both in practical and theoretical

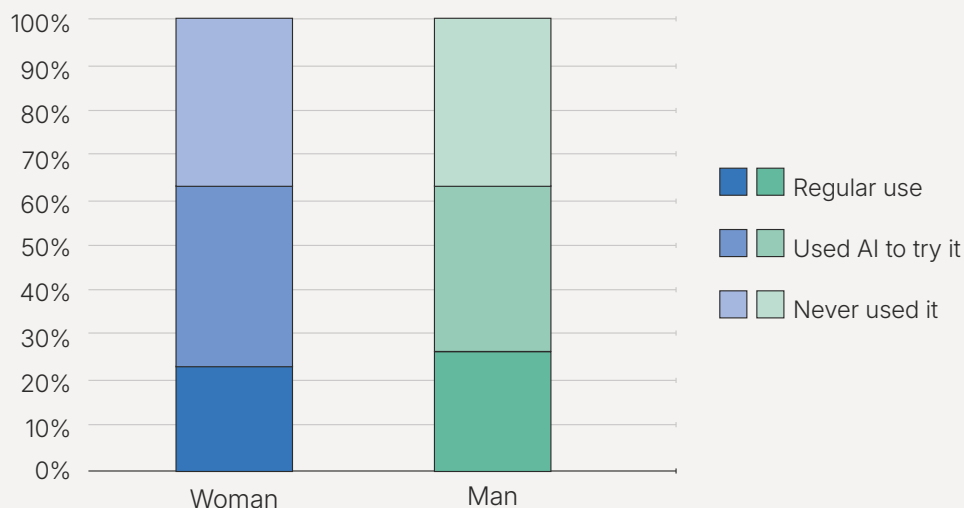
classes, as well as in the tasks they must perform outside the school. In addition, between 25% and 30% believe that, although they should not use them every day, they should use them once a week (graph 5).

There are significant differences according to the level of VT and the use of digital devices, with the use of digital devices increasing as the level increases. In basic vocational training, only

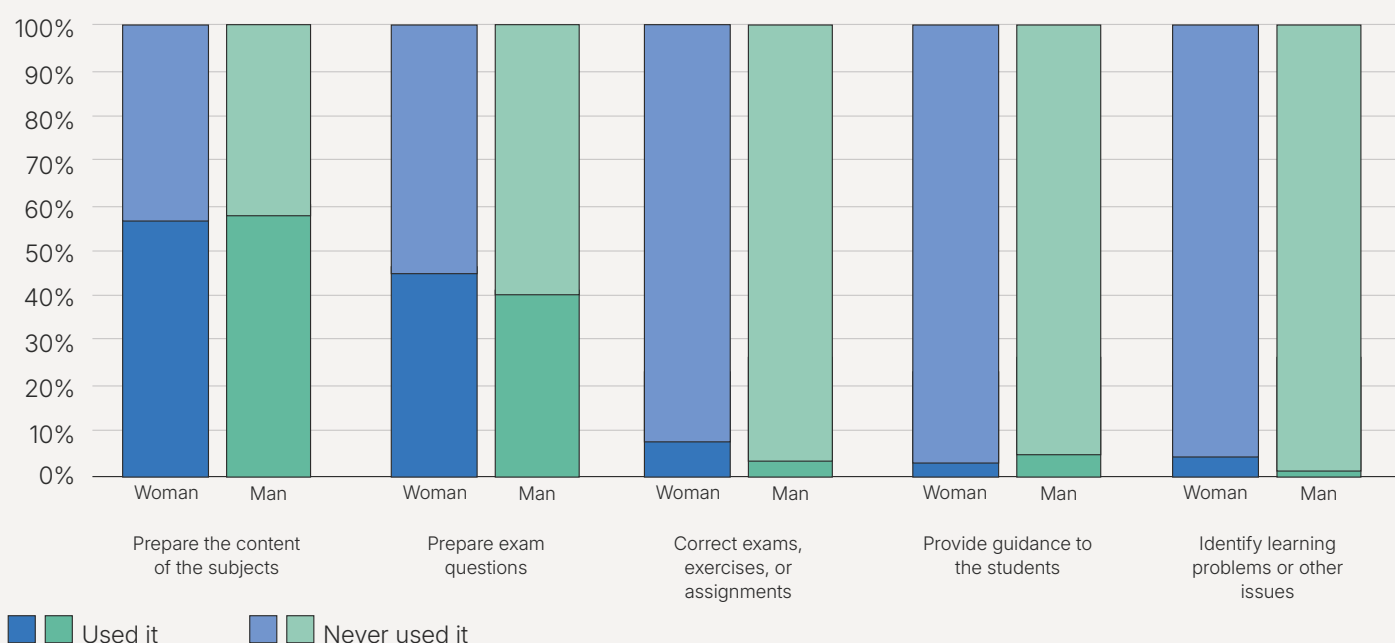
Gráfico 6. How often should your students use digital devices (computers, tablet, cell phone) for each of the following? By level of VT



Graph 7. Use of AI among teachers, by gender



Graph 8. Use of AI by type of task, by gender



7.1% and 10.7% of the teachers surveyed stated that their students need to use digital devices on a daily basis in theory classes and to work outside the school, respectively. However, this figure rises in the case of their use for practical activities, where it increases to 20%. In IVT we find a higher use, with around 45% of teachers stating that their students need to use digital devices on a daily basis for all activities. In HVT this figure rises to 60% and 65% (graph 6).

### 3.3. Use of AI among teachers

A quarter of the teachers surveyed (25.6%) use AI frequently. 38.1% say they have used it on some occasions to try it out and 36.4% say they have never used it (graph 7).

The tasks for which AI is most commonly used are to prepare subject content (57%) and to prepare exam questions (42.6%). Other uses

Gráfico 9. Frecuencia de uso de IA por tipo de tarea, por género

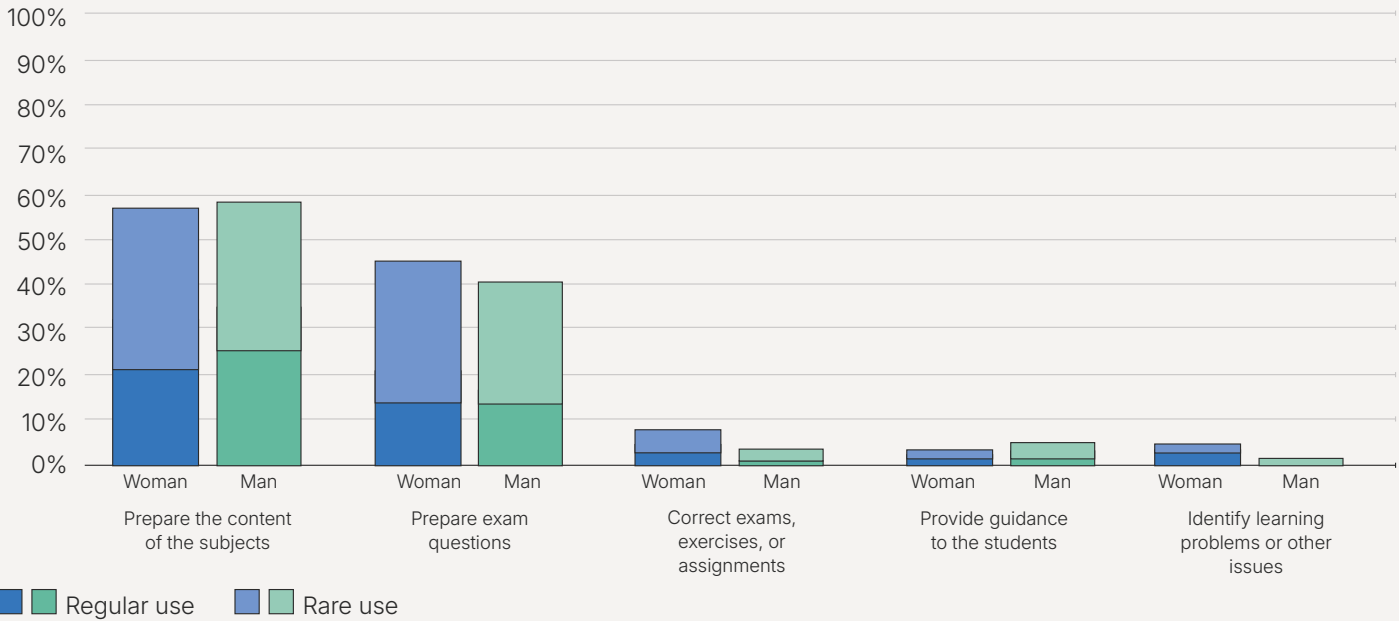
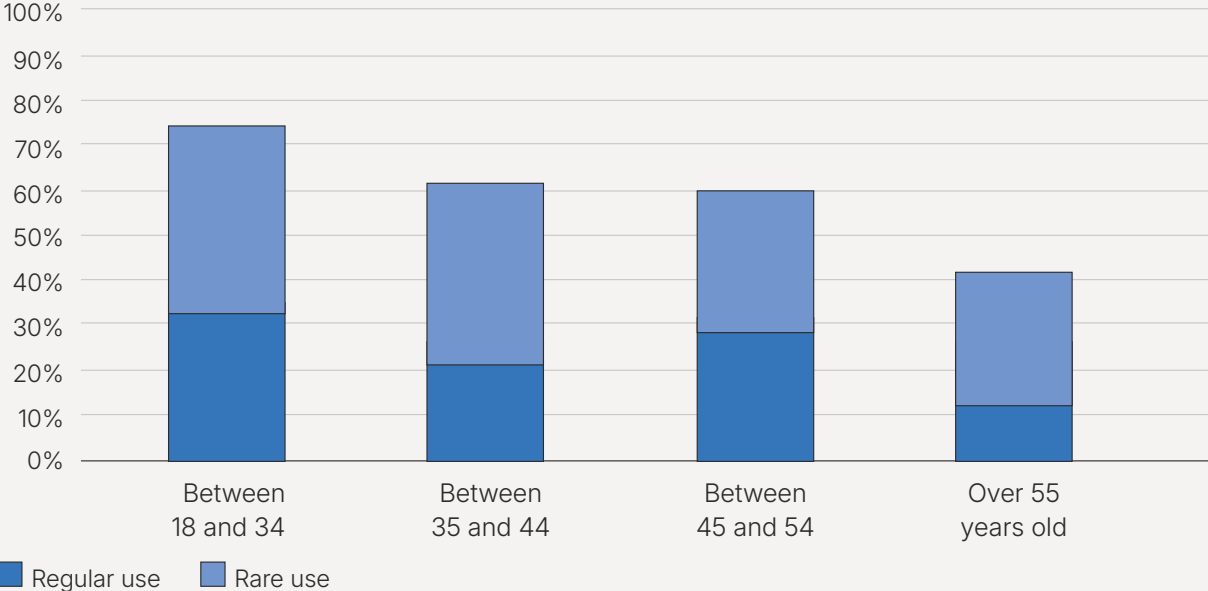


Gráfico 10. Frecuencia de uso de IA para preparar contenido de la asignatura, por edad



such as making corrections, giving guidance aids or identifying problems are more minor (graph 8).

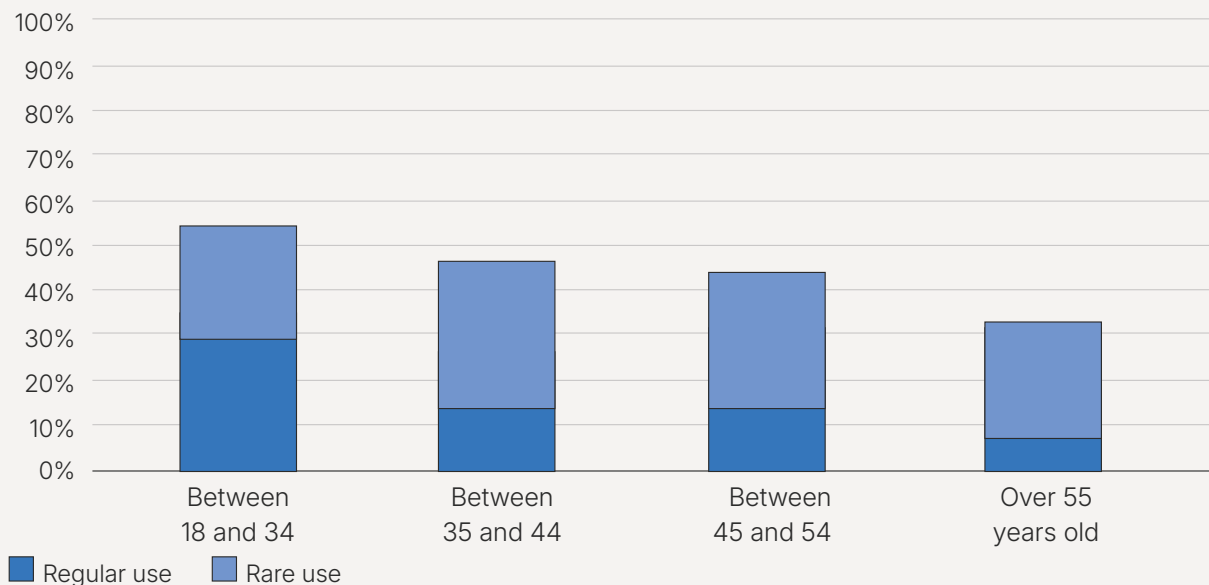
While 57.7% of respondents have ever used AI to prepare subject content and 42.6% to prepare exam questions; only 23.6% and 13.6% (respectively) use AI frequently for these tasks (graph 9).

When analyzing the use of AI by age, significant differences can be observed for the two most

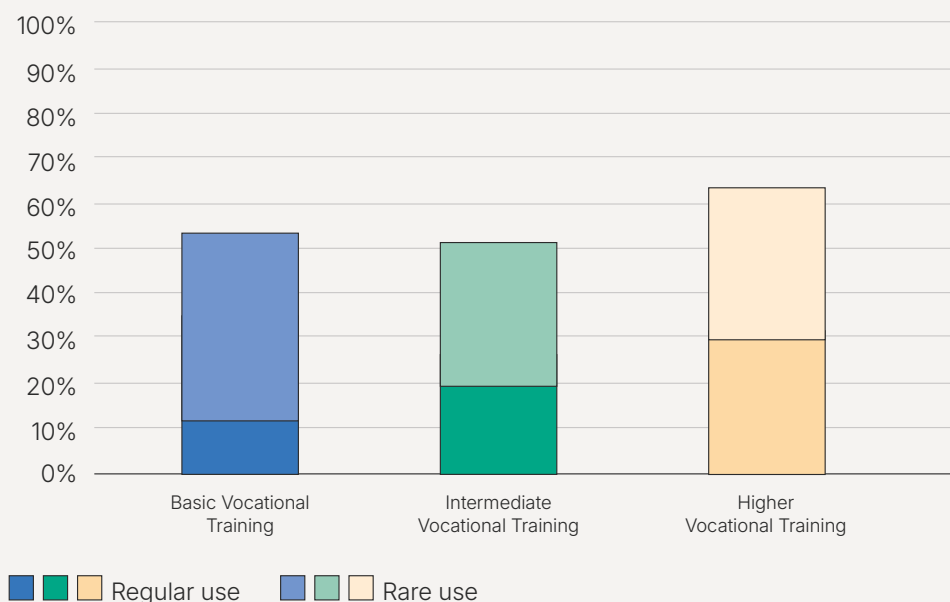
frequent uses, with the youngest teachers using it the most, and vice versa. One third of the respondents (33.3%) aged 18-34 years claim to use AI frequently to prepare the content of their subjects, while only 12.9% of those over 55 claim to do so. The same is true for sporadic use, with values of 41.7% for the first age group and 29.4% for the latter (graph 10).

The same is true for the use of AI to prepare exam questions: while nearly 30% (29.2%) of

**Graph 11.** Frequency of AI use to prepare for exam questions, by age



**Graph 12.** Frequency of AI use in preparing course content, by level of VT



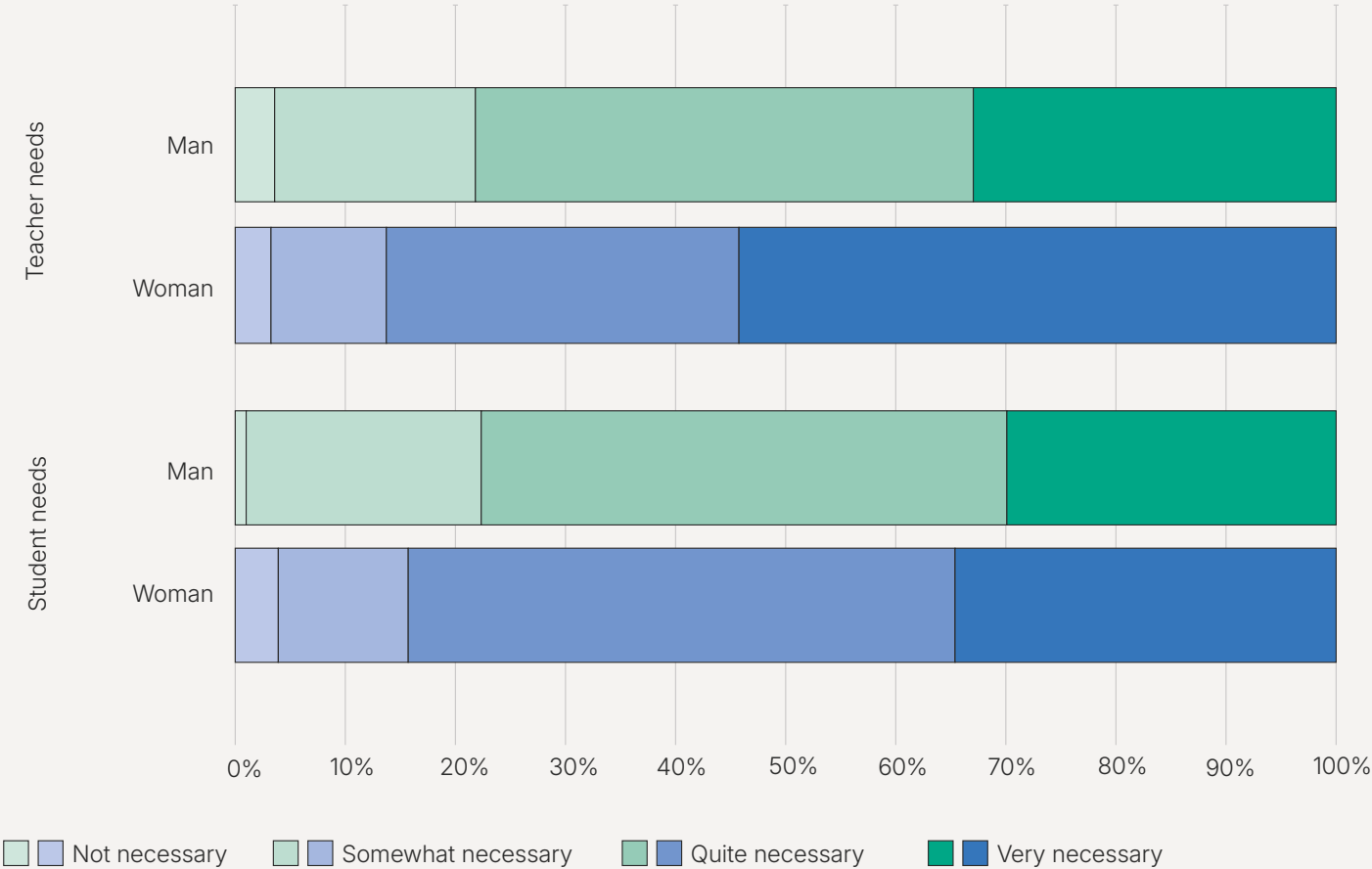
respondents aged 18-34 use AI for this purpose, only 7% of those aged 55 and over do so (graph 11).

Significant differences were also found in the use of AI according to the level of training provided. The higher the level of education, the greater the use of AI to prepare subject content: in BVT only 10% of the teachers surveyed use AI for this purpose, while in IVT this figure rises to 19% and in HVT to 29.6% (graph 12).

### 3.4. The need for AI learning

The teachers surveyed consider it necessary to learn about AI, both for themselves and for their students: 80% consider it quite necessary or very necessary for their students to learn about AI and 81.2% consider it necessary to learn about AI for their own work. On the other hand, women consider it more necessary than men to learn more about AI for teachers, 54.2% of women compared to 33% of men (graph 13).

Graph 13. Do you consider it necessary for you or your students to learn about AI? By gender



There are significant differences in assessing the need for AI learning according to the level of VT. The higher the level of VT, the greater the need for more AI training, both for students and teachers. On the one hand, the percentage of teachers surveyed who consider it very necessary to learn about AI for their profession is very similar for BVT and IVT (32.1% and 36.7%, respectively), while in HVT it rises to 49.2%. On the other hand, the differences in teachers who consider it very necessary for their students to learn about AI are greater: 14.3% in BVT, 26.5% in IVT and 40.2% in HVT (graph 14).

### 3.5. Training or information on AI in the classroom

In relation to the training or information on AI provided by the teachers surveyed, 44.6% have

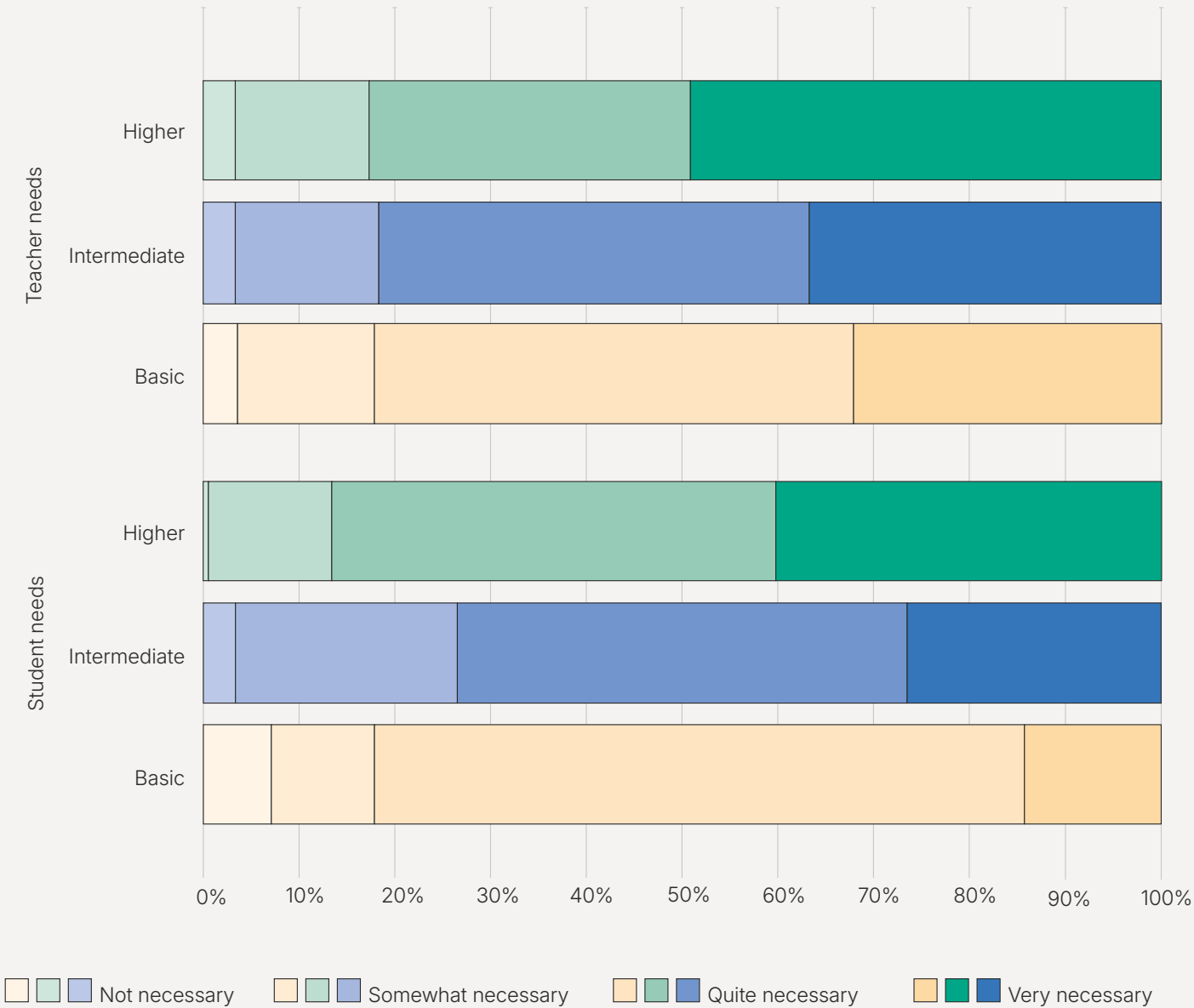
not worked on AI in class, with a difference of 10 percentage points between women 50.3% and men 40.1%.

The AI topic that is most worked on in class is the responsible use of AI, with 37.2% of the teachers surveyed having dealt with this topic in class, and general information about AI, with 35.2% of teachers (graph 15).

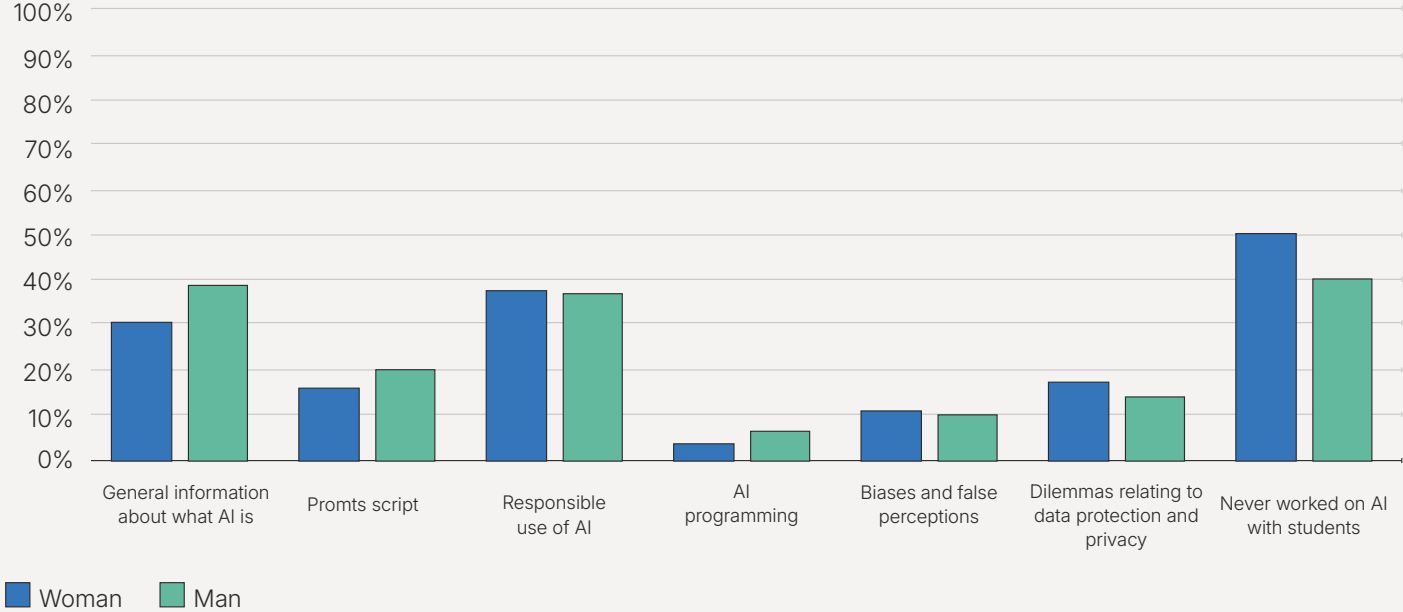
Significant differences are found according to age in relation to the topics on AI worked on in class. It is noteworthy that training or information on the responsible use of AI decreases as age increases. In general, the older the age of the teacher, the less they tend to discuss AI-related topics with students (graph 16).

Similarly, there is a significant relationship between the educational level at which teachers teach and

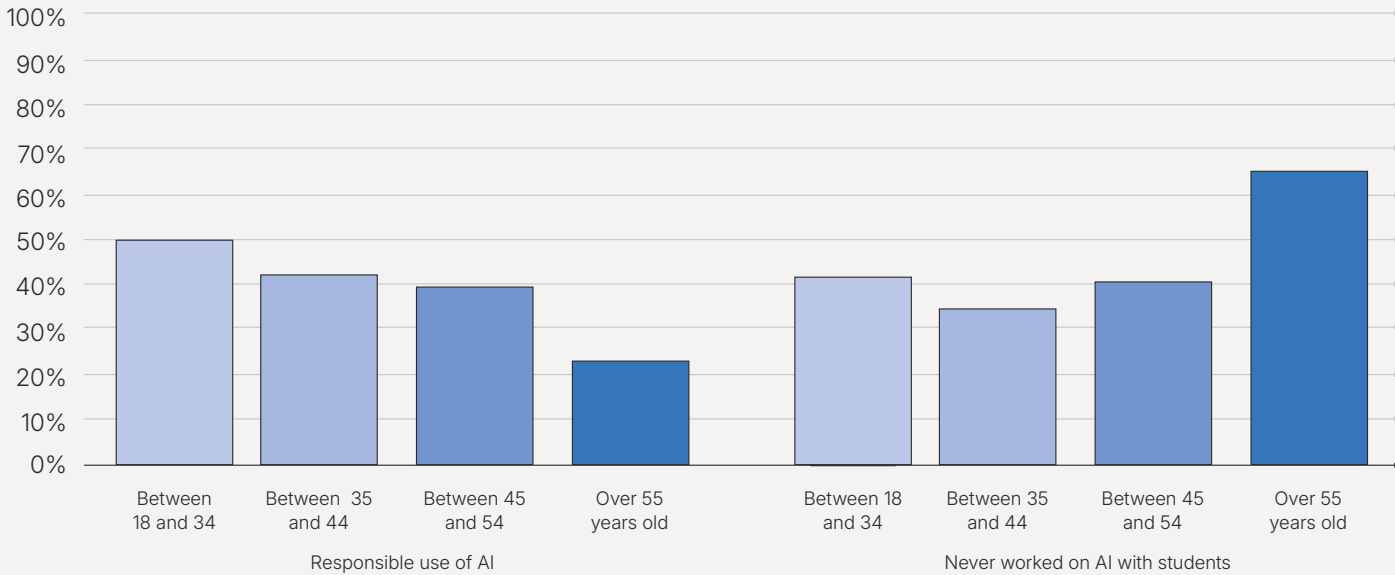
Graph 14. Do you consider it necessary for you or your students to learn about AI? By level of VT



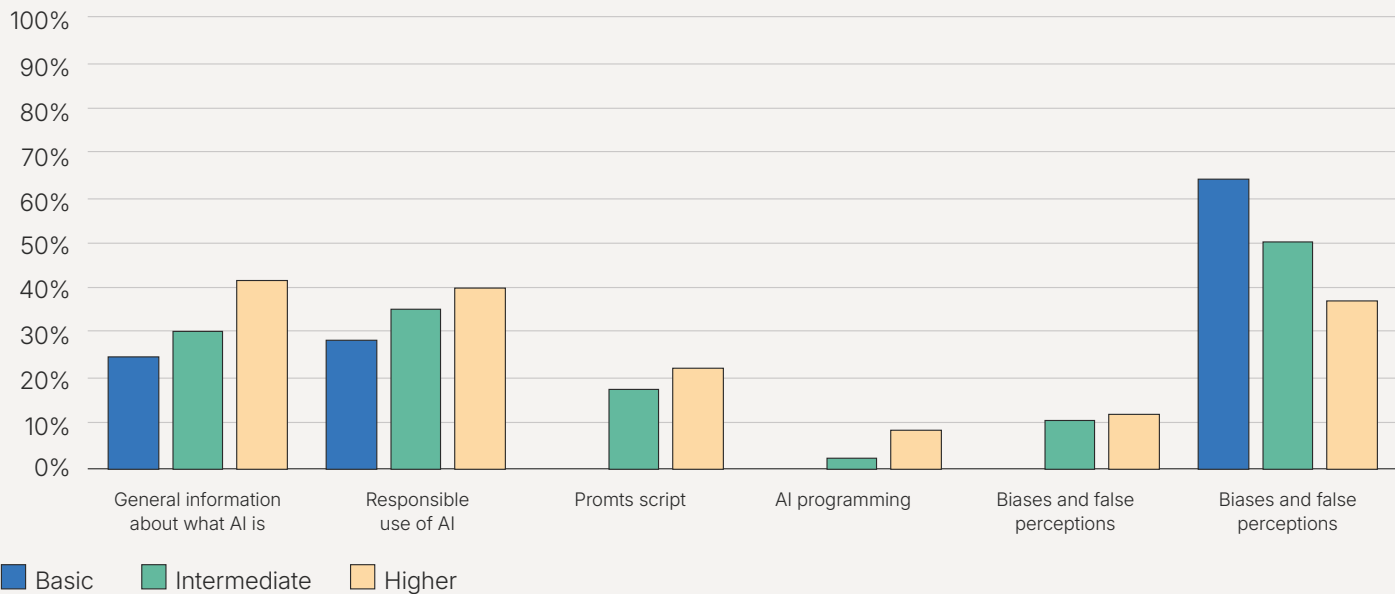
Graph 15. In your classes, have you worked with students on any of these topics? By gender



Graph 16. In your classes have you worked with students on any of these topics? By age



Graph 17. In your classes, have you worked with students on any of these topics? By level of VT



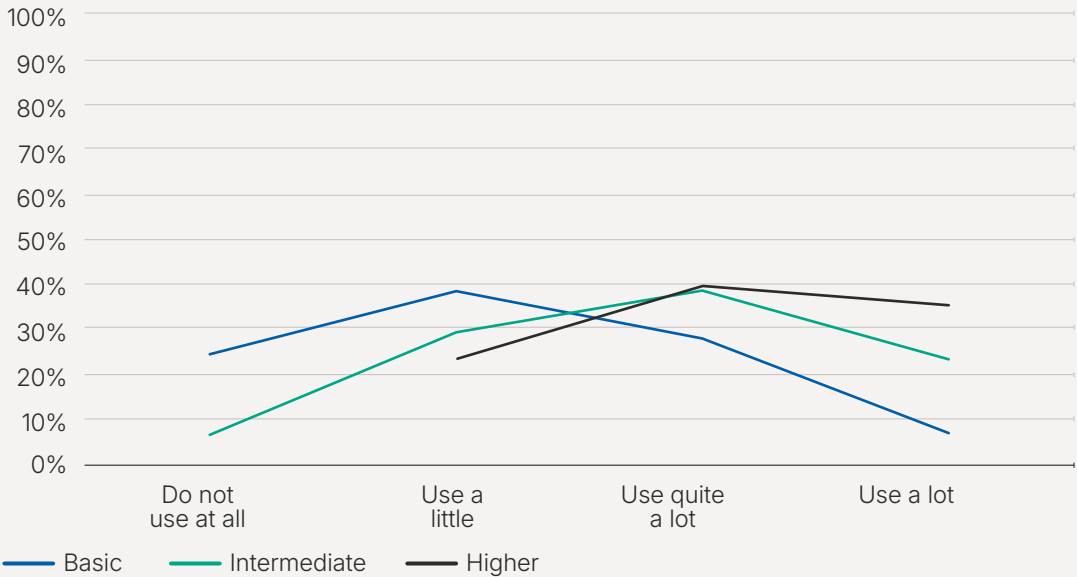
whether they have covered any topics related to AI. The higher the educational level, the more diverse topics related to AI are covered in the classroom. Among teachers in BVT, 64.3% have not covered AI in class, compared to 50.3% of teachers in IVT and 37.4% in HVT. These differences can also be seen in topics such as general information about what AI is (25% in BVT, 30% in IVT, and 42% in HVT), writing prompts (0% in BVT, 17.7% in IVT, and 22.3% in HVT), and AI programming (0% in BVT, 3% in IVT, and 9% in HVT) (graph 17).

### 3.6. Perception of GAI use by students

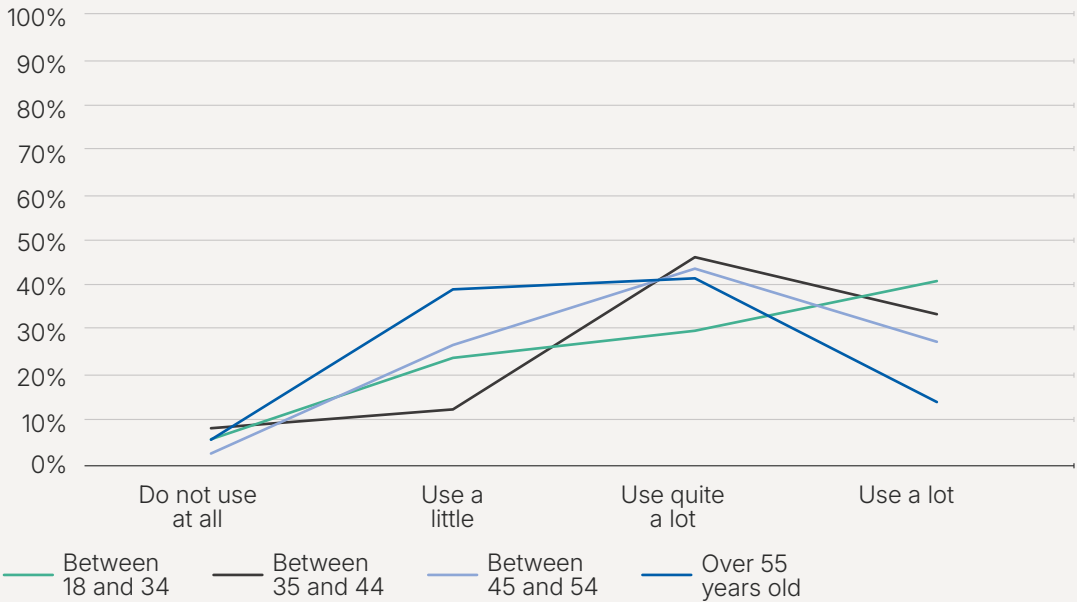
More than two thirds of the teachers surveyed (67.7%) consider that their students use the GAI a lot or quite a lot and only 4.8% consider that they do not use it at all.

These figures show significant differences according to the level of education. The higher the level of vocational training at which they teach, the

Graph 18. Do you think your students use GAI to prepare their assignments? By level of VT



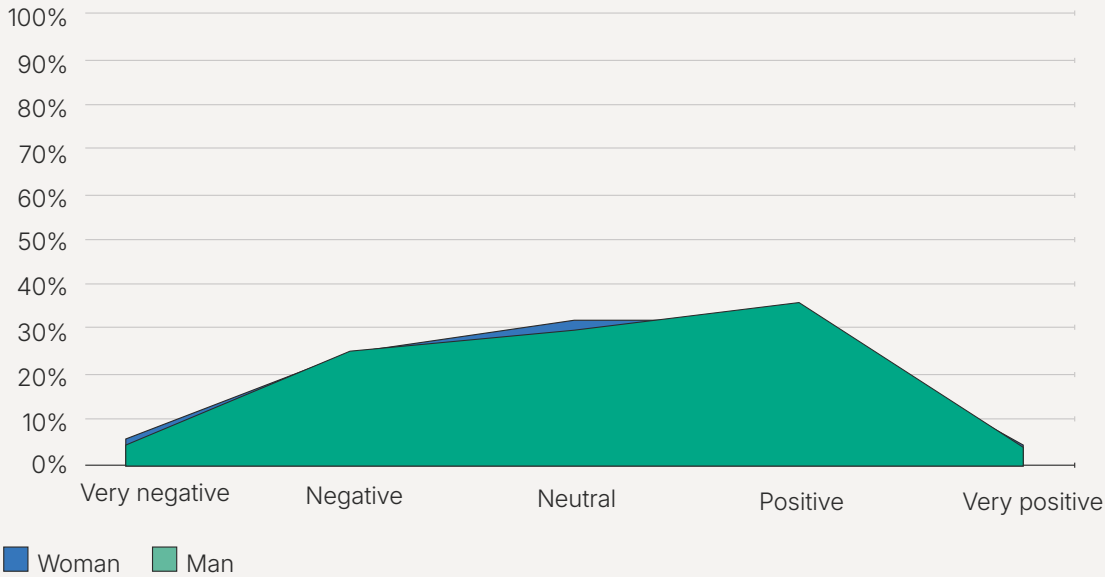
Graph 19. Do you think your students use GAI to prepare their work? By age



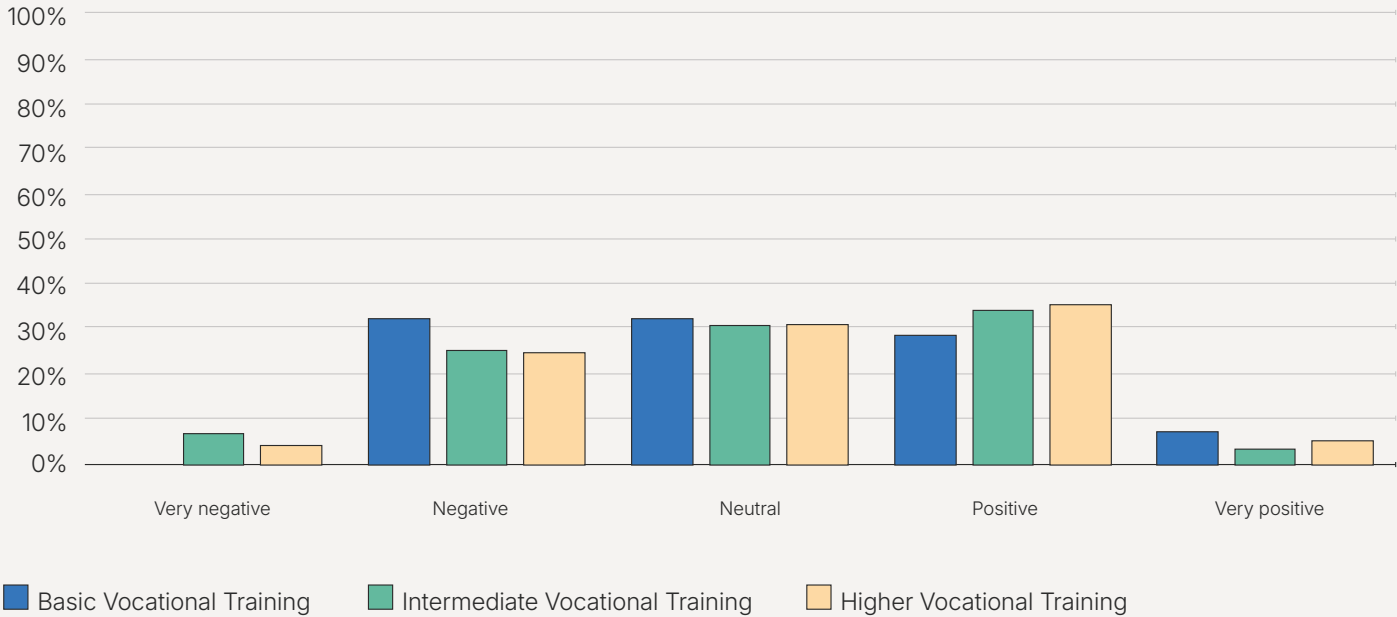
more the teachers surveyed tend to consider that their students make use of AI in their work. Among BVT teachers, 25% consider that their students do not use AI at all in their work, 39.3% consider that they use it a little, 28.6% consider that they use it quite a lot and only 7% that they use it a lot. This contrasts with the other levels, where the IVT and HVT teachers who consider that they do not use it at all are 7% and 0% respectively, that they use it little 30% and 23.5% respectively, that they use it quite a lot 40% in both cases and that they use it a lot 24% and 36% respectively (graph 18).

The older the teachers are, the less they tend to think that their students use GAI to answer their assignments. Although it can be observed that none of the groups tends to think that they do not use it at all (in all cases values below 10%), there are significant differences between those teachers who consider that their students use it little (38.8% in the oldest group and 12.5% in the youngest group). Similarly, a third of the youngest teachers surveyed consider that their students use it a lot, while only 14% of the oldest teachers value this option (graph 19).

Graph 20. What impact do you think GAI has on education? By gender



Graph 21. What impact do you think the GAI has on education? By level of vocational training



### 3.7. Assessment of the impact of AI on education

When it comes to assessing the impact of the GAI on education, it can be seen that the general opinion of the teachers surveyed is very diverse, but very extreme positions are avoided. High values are given for negative as well as positive and neutral positions, but responses at the

extremes are around 5%. Nevertheless, a slight inclination towards the positive assessment can be seen, since the sum total of these is 38.5% compared to 30.5% of the negative values (graph 20).

It is noteworthy that, unlike the previous variables analyzed related to the use of AI, when crossing the perception of its impact on education, no significant differences are found

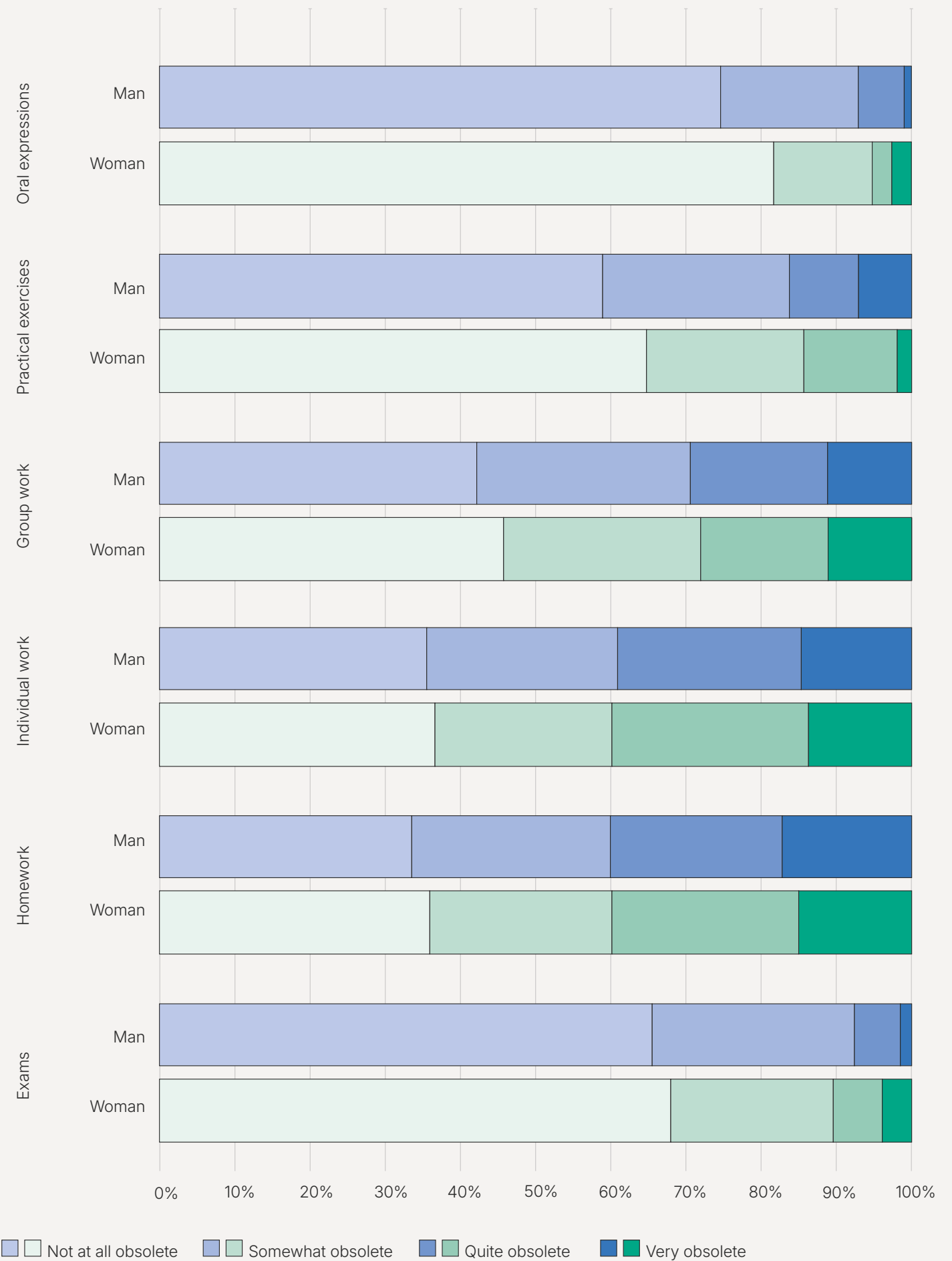
between the three levels of Vocational Training (graph 21).

Regarding how AI affects assessment, there are important differences according to the type of assessment method. Among the assessment methods considered most obsolete by the respondents are homework (39.8% consider it fairly or very obsolete), individual work (39.2% consider it fairly or very obsolete) and group work (28.7% consider it fairly or very obsolete). On the other hand, the methods perceived as less obsolete are oral presentations (77.8% consider them not at all obsolete), exams (66.8% consider them not at all obsolete) or practical exercises (61.6% consider them not at all obsolete) (graph 22).

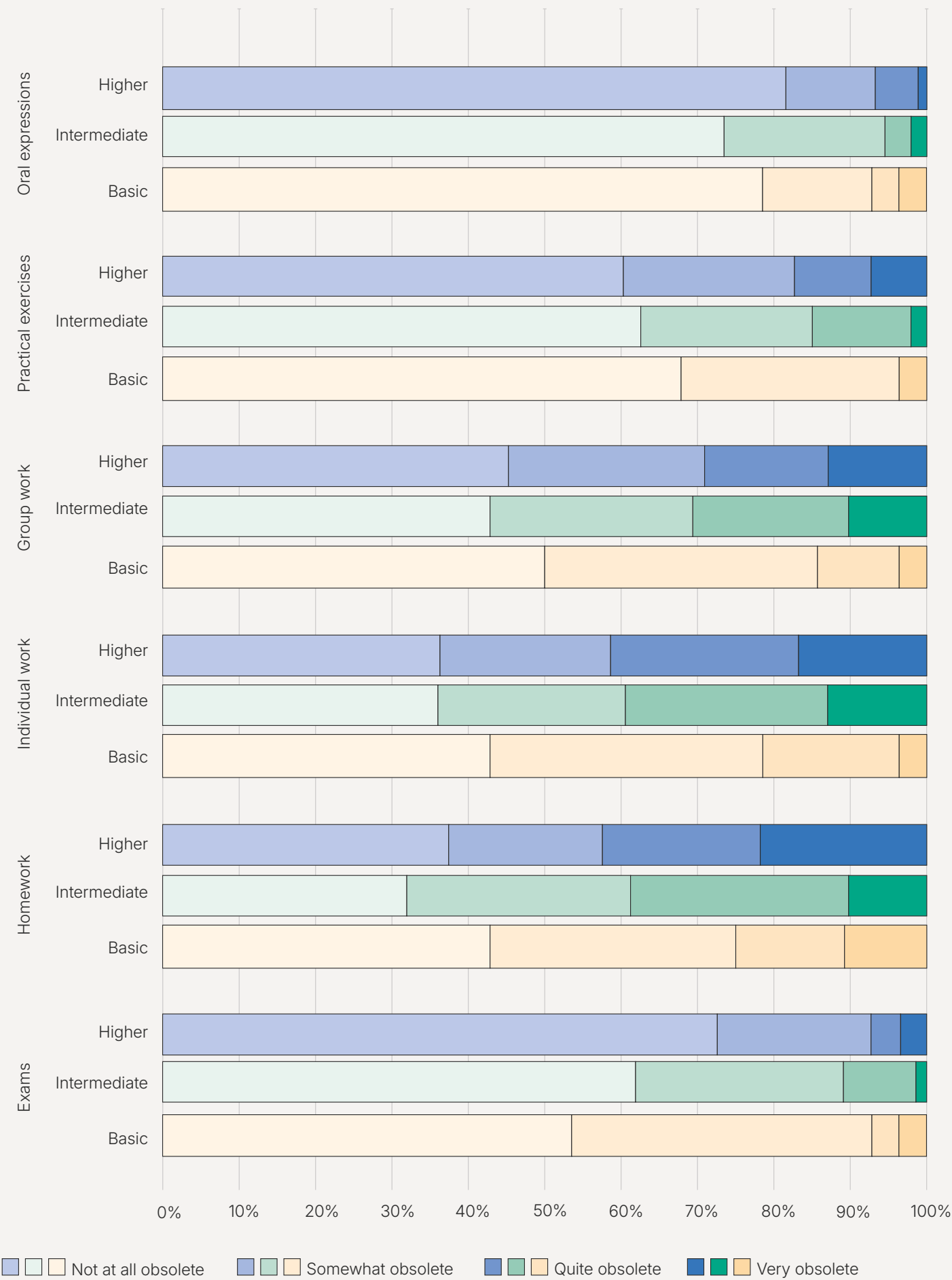
By level of VT, a slight significant difference is observed, whereby the higher the level of education, the lower the tendency to consider the exams as an obsolete evaluation method: for HVT, 72.6% of the teachers surveyed consider that they are not obsolete, compared to 61.9% for IVT and 53.6% for BVT (graph 23).

When crossing the perception of its impact on education, no significant differences are found between the three levels of Vocational Training

Graph 22. To what extent do you consider the following evaluation methods obsolete with the advent of AI? By gender



Graph 23. To what extent do you consider that the following evaluation methods are obsolete with the advent of AI? By level of VT



## 3.8. Conclusions

### **Use of AI among teachers:**

AI is used frequently by 25.6% of teachers, 38.1% have tried it and 36.4% have not used it. The main applications are content preparation (57%) and exam questions (42.6%), although frequent use in these tasks is 23.6% and 13.6%, respectively. Differences are observed according to age: 37.5% of young teachers (18-34 years old) use it regularly, compared to 14.1% of those over 55 years old.

### **Need for learning about AI:**

81.2% of teachers consider it necessary to be trained in AI, while 80% believe that their students should also be trained in the subject. In HVT, 49.2% of teachers consider it very necessary to learn AI for their profession, compared to 32.1% in BVT. In addition, women perceive a greater need for AI training (54.2%) than men (33%).

### **Training and information on AI in the classroom:**

Of those who have worked on AI in class, 44.6% have not done so at all, with this being more common at higher levels. Of those who have worked on AI in class, 37.2% have addressed the responsible use of AI and 35.2% have provided general information. In HVT, 22.3% have worked on writing prompts and 9% on AI programming, while in BVT these topics are hardly addressed.

### **Perception of student use of GAI:**

Perception of the use of GAI by students: 67.7% of teachers believe that their students use GAI quite a lot or a lot, with significant differences depending on the level of vocational training. In HVT, between 60% and 65% of teachers believe that their students use it daily, while in BVT this percentage is less than 20%. Younger teachers tend to perceive greater use of GAI by students than older teachers.

### **Assessment of the impact of AI on education:**

The teachers' opinion on AI is diverse, although there is a slight positive inclination (38.5% vs. 30.5% negative). Regarding assessment, traditional methods such as homework (39.8% consider them obsolete) and individual work (39.2% consider them obsolete) are considered obsolete, while oral presentations (77.8% do not consider them obsolete) and exams (66.8% do not consider them obsolete) are perceived as current.

### **General considerations:**

VT teachers recognize the growing relevance of AI in education, although its use is not yet widespread. There is a widespread need for training in AI, both for teachers and students. Differences are identified according to the level of VT, being more widespread and relevant at higher levels.

Table 2. Interviews with teachers, according to the type of school

| School type | n |
|-------------|---|
| Public      | 5 |
| Charter     | 4 |
| Private     | 6 |

Table 3. Teacher interviews, by gender

| Gender | n |
|--------|---|
| Women  | 7 |
| Men    | 8 |

Table 4. Teacher interviews, according to professional family and level of VT

| Professional family | Basic Vocational Training | Intermediate Vocational Training | Higher Vocational Training |
|---------------------|---------------------------|----------------------------------|----------------------------|
| Health              |                           | 4                                | 3                          |
| Computing           | 1                         | 1                                | 2                          |
| Electronics         |                           |                                  | 2                          |
| Domestic activities | 1                         |                                  |                            |
| Mechanics           | 1                         |                                  |                            |

## 4. VT teacher interviews

### 4.1. Introduction

The aim of the interviews with teachers is to know their opinions about the introduction of AI in VT and to identify the uses and problems they identify in their daily professional activity.

A total of 15 interviews were conducted with teachers of basic, intermediate and higher vocational training, from different professional families. Face-to-face in-depth interviews were conducted (in face-to-face and virtual format), following an open semi-structured script. The interviews were transcribed and subsequently a thematic analysis of the information was carried out.

The information obtained from the teacher interviews has been key in the preparation of the

The positive aspects offered by this technology for teachers are emphasized, while the risks (...) are associated with the use that students may make of it.

surveys, as well as to obtain an overview of the advantages of using AI in the performance of their duties, as well as the problems they have perceived as a result of its inclusion in VT.

A characteristic feature of the interviews conducted with teachers is that they were not only asked about their relationship with AI, but a series of questions on topics that tangentially dealt with the use of these technologies that provide relevant information when it comes to understanding their uses and the issues surrounding them.

The analysis of the results of the teacher interviews has been organized around the following sections:

- Uses of AI among teachers
- Uses of AI among students
- Student guidance
- Conclusions

## 4.2. Uses of AI among teachers

### 4.2.1. Positive and unavoidable perception of GAI

One of the main issues to be highlighted in the interviews with teachers is their regular use of the GAI for a large number of teaching tasks. The positive aspects offered by this technology for teachers are emphasized, while the risks or negative aspects are associated with the use that students may make of it.

*E11: Let's see, I am always in favor of technology going ahead, that is, in the sense that when something like artificial intelligence can be introduced as part of a solution, what we have to teach is or do, let's say, the challenge is already on the teacher's side to make it work for the student to acquire the learning.*

The nuances or reluctance towards the GAI are associated with a lack of knowledge or lack of use. Special emphasis is placed on the instrumental use of the GAI to facilitate the teacher's work, related to preparing content and evaluating.

*E6: It was a couple of years ago that I got to know it more than using it, and I thought it was something between wonderful and scary. Now, as I work with it and use it, it seems to me that it is something very good. I'm not afraid that it's going to take my job, far from it. I don't think it's going to take it away from anybody. I think it is a very useful tool because it makes it much easier.*

However, despite the fact that in the interviews the teachers are inclined to use the GAI, there is a negative attitude on the part of "other" teachers towards this type of technology.

*E5: I have most of my colleagues who don't even want to hear about it. They consider AI as a tool for students not to do the work and get it easily and they don't want to know anything about artificial intelligence.*

This negative attitude has to do with a lack of knowledge and a negative image of the GAI.

*E6: But it's a bit like... Who watches Sálvame? Nobody watches Sálvame, but it had a super high screen share. Everybody knows it but nobody dares to say "I use it". Well, that's what it is. It is a working tool. I think there is a bit of a... what do you call it? A taboo.*

The expansion and widespread use of GAI is seen as something inevitable, to which teachers should adapt and learn to integrate it into their teaching activity and content preparation.

*E5: This is like when WhatsApp came out and some people said they were not going to use it. Well, in the end it may delay it for a while, but in the end 99% of people, including my parents, who are 80 and 72 years old, use WhatsApp. Well, the same thing is going to happen with artificial intelligence.*

#### 4.2.3. Complementing and updating content

When we delve into the specific uses of AI in their teaching tasks, we find various forms of application. One of the most prominent is to use it as a support when developing examples, specific cases to work on in practical activities and to update materials.

In some VT modalities and subjects, it is important for students to know the latest innovations in their field of study, which makes it difficult to use manuals because they become obsolete relatively quickly. In these cases, the GAI is used to review the available materials and provide the syllabus with updated information year after year.

*E13: I make all my materials with artificial intelligence. At the end I do a revision of those materials, but the AI makes them for me. Why? Because if I pick up a book.... Look, I have here: "Book of programming services and processes". It's good for me to have a guide, it's not good for me for anything else. Why? Because this is obsolete. A computer book, the day it is published it is already obsolete. Because it goes so fast that it is of no use to us. However, if I take notes using AI, I can already do that development.*

#### 4.2.4. Preparation of activities and exams

The GAI is also used to synthesize materials, evaluation criteria and the development of practical activities. The GAI provides the possibility of relating diverse contents and concepts to later prepare activities.

*E13: Because there are times when you propose a practice and if I set some objectives, but maybe the artificial intelligence sees something that I do not see or relates it, as you have talked about other things about the subject with it, it relates it to other things and links it to you and, ah, well this, look, I have not set it and it is fine, in that sense.*

GAI is also used for the preparation of exams and evaluation criteria.

*E4: And then, I have also used it a lot, although it is more secondary, for the preparation of exams. In our school, the exams have to be by regulation test type. And of course, they are done topic by topic. To do an exam, subject by subject, of subjects that are not very extensive, and every two weeks they have one, is very complicated because you don't know where to get twenty questions from. There may be twenty significant questions, because maybe I am able to get ten or twelve, but the others are blank. So, what I usually do is that from the points that I consider the most important of my syllabus, or that I think that maybe I haven't asked, or I can't think of how to ask it, then maybe I tell ChatGPT: "Look, take this text and write me three multiple choice questions, four*

*options, only one correct, where you ask about the topic".*

#### 4.2.5 Reasons for its use

The reasons for the use of the GAI are varied, among them, the lack of imagination and time to develop examples that facilitate the understanding of the theory.

*E1: I often use it, for example, to create clinical cases. Because there comes a time when I run out of imagination, I can't think of new cases. I always come up with the same four, I give them 800 turns and there comes a time when I say this is getting boring [...] Things that are very mechanical and that maybe it will take me 40 minutes to think of 25 examples, I don't know, and then I have like 5.*

The specific nature of some subjects and their necessary applied aspect also hinders the development of content by teachers, pointing to the difficulty of finding specific resources for some VT subjects.

*E6: Note that on history, geography and art history there are millions of activities. But for modules that are semi-labor... Domestic cleaning. You say, how can I prepare a curious or entertaining activity*

*where the cleaning materials, the broom and the mop are something didactic? You put didactic activity on this and it raises several activities in a quick way.*

For this same reason, due to the specific nature of some topics, teachers rely on the GAI to complement their knowledge.

*E4: Actually, I've definitely used it most for generating tasks for students. In my case, I teach clinical laboratory and pathological anatomy in vocational training, so that's students, mainly clinical laboratory students. Clinical laboratory students are very focused on what a hospital laboratory is and all the tests that are carried out. Of course, the set of parameter tests and so on is enormous. So, I've never worked in a clinic, although I know the parameters and I know the theory behind things, I don't know the values, I don't know what's normal and what's not, I don't know... Okay, so I say, no, well, it turns out that the blood values are X, right? But I don't know if an abnormal value would be X plus one or X plus a thousand. I don't know what would actually be normal. So, for me, approaching it that way is very difficult.*

#### 4.2.6. Limited and supervised use

It should be noted that the teachers interviewed do not use GAI for all tasks, each one uses it in different specific cases, nor are all the uses described above integrated every day, only one or two. However, a growing use of GAI to automate a large part of teaching tasks has been detected.

*E13: I do the whole process. I do everything from planning, creating materials, creating examples and proofreading. In other words, I use it for absolutely everything.*

The automation of tasks with GAI implies the necessary collaboration between technology and the professional judgment of the teacher. The use of GAI in many cases saves time, but there is also the need to ensure that the information obtained is correct and follows the teacher's expert judgment. For this reason, teachers stress the need to correct and review the materials developed with GAI.

*E4: My experience with ChatGPT is that it is not perfect. Because at the end you have to do a lot of editing of those results, but it is a very good start to begin to elaborate in a simple and very fast way your activities and your exams.*

#### 4.2.7. Critical Perspective: Teaching Expertise

The need to take into account and prioritize the teachers' expert criteria is the main challenge that GAI implies for its use among teachers. Maintaining this expert and pedagogical criterion is the main reluctance and risk identified.

The need to enhance the value of teaching work, the expertise needed to develop good materials and to be able to guide students in the most relevant issues are concerns of teachers when part of their tasks are automated.

*E15: When I prepare an exam I think a lot about the questions. Because I don't just try to determine whether the student has understood or not, whether or not he has the knowledge that the program says he should have. [...] The way I ask is also related to what I have explained and how I have explained it. Because I know how I have explained things and I know, beyond what the text says, that I have been able to have a critical view of that content. Then, when I transmit this information, I also say: "Well, the book says this, but look, what it is really telling you is this, or the main message is over there, or the objective of all this is that you learn how to do this". And all of that, of course, I take into account when I take a test.*

The use of GAI in many cases saves time, but there is also the need to ensure that the information obtained is correct and follows the teacher's expert judgment.

*I think there is a risk of losing all those elements that you know are also part of education and that, in an exam done in such an aseptic way, maybe we are not picking up.*

In VT teaching, the process of accompanying students in their learning also has to do with the professional experience of the teachers, not only their theoretical knowledge.

*E15: I say this in the sense of the added value that can be provided by the fact that someone is a professional, in this case, me. I can't say anything about others. But in my case, what the professional can contribute is his analysis through his knowledge and experience. I think that, in some way, we lose that or there is a risk of losing it.*

## 4.3. Perception of the uses of AI among students

### 4.3.1. Perception of a generalized and indiscriminate use of the GAI among students

Teachers perceive that the use of the GAI is very widespread among students when they have to do homework, exercises and activities at home. Moreover, it is perceived that this use is done indiscriminately, that is, without having a critical criterion to know when it is necessary to use it and when it is not.

*E2: They are young, they use ChatGPT, but they don't really know how to take full advantage of ChatGPT, nor do they know how many artificial intelligences there are, what they are for, how to use them, how to manage them, in which areas they can be used and in which areas they can't [...]. A teenager is not going to use artificial intelligence in the moments when he needs it, but he is going to rely on it for everything. And what that creates is that he will not really be able to progress*

## The main reason that teachers consider that explains the widespread use of GAI to do homework outside of school and school hours is what they call "lack of motivation".

*in things that he has been dragging along since secondary school.*

*E13: If you assign homework, ChatGPT will do the homework, they will give you homework that ChatGPT has done, and you will correct ChatGPT.*

*anything else. But what you did was to choose from those 10 articles the best one, cut that piece and paste it. Even to do that, you had to read those 10 articles. Now, you don't even have to read those 10 or 3 articles. [...] Damn, you don't have to do anything, man!*

Despite the fact that students have always searched for information by their own means, and have done work by copying content from various sources, it is considered that the indiscriminate use of GAI aggravates the consequences of this type of dynamics. While that the traditional "copy and paste" required a search, previous reading and selection, the use of GAI eliminates this research process.

*E15: Before, you had to read 3, 4, 5 or 10 articles and, from there, make your own "summary". Of course, now you don't even have to do that. You don't even have to read. I mean, with Google, with the, let's say, classic search, you could do a "cut and paste" and that's it, without adding*

### 4.3.2. Lack of student motivation

The main reason that teachers consider that explains the widespread use of GAI to do homework outside of school and school hours is what they call "lack of motivation".

*E6: We start with adolescents who have little motivation, they do not have a computer at home and they personally have no interest or need to look for information to do a job, because they are not going to do the job from the start.*

However, as it appears in this verbatim, the issues behind the heading "low motivation" or "lack of

motivation" are very diverse, and account for relevant problems in VT identified by teachers.

One of these issues has to do with the lack of interest of students in the vocational training they are studying, which they choose not because of the contents or professional insertion it offers them, but for other reasons. In the case of Basic or Intermediate Vocational Training, one of the main reasons is having had previous problems in the educational system, and the insistence of the families that they continue studying.

*E12: Unfortunately, some have also fallen into vocational training as an alternative to other studies because they did not do well at the beginning. In that itinerary they fit in, but I believe that most of them do not come with an idea of where they are going to go, we are going to give it to them.*

*E10: I think the younger ones are not even motivated. They are directly forced to continue studying and then they see what courses are available in their area, in their city, and they decide. And in fact there is a lot of dropout in the first months, especially in this profile. Or you see that they go to class and they don't care, they go because they feel obliged to go.*

This reason does not apply to higher vocational training. Despite the fact that in some higher

vocational training cycles there are students who are not attributed with this lack of interest in learning, the motivation problems are associated with the fact that the students' expectations are different from what they find when they begin their vocational training studies.

*E13: You usually meet people who like video games [in a Computer Science degree]. And you think they're going to program video games. When they see the reality, especially when they arrive in the morning, they realize that's not the case. The problem they have is that they're not going to program video games. They have quite complicated subjects.*

Lack of motivation is also associated with the difficulty of incorporating young people into the labor market, so that vocational training studies are undertaken in order to continue studying, and not so much for the contents or the professional incorporation that they make possible.

*E5: Contrary to what most people think, although I teach at a higher level, not all my students come because they want to learn, as most people think. I do have students who do, but more than half of the class are studying at a higher level because they have to do something. They are not allowed to stay at home playing, and they don't feel like entering the workforce either.*

*E10: Do you know that there are some students who are eternal students? He has started to study one cycle, then he studies another, then he studies another. And he studies not what he wants, but what is available in the school. Because it's not that they want to study to get a job, it's that they don't want to work, I think, and they want to study. So they study all the cycles available in the school where they are.*

### 4.3.3. Lack of digital skills

A key issue to highlight, closely related to the uses of GAI students in VT, is that teachers feel that there is a lack of digital skills at many levels.

On the one hand, it is considered that students do not have sufficient digital skills. There is a contradiction in the fact that we talk about the fact that we are in the digital era and then young people do not know how to use programs or devices that are required by the education system. Often in vocational training it is taken for granted that young people are familiar with digital technologies, but then in the classroom it is seen that this is not the case. Although young people regularly use social networks or other programs for leisure, they have not always developed the skills to use those digital tools required by the education system or the labor market (such as Word or Excel).

*E4: What I have experienced as a teacher is that we are in the era of digitization and we have taken for granted that children who arrive now have lived with digitization, have lived with computers, with the Internet, with cell phones, which for them is something very normal. I think we have been a little guilty of assuming that, because we know how to use a platform to send homework or send messages to students, students will also easily know how to use that platform to access notifications or complete tasks, etc.*

It is also considered that students do not have sufficient knowledge and training to use a critical perspective or to discriminate the information they find on the Internet.

*E15: The improvement in access to information that I mentioned before has not been accompanied by an improvement in the analysis of that information.*

Students often do not have the tools to distinguish reliable sources of information from unreliable sources. In this sense, teachers emphasize the need to promote digital knowledge that allows them to develop this critical and selective capacity, to identify good sources and the information necessary for their professional development.

*E1: I almost ended up wasting more time correcting what they found on random websites or even on TikTok.*

On the other hand, this lack of digital skills among students is also associated with a lack of skills among families, thus perpetuating the digital divide. This particularly affects the support that families can provide for their children's use of the GAI, as well as the relationship between the schools and the families.

*E6: Of the 20 students, three have repeated. Of the 20, I have only communicated with one mother by email. She is an administrative worker who works with computers, finds it easier, and, from what I can see and understand, is financially stable. This means she has access to a computer. As for the rest, I know perfectly well that the mothers and fathers do not have a computer at home. Neither do the children.*

Finally, there is also a lack of digital skills among teachers, to be able to use these technologies on a daily basis and to promote a more responsible use among students. It is complex to keep up to date with the use of different platforms and systems, including AI. Despite the existence of specific training on technologies for teachers, it is considered relevant to balance the need to integrate digital competencies and enhance the

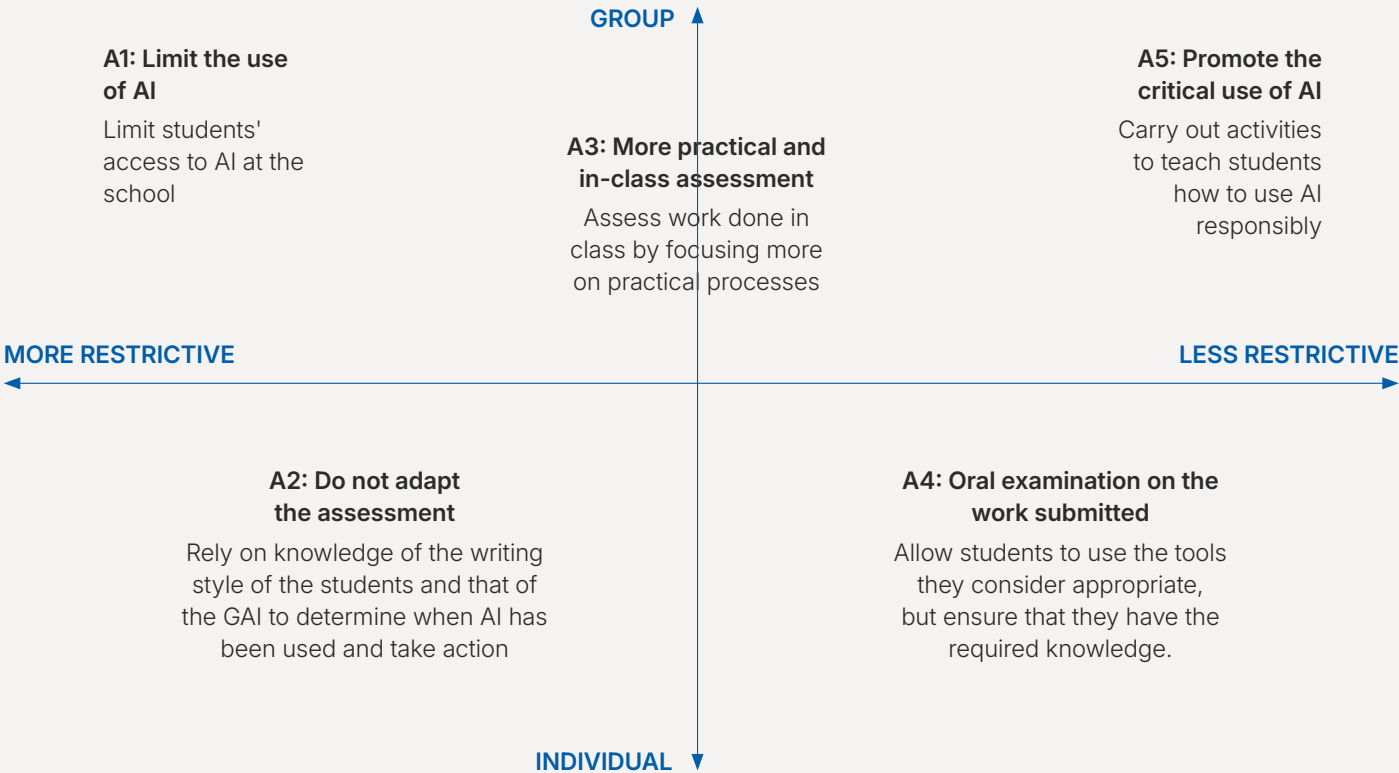
critical capacity on digital technologies. Initiatives that include not only the ability to use digital tools, but also provide strategies to transmit to students critical thinking about when and how it is relevant to use AI. In this way, teachers will be able to guide students in understanding the limits and ethical applications of these technologies, promoting a critical and responsible use.

*E5: Yesterday in my school they gave us a list of courses to enroll in and I requested one on artificial intelligence. Because I want to know more about this topic and the students use it to obtain information about the work we ask them to do more quickly. But I am convinced that there is a lack of training for teachers.*

#### 4.3.4. Risks of GAI for students

Teachers are concerned about the development of students' skills and competencies due to the widespread and indiscriminate use of the GAI. By delegating the performance of tasks to the GAI, there is concern that young people are not acquiring the tools and skills necessary to complete their training and subsequently integrate into the labor market. In this sense, a symptom of this risk is already being observed by teachers in the students' ability to answer practical exercises in exams.

Figure 1. Options for adapting the assessment to the GAI



*E13: I tell the AI to do it for me, I don't know what it's doing. What happens? They don't have AI in the exam. And that's when the problems start. And that's when they realize, as happened to me last year, that if they've just been telling it [the GAI tools] how to do it, when the time comes for them to code it, they don't know how.*

On the other hand, this type of technology also aggravates previously existing problems, such as plagiarism of content found online, both from scientific articles and from unreliable sources.

4.3.5. Main challenges for evaluation

One of the main concerns of teachers since the advent of GAI at the end of 2022 and its widespread use by students is the issue of assessment.

*E4: It is seen a lot, since the students, many of them do not have a sufficient level to reach, perhaps, university. And you only have to look at the way they write, the spelling mistakes, the expressions they use. And suddenly a magnificent and wonderful text appears, which often ends up saying: "in summary", and begins to summarize the whole previous answer. That's when you really get them.*

The issue of evaluation is very controversial and there is no consensus on how to deal with it. From the interviews conducted with teachers, a series of possible options have been identified, based on two axes: (a) according to the level of restriction exercised by teachers to avoid the use of these technologies and; (b) according to whether the different adaptations involve a collective approach or leave the decision of whether to use AI or not to an individual level.

It is pointed out that in many schools the number of people dedicated to providing guidance to students is very small in comparison with the large number of students, which makes personal accompaniment and careful follow-up difficult.

These options are not mutually exclusive and, in many cases, teachers consider the simultaneous inclusion of several of them.

personal accompaniment and careful follow-up difficult.

*E13: Estimate that we have two counselors for every thousand students. That is to say, the academic guidance provided by the counselor is very limited. In the end, it is the tutor who provides the most guidance.*

## 4.4. Student guidance

### 4.4.1. Lack of resources to ensure good guidance and facilitate educational transitions

The teaching staff considers that there are problems in VT with the guidance received by the students. It is considered that there is a low availability of resources and services for the guidance of students. On the one hand, it is pointed out that in many schools the number of people dedicated to providing guidance to students is very small in comparison with the large number of students, which makes

Sometimes, in addition to the low number of guidance counselors, the fact that they are located in time slots that are not easily accessible to vocational training students is also a problem. In schools offering different levels of training, it is common for guidance services to be available only in the morning, while many training courses are given in the afternoon.

*E10: The truth is that I have mainly worked in the afternoons, and the guidance counselor is the one who is usually there in the mornings.*

## One of the reasons given is that the guidance task of the schools does not have updated resources on job opportunities and options for students.

Whether due to the insufficient presence of these services, timetables or other issues, according to teachers, VT students do not make use of guidance services of their own free will.

*E13: It was the tutor, or a teacher who spoke to the tutor, who determined that a student should be sent to counseling. But a student is not going to ask to go to counseling because they feel a bit stigmatized, so they avoid it. And then in the case of higher-level vocational training, there is no counseling whatsoever.*

In some cases, students arrive at VT after having gone through guidance services to help them make decisions about their training itineraries. As mentioned above, in the section on student

motivations and expectations, it is sometimes considered that students have not received good guidance. One of the reasons given is that the guidance task of the schools does not have updated resources on job opportunities and options for students, as well as a general lack of knowledge about the specific functioning of vocational training.

*E4: This year we did have the case of a student who came from a high school specializing in the arts, I think. And the truth is that it has been quite a rare case, since she has always wanted to be a nurse, but apparently, from what she has told us, the school guidance she has had since she was little has not been adequate, and in fact she did a high school degree in arts because it was recommended to her despite her wanting to study nursing [...]. What I thought was, my mother is a nurse by profession, but she did a high school degree in arts, she studied Latin and so on, because at the time, in her day, it was apparently very easy to do a high school degree in arts and then go on to a scientific career without any problems. Well, it occurred to me that maybe the guidance counselor who worked with her or the people who guided her had that mentality of the time or are not aware of the changes that have taken place or the competitiveness*

It is the teachers who in many cases assume the responsibility of advising and guiding the student to make the right decisions about his or her educational pathway.

*that exists today, and maybe they recommended that to her thinking that it would be more beneficial, easier, when in reality it wasn't going to benefit her at all.*

Many of the tasks of providing support and guidance fall directly on the teachers and tutors. It is the teachers who in many cases assume the responsibility of advising and guiding the student to make the right decisions about his or her educational pathway and the labor market outlets. However, this is usually done informally, outside of official tasks, so that many teachers do not have adequate resources or specific information to perform this guidance and accompaniment function.

*E15: I am talking about emergencies, for example, guidance is a bit implicit. There are different types of techniques depending on the specific workplace where the student will develop his/her work.*

#### 4.4.2. Role of AI in educational guidance and transitions

When teachers have been asked about the role that AI can play in counteracting these gaps, they agree that they do not know what to think about it. While they say that it can be part of an initial search by the student, the teacher or the counselor, they agree that the task of guidance should go further, both in contrasting other sources of data and in asking people with whom they can empathize. In this regard, they consider personal contact to be of great importance.

*E13: When it comes to something that will affect their future, they prefer it to be one person, someone who is knowledgeable and whom they consider to be knowledgeable in the area.*

### 4.5. Conclusions

Although the emergence of AI in VT is a relatively recent phenomenon, it is already acquiring great

relevance by redefining the way in which the teaching-learning process is carried out, and its uses are very widespread among teachers and students. Its irruption poses challenges that affect the entire educational community, generating new dynamics in teaching and learning.

Firstly, there is a tendency for teachers to relinquish their expert judgment in pedagogical decision-making as the development of materials and activities is automated through AI. Although many of the tasks described as being automated are routine, it is clear that issues in which the professional and critical judgment of teachers can play an important role are being delegated. In response to this, some teachers are opposed to its use, arguing that they should be able to showcase their own work.

Secondly, teachers interpret that the low motivation of students and their limited digital skills push students to use AI in an uncritical way. They consider that some students have little interest in learning, see tasks as mere formalities and lack work routines that foster the development of competencies. In addition, they perceive that students have difficulties in searching for reliable information, distinguishing valid sources and dealing critically with the contents found. This combination of factors causes, according to teachers, a delegation to GAI technologies to carry out work, without a process of analysis or understanding of the content generated.

There is a tendency for teachers to relinquish their expert judgment in pedagogical decision-making as the development of materials and activities is automated through AI.

Likewise, the AI phenomenon is perceived as a modernization of the traditional "copy and paste". Although some teachers are concerned about the elimination of even the minimal research component previously required by this practice -such as reading and selecting sources-, others do not see AI as a danger, precisely because they are used to dealing with similar situations of plagiarism or external assistance in papers.

In relation to the adaptation of evaluation methods, diverse approaches are detected, ranging from strong control to more flexible proposals oriented to critical learning. In this

## The AI phenomenon is perceived as a modernization of the traditional "copy and paste".

regard, the importance of teaching students to use AI in a critical and reflective way, designing activities that encourage the identification of its limitations and responsible use is highlighted.

Finally, serious difficulties are identified in student guidance. The scarcity of resources, the limited availability of guidance counselors and the perception that the counseling received is not always adequate cause mismatches in the students' educational expectations. In addition, a large part of the guidance task falls informally on teachers, who assume this responsibility without the necessary support. There is reluctance to automate this guidance task, emphasizing the value of personalization and empathetic accompaniment in this process.

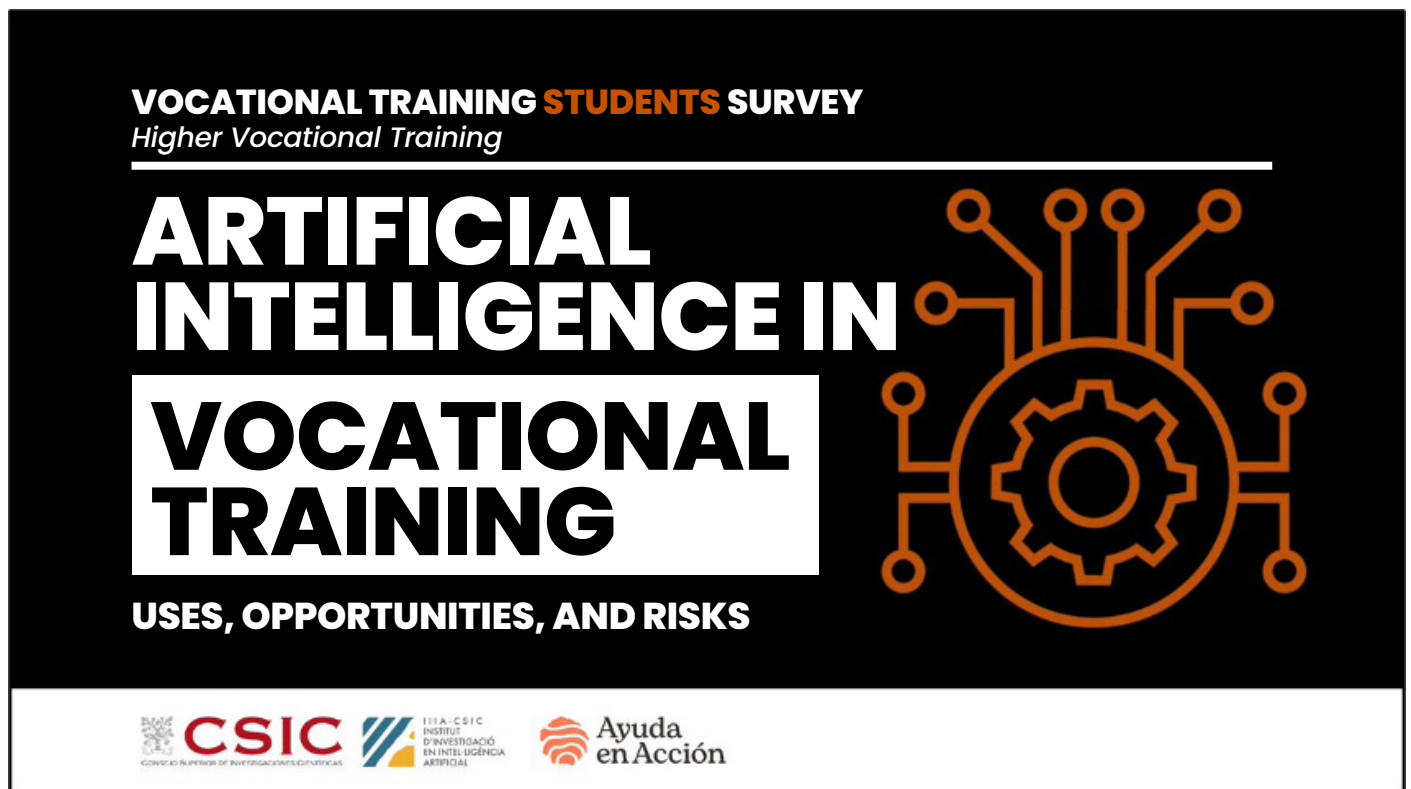
# PHASE III:

## USES OF IA AMONG STUDENTS

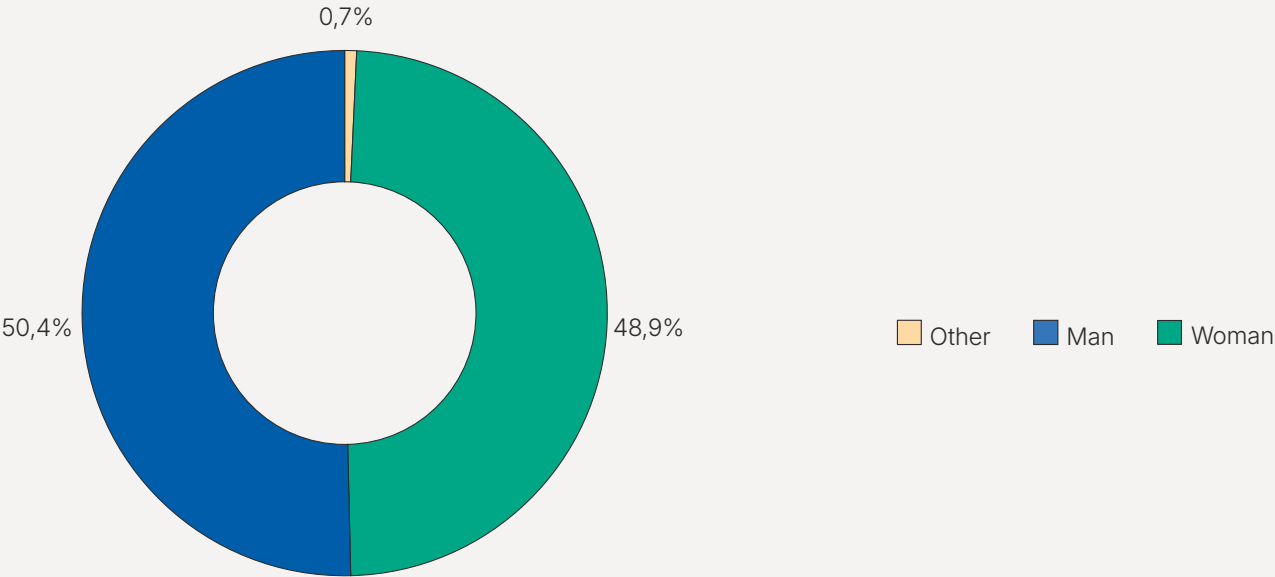


## 5. Survey of HVT students

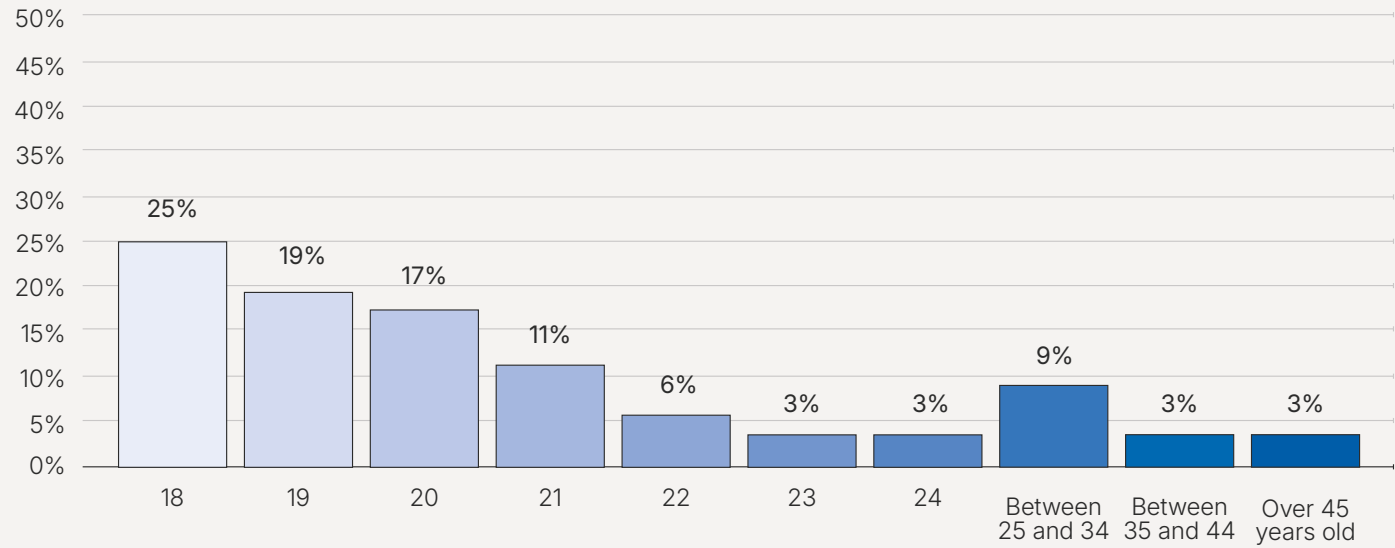
An online survey has been distributed to students of Higher Level Vocational Training. A total of **549 HVT students** have answered the survey.



Graph 1. Gender (%)



Graph 2. Age groups (%)



## 5.1. Description of the response sample

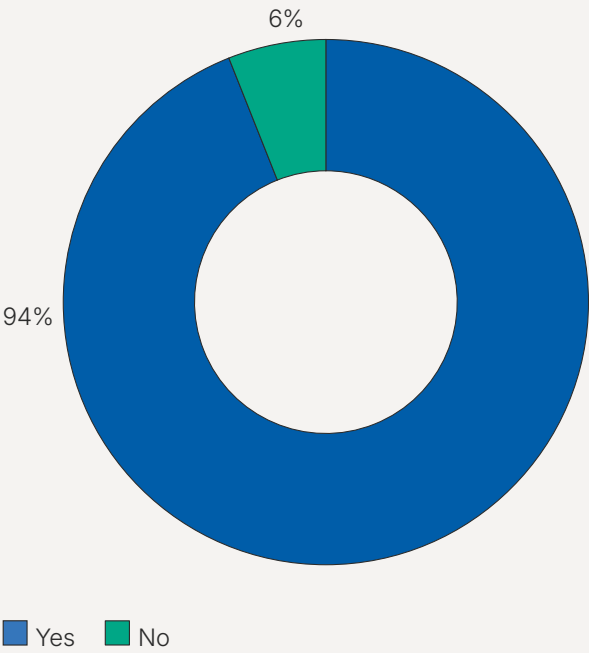
Women accounted for 48.9% of the responses and men for 50.4% (graph 1).

Most of these students are between 18 and 22 years of age (78% of the responses) (graph 2).

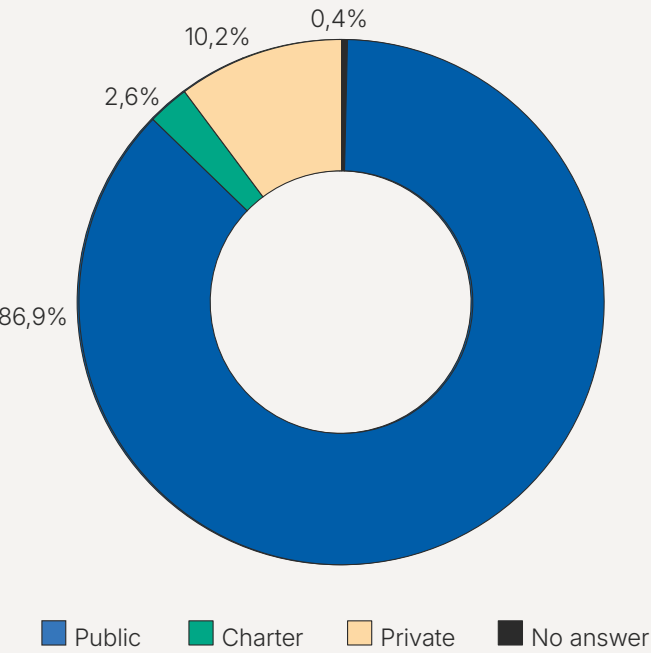
The vast majority of respondents (94%) have their own computer (graph 3).

Of those who responded to the survey, 89% are enrolled in vocational training programs at public institutions, 10.2% at private institutions, and 2.5% at charter schools (gráfico 4).

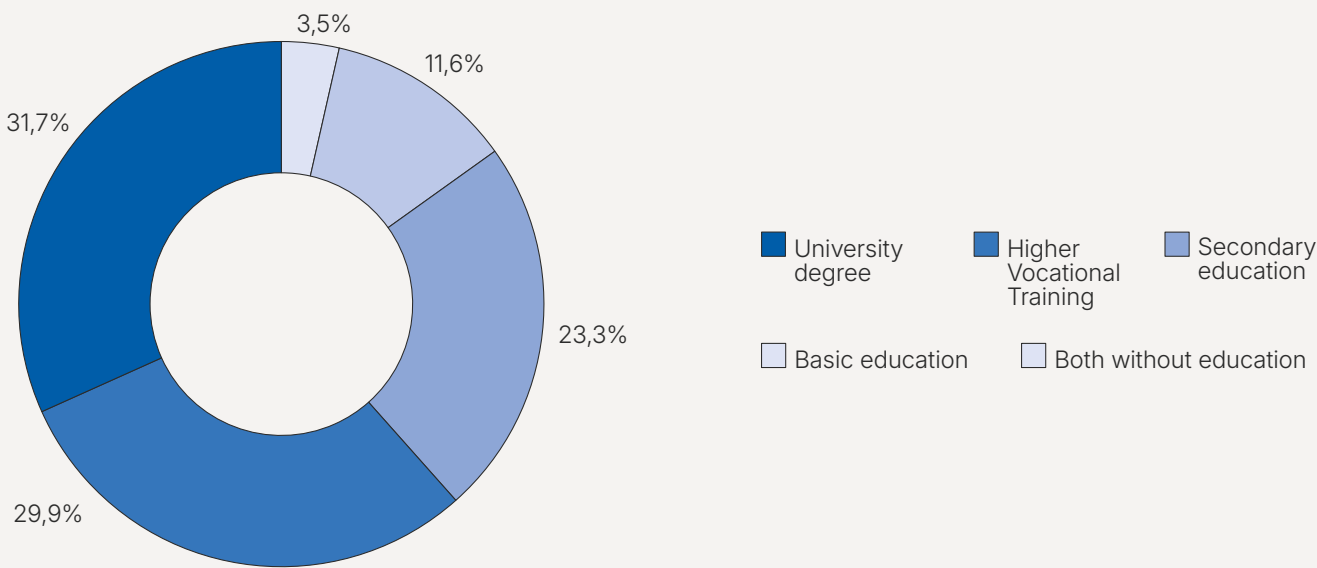
Graph 3. Availability of computer for own use (%)



Graph 4. School type



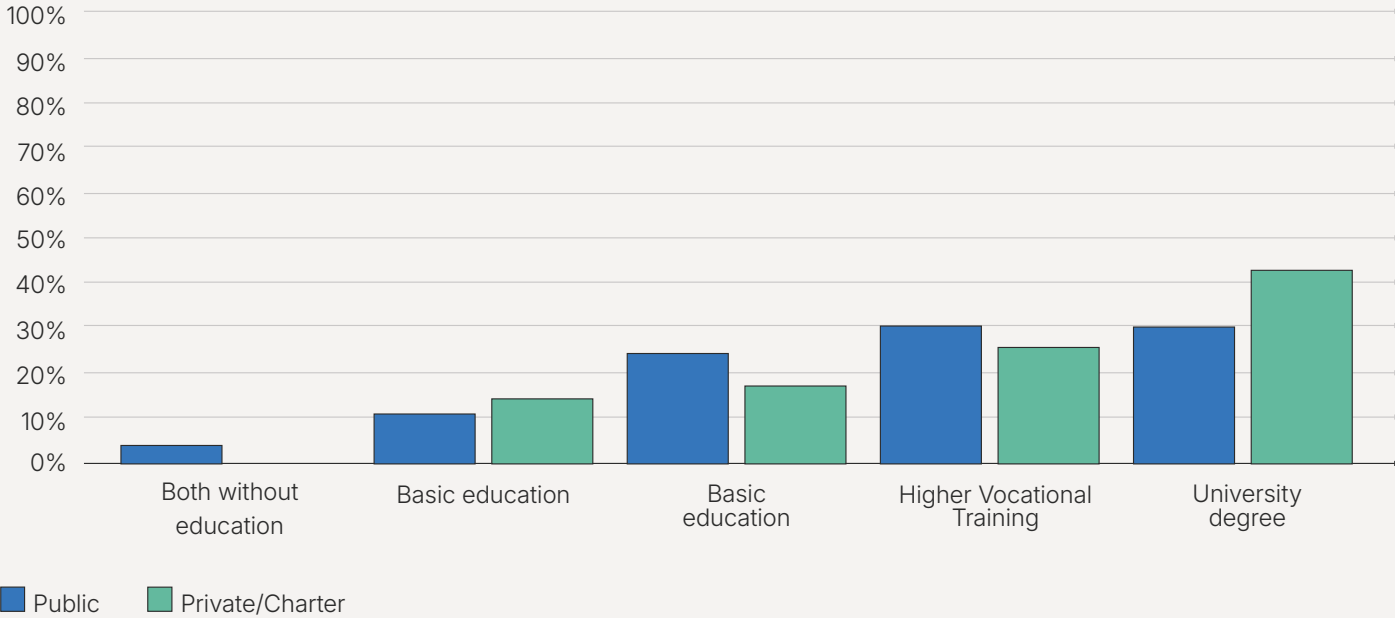
Graph 5. Family educational level (maximum level attained by one of the parents) (%)



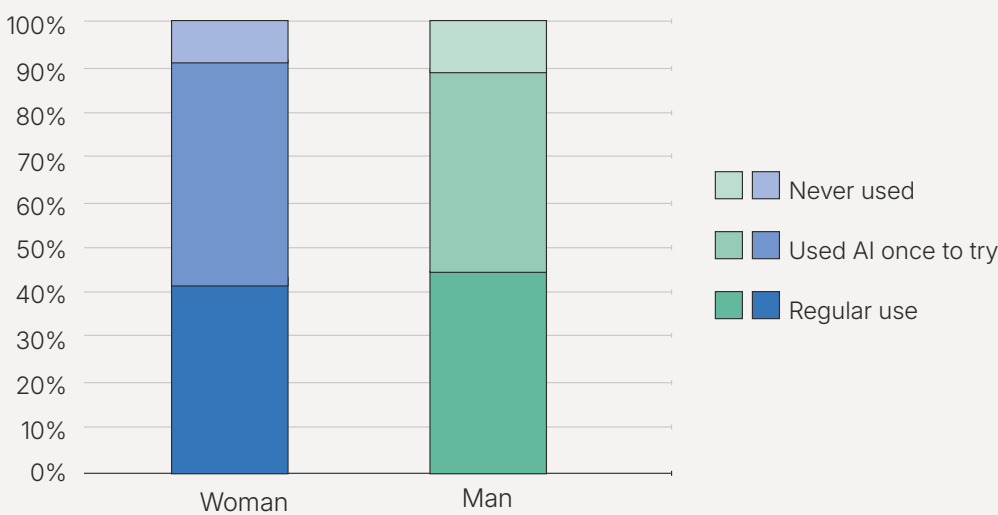
Regarding the family context, for 3.5% of respondents, both parents have no education, for 11.6% the highest level attained by one of the parents is basic education, for 23.3% secondary education or intermediate vocational training, for 29.9% higher vocational training and for 31.7% university studies (graph 5).

89% are enrolled in vocational training programs at public institutions.

Graph 6. School type by family educational level



Graph 7. Use of AI among students, by gender



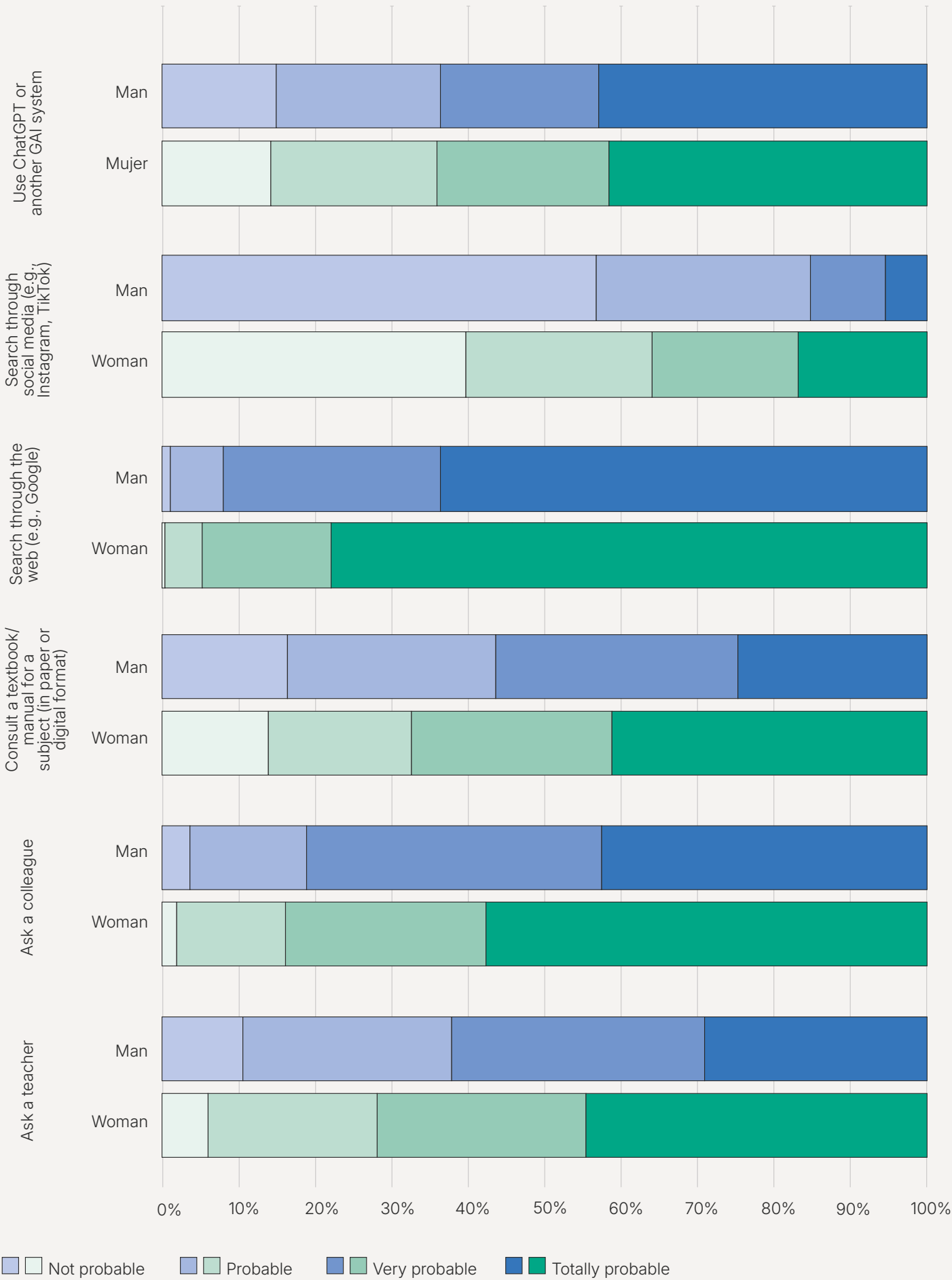
With the exception of basic education, public schools have a greater number of students whose parents have less than a university education. However, while in public schools the number of students surveyed from families in which one of the parents has university studies represents 30.1%, in private/charter schools this value reaches 42.9% (graph 6).

Of those who have used AI, 43% say they use it frequently, 46.5% say they have used it at some point to try it out, but not regularly, and 10% have never used it (graph 7).

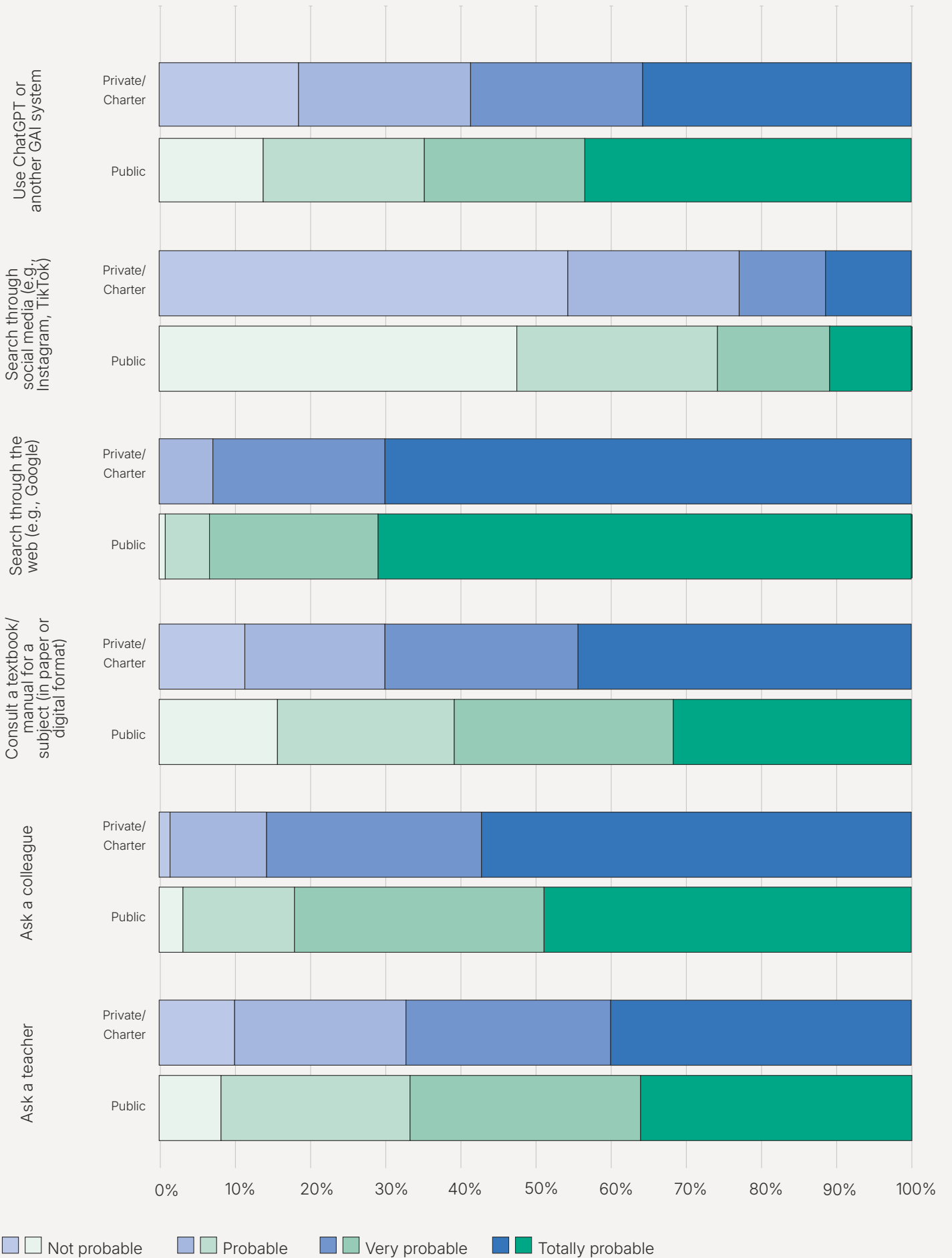
## 5.2. Use of various resources to prepare assignments

More than 60% of the students surveyed consider it very likely or very likely (scores higher than 7 on a scale of 1 to 10) to use ChatGPT or other GAI systems to prepare an assignment. However, students prefer to make use of resources such as traditional web search engines like Google (more than 90% consider their use totally probable or very probable) or

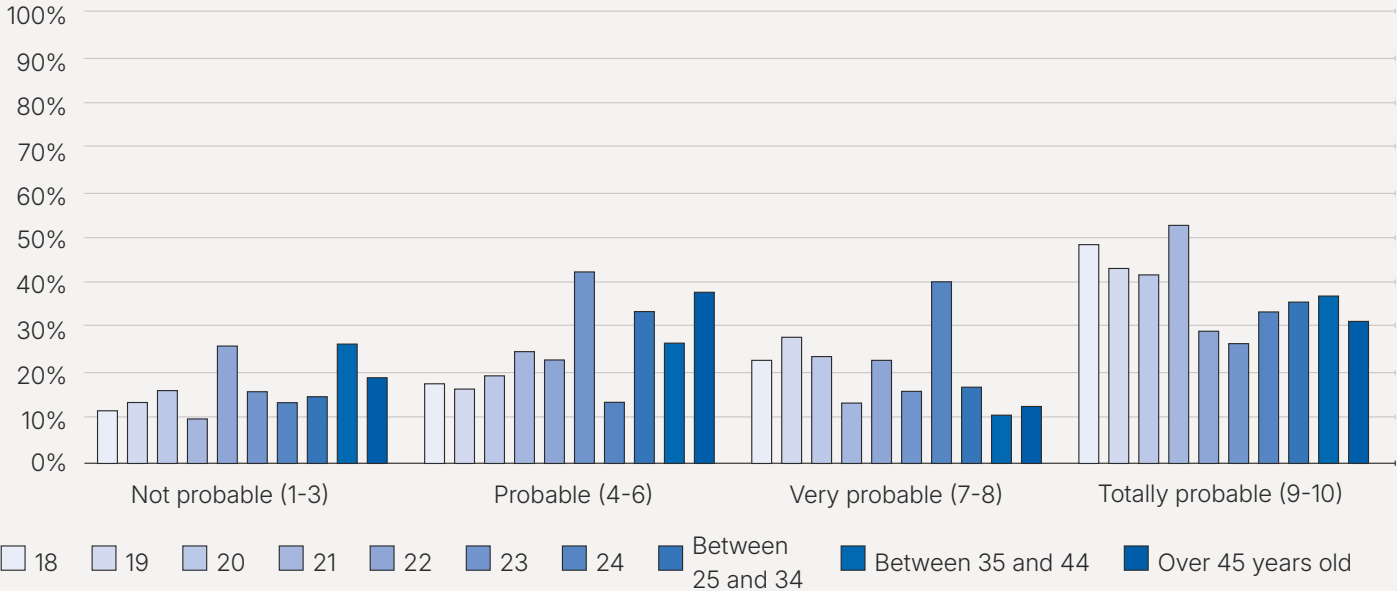
Graph 8. Mark on a scale of 1 to 10 how likely you are to use the following resources when preparing a paper, by gender



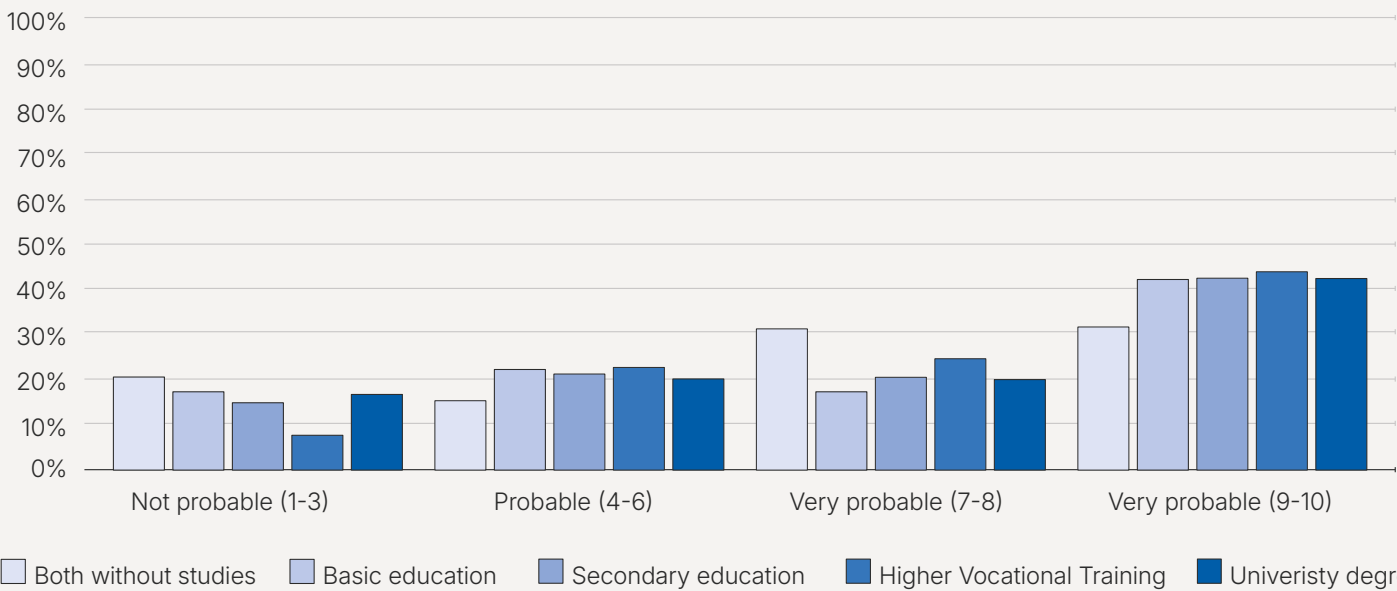
Graph 9. Mark from 1 to 10 how likely you are to use the following resources when preparing an assignment, by school type



Graph 10. Rate from 1 to 10 how likely you are to use ChatGPT or other GAI systems when preparing a paper, by age group



Graph 11. Rate from 1 to 10 how likely you are to use ChatGPT or other GAI systems when preparing a job, by parents' educational level

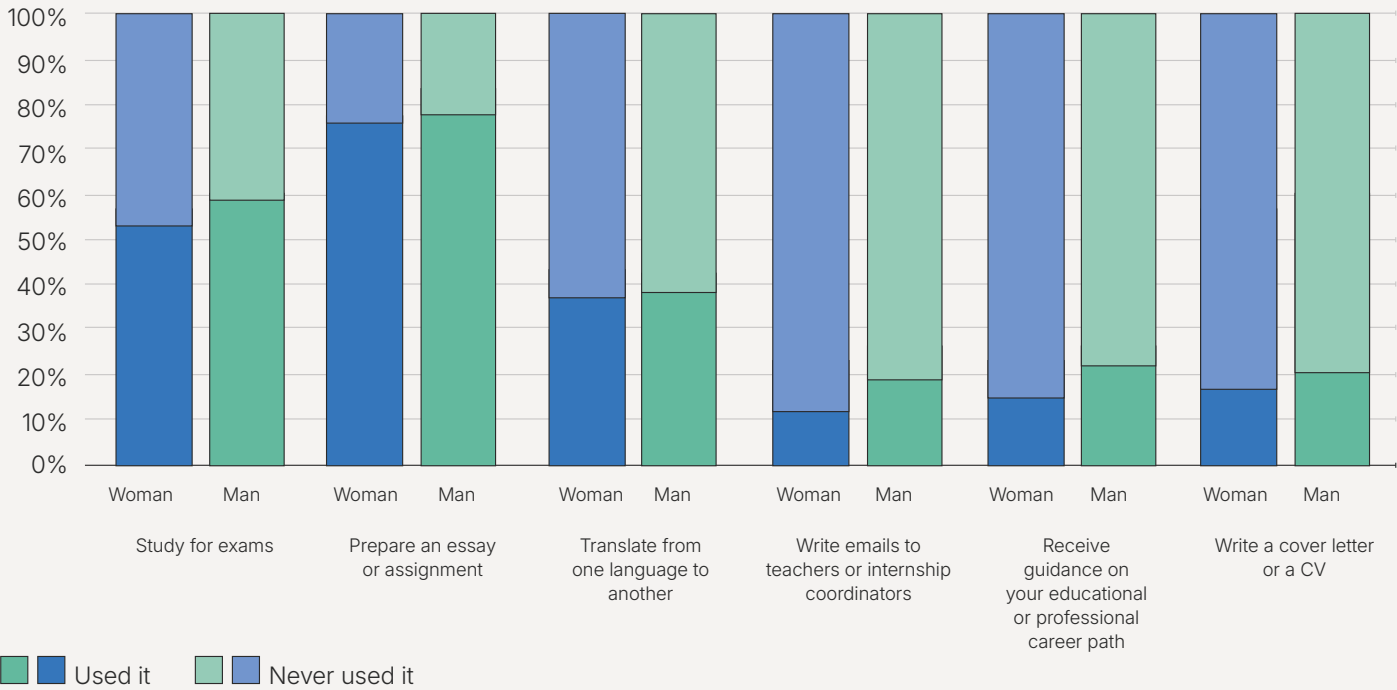


ask a classmate (more than 80% consider their use totally probable or very probable) (graph 8).

When analyzing the probability of using different resources to prepare an assignment, according to the school type, slight differences can be observed. Respondents from private or charter schools have a greater propensity to resort to the help of classmates (57% with values of 9 or 10 in private/charter schools compared to 48.8% in public schools) and to the help of books or manuals (44.3% with values of 9 or 10

in private/ charter schools compared to 31.7% in public schools). However, this trend is reversed among students in public schools, where they are slightly more likely to use GAI (43.4% take values of 9 and 10 compared to 35.7% in private/ charter schools) (graph 9).

Graph 12. Uses of AI by task (yes/no), by gender



### 5.3. Probability of using GAI to prepare assignments

There are significant differences in the uses of AI to prepare assignments depending on the age of the students. Younger students (18-22 years old) are more likely to use AI to prepare a paper (graph 10).

Although there are no statistically significant differences, there is a slight difference between those whose parents have no education and the rest of the students. Specifically, it can be seen that this group is less willing to use the GAI to prepare assignments (graph 11).

### 5.4. Use of GAI

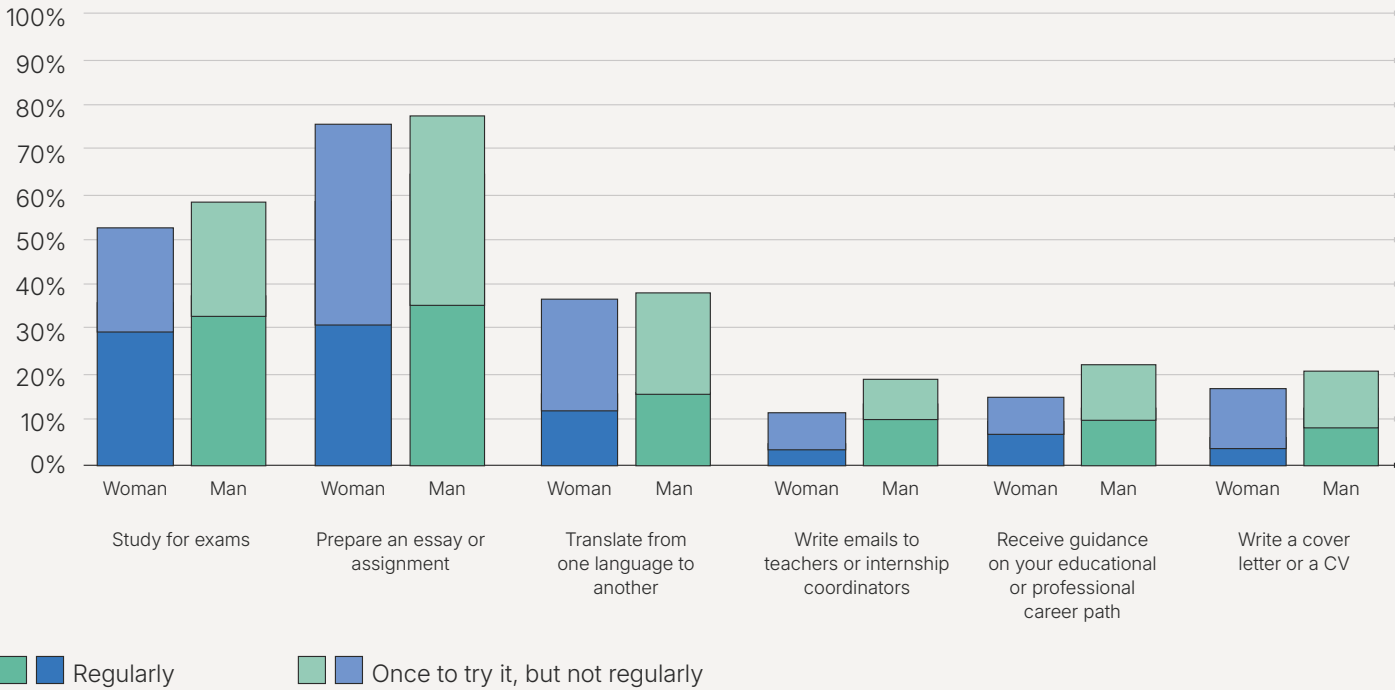
The greatest use of GAI recorded in the survey was to help prepare an essay or paper (77% of students) or to study for exams (55.7%). On the other hand, GAI was hardly used to write e-mails to professors or internship supervisors (15.6%),

to write motivation letters and CVs (18.7%) or to receive guidance on training or professional development (19.2%) (graph 12).

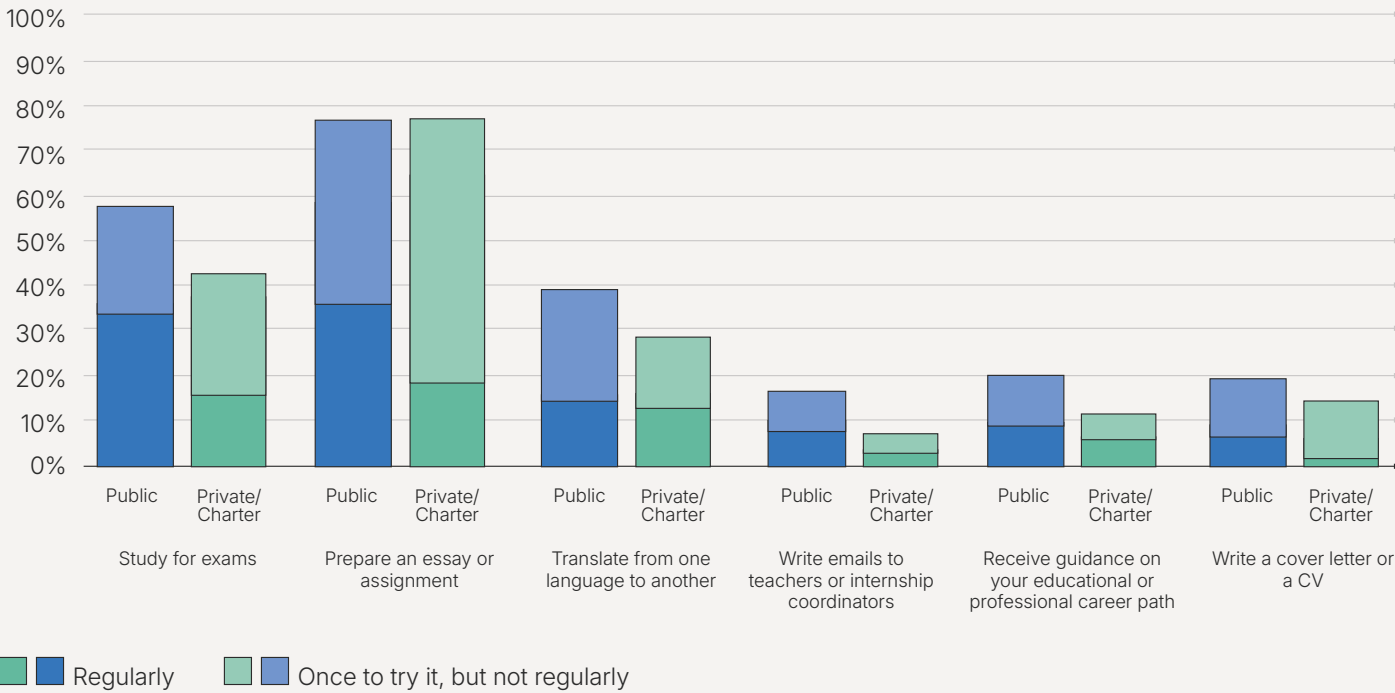
Among the students who have used the GAI, the frequency of use is very diverse. Although more than 50% of students say they have used the GAI to study for exams and more than 70% to prepare papers, only one third of students use it regularly. In the preparation of papers, for example, 44.6% of women and 41.8% of men have used it only for testing, which implies that the percentage of habitual use is much lower than the general use. Continuing with the preparation of papers and essays, 31.1% of women and 35.6% of men use GAI regularly (graph 13).

There are significant differences in the frequency of AI use between public and private/charter schools, with the frequency of use being lower in private/charter schools. While around 35% of the students surveyed in public schools reported frequent use of AI for preparing essays and papers and studying for exams, less than 20%

Graph 13. Frequency of use of GAI by task, by gender

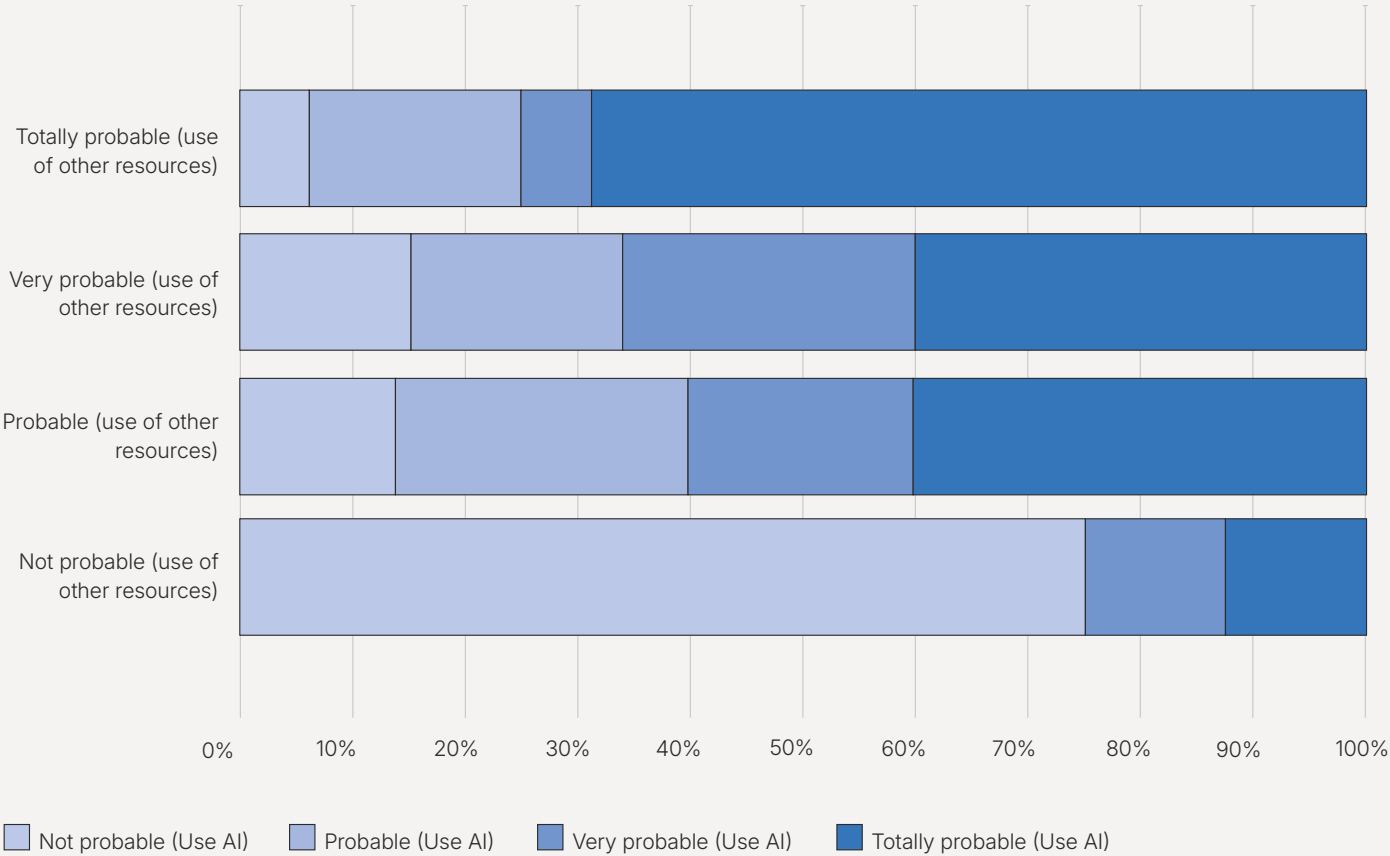


Graph 14. Frequency of GAI use by task, by school type

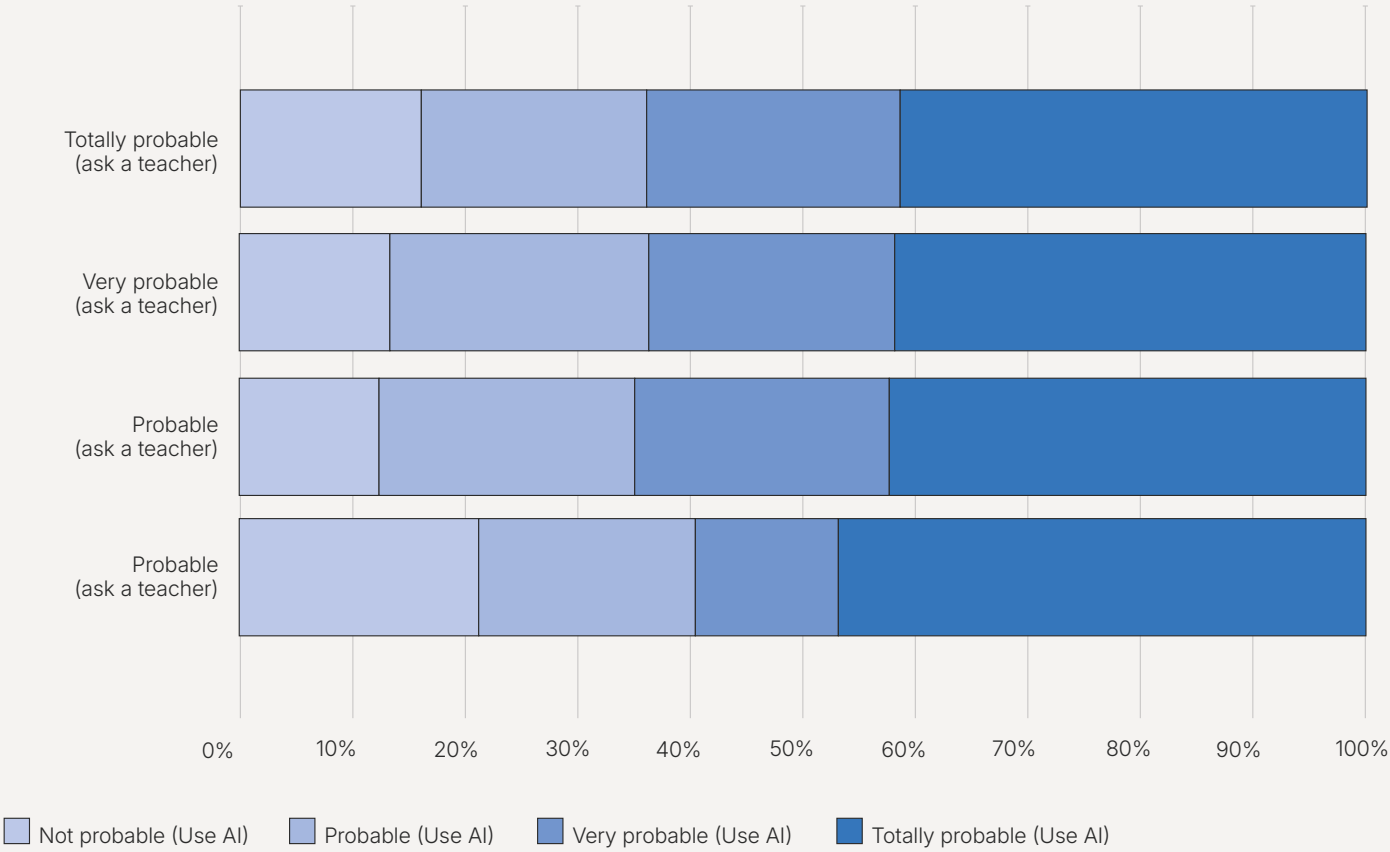


There are significant differences in the frequency of AI use between public and private/charter schools.

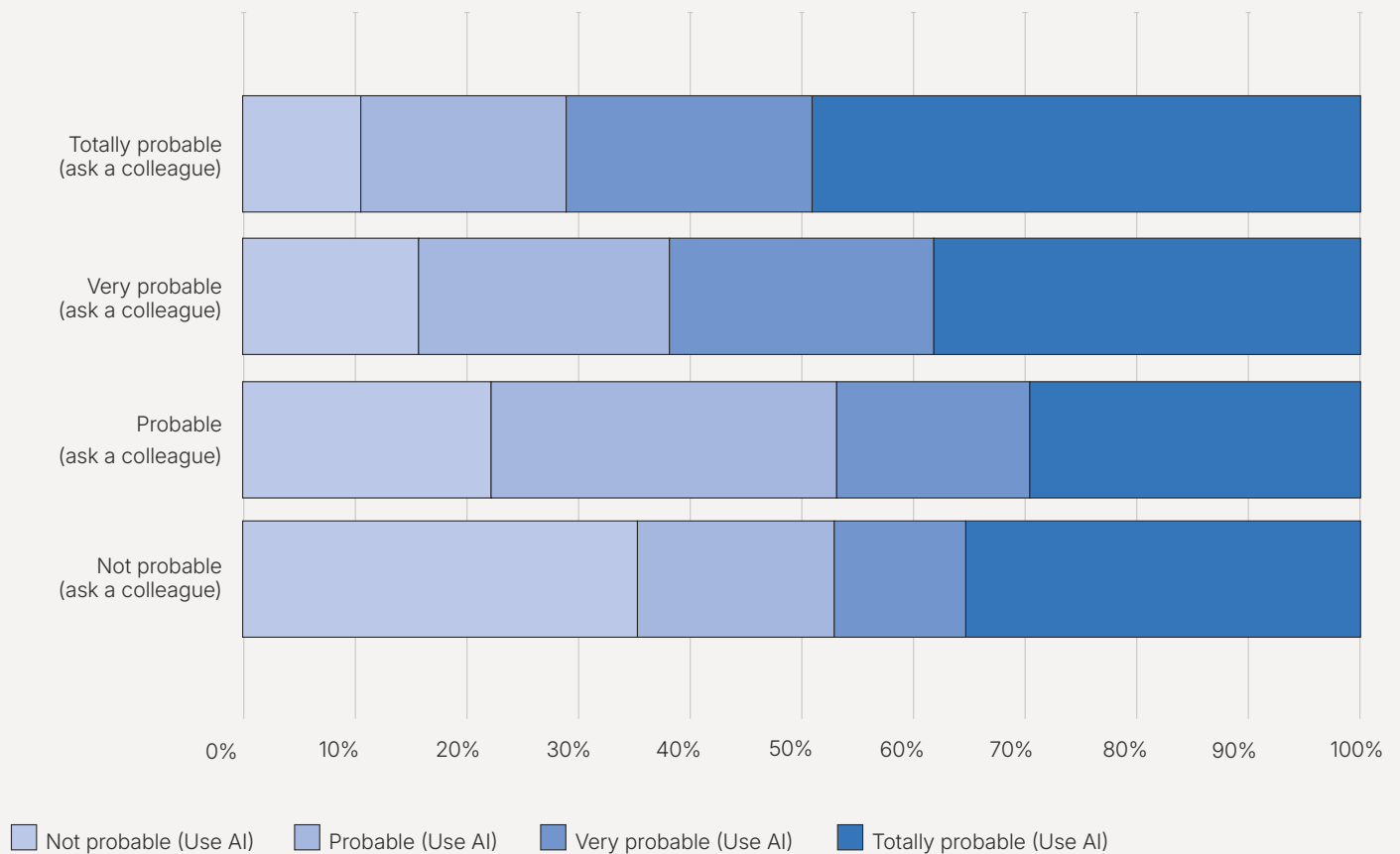
Graph 15. Probability of using AI if using other resources to do an assignment



Graph 16. Probability of using AI if you turn to teachers when doing an assignment



Graph 17. Probability that you will use AI if you rely on peers when doing an assignment



(18% and 15%, respectively) do so in private/charter schools (graph 14).

## 5.5. Probability of using the GAI for work if the student uses other resources

The greater the probability of using other resources, the greater the probability of using the GAI for work.

The variable "other resources" groups together the possibilities of resorting to teachers, peers, books/manuals, web search engines and social networks (graph 15).

The probability of using AI for those who use each of these resources is shown individually below.

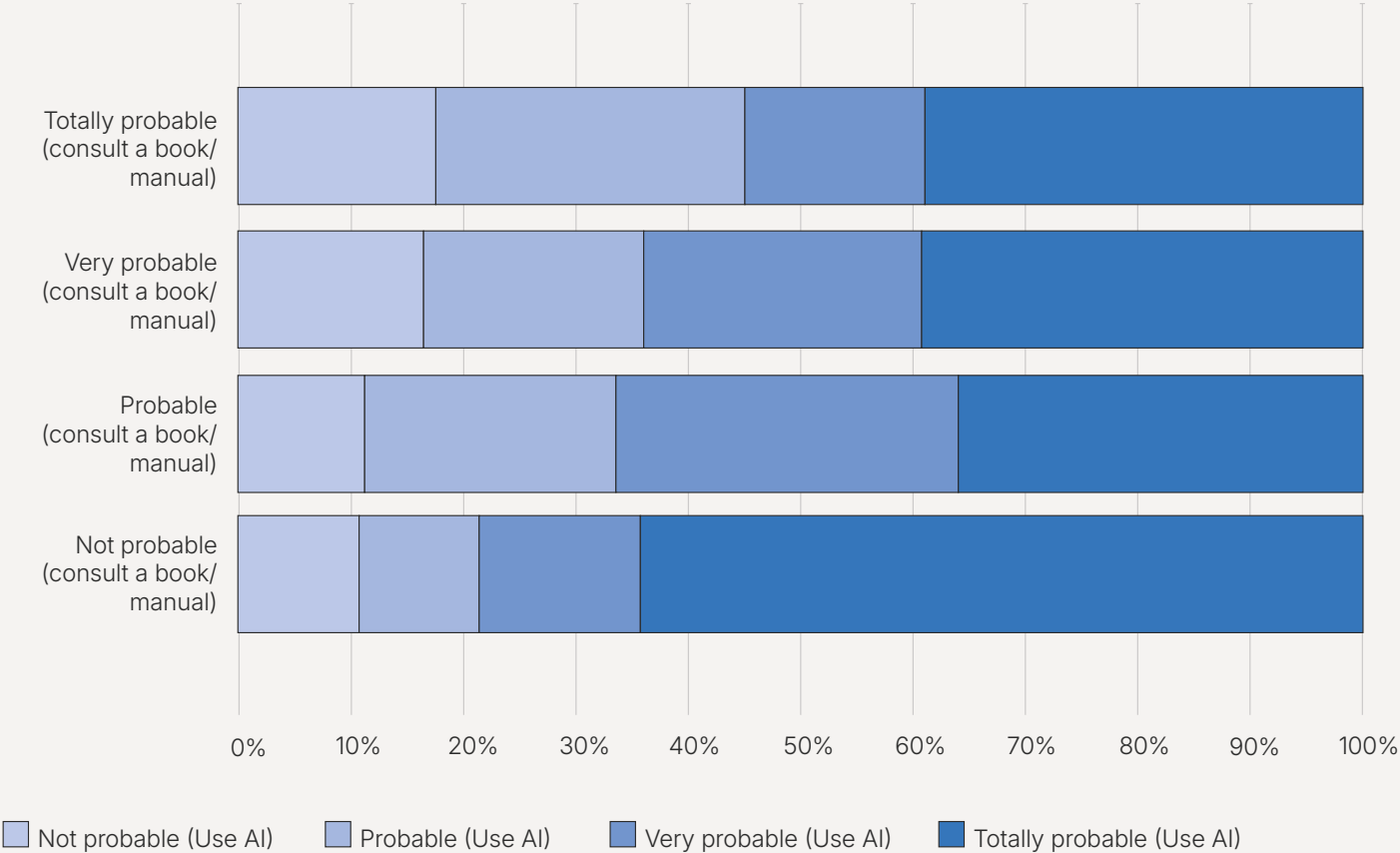
**The greater the probability of using other resources, the greater the probability of using the GAI for work.**

There is no statistically significant relationship between the probability of resorting to teachers and using AI tools (graph 16).

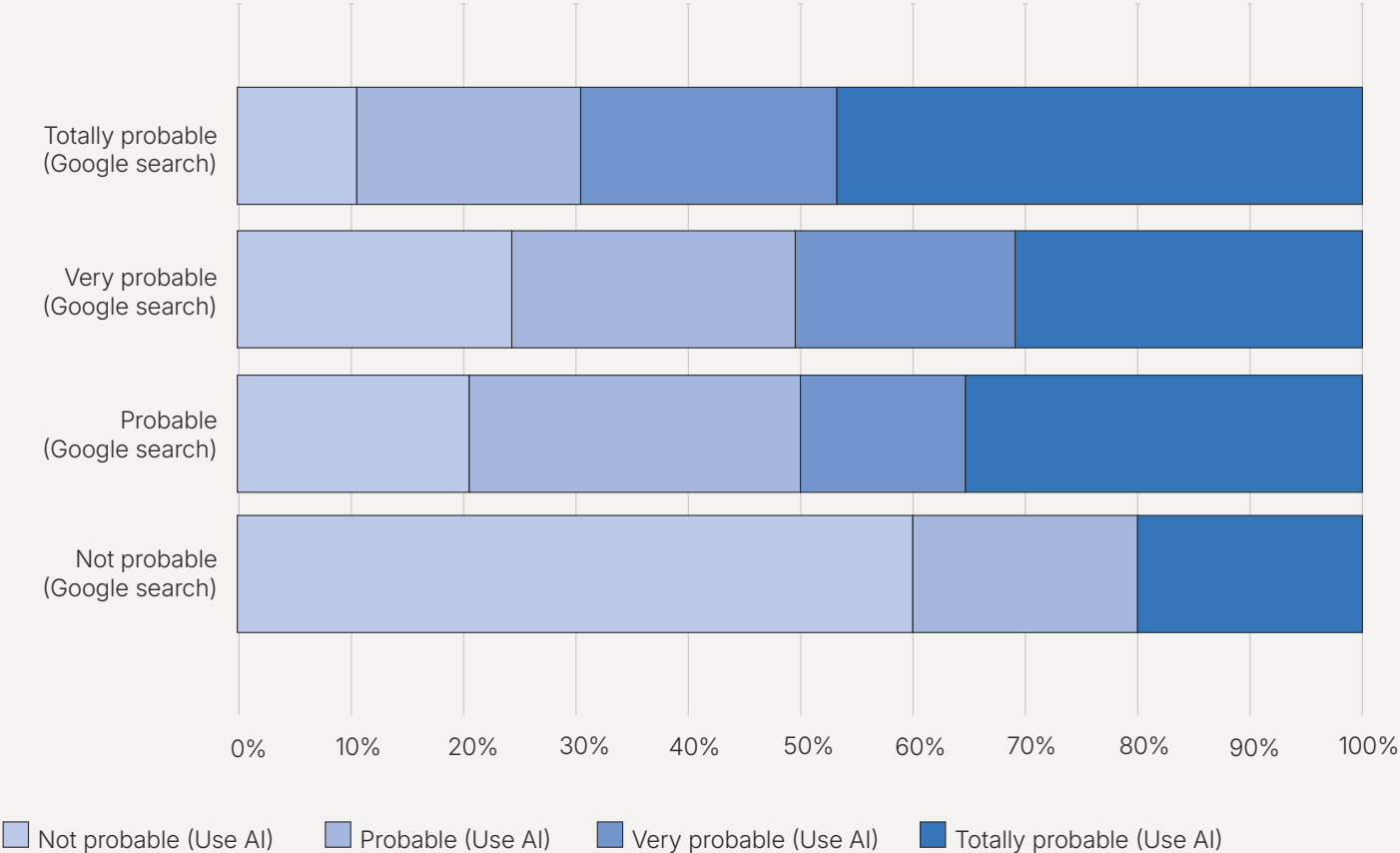
The greater the probability of resorting to peers, the greater the probability of using AI (graph 17).

The higher the probability of consulting books or manuals on the subject, the lower the probability of using AI (graph 19).

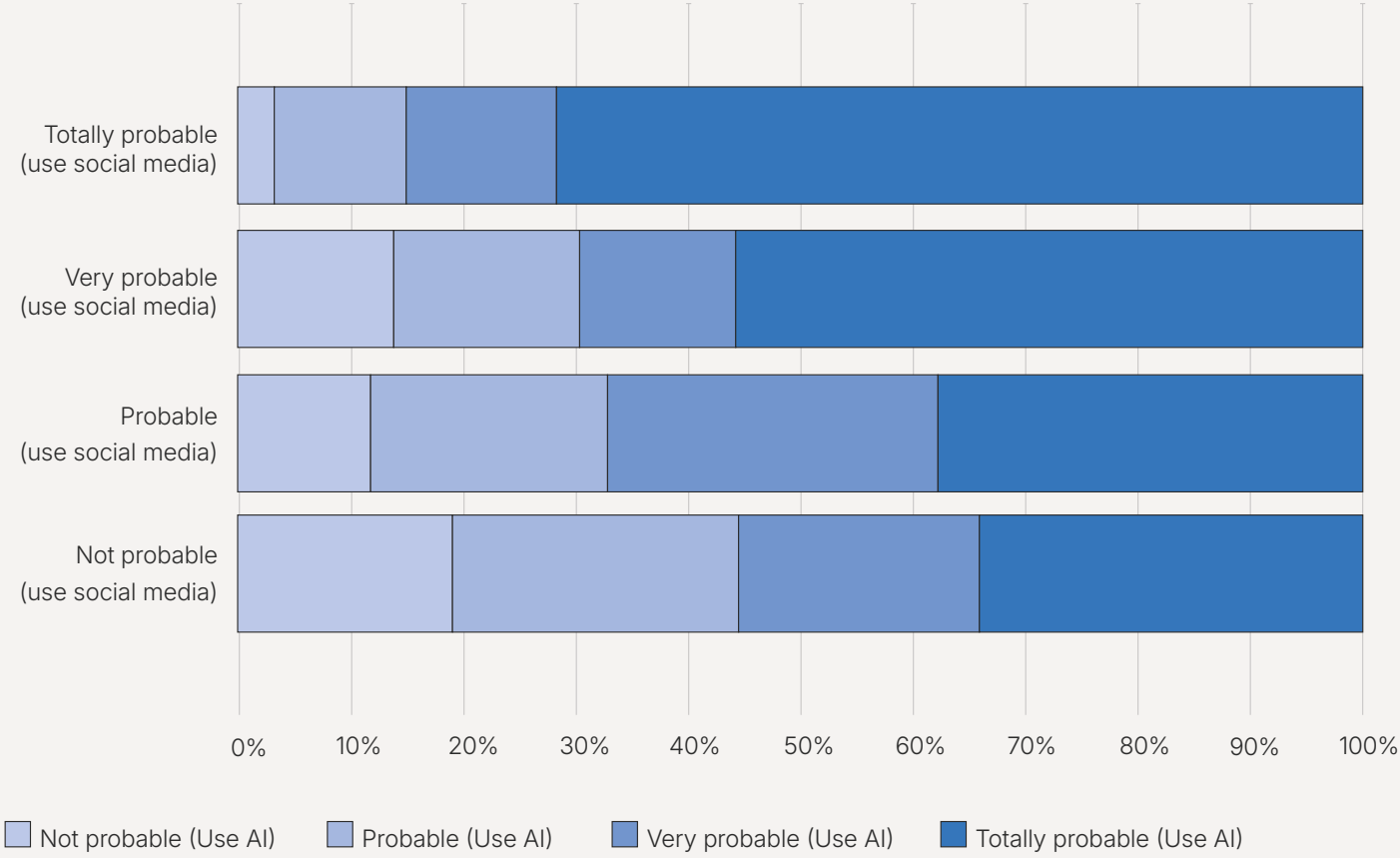
Graph 19. Probability of using AI if you rely on books or manuals when doing an assignment



Graph 20. Probability that you will use AI if you use web search engines such as Google when doing an assignment



Graph 21. Probability that you will use AI if you use social networks to do an assignment



Those who say they are more likely to use web search engines such as Google are more likely to use AI (graph 20).

Those who say they are more likely to use social networks are more likely to use AI (graph 21).

### 5.6. School information on AI

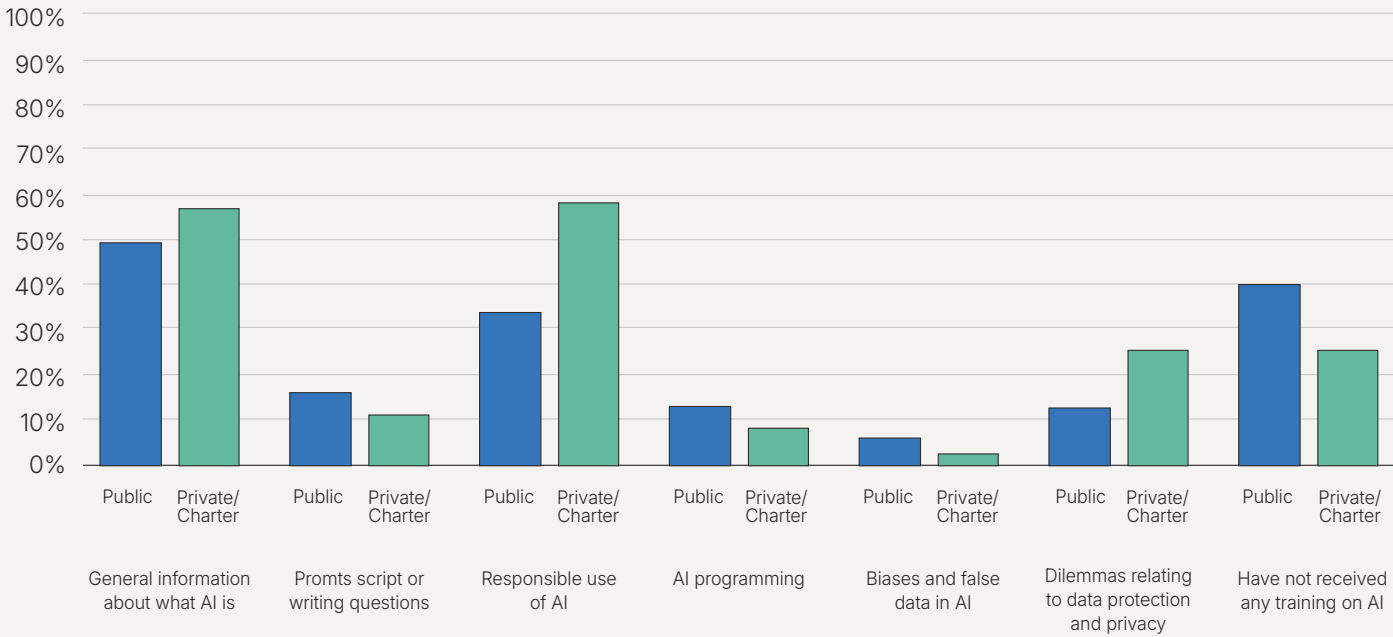
According to student responses, 61.4% of schools have provided some type of information on AI. Conversely, it is important to note that almost 40% of students (38.6%) stated that they had not received any type of training on the subject.

This information is usually on general AI issues (50%) and responsible use (37.2%). Much less training has been received on more specific

content, such as writing prompts (15.7%), dilemmas related to data protection and privacy (14.5%) or AI programming (12.5%). Work on the biases and hallucinations of AI content is in the minority (6%).

Training on AI in schools shows significant differences according to the school type, with more information being provided in private/charter schools. While 40% of the students surveyed from public schools have not received any information on AI, only 25% of students from private/charter schools say the same. Conversely, while only 34% of respondents from public schools have received training on responsible use of AI, almost 60% from private or charter schools do so (graph 22).

Graph 22. Have any of the following topics been discussed in any of your cycle classes? By school type



## 5.7. Professional guidance

The use of AI for training and career guidance is unlikely. Around 50% (48.9%) consider it not at all likely (from 1 to 3 on a scale of 10) to use it for this purpose. This score places the probability of using AI for future career or training guidance below that of the other resources. In contrast to social networks (TikTok, Instagram...), where 42% rate their probability of using them for guidance with values of 3 or lower, almost 30% of respondents would consider it very likely to use it (scores above 7).

The most frequently used option is traditional web search engines. About 75% of students say that they are very likely or completely likely (scores above 7) to use it for professional guidance.

The students' network of relationships is also very important, as shown by the high probability of asking friends (68.1% with values higher than 7), family members (67.6%) and teachers or counselors (63.9%) (graph 23).

There are differences between public and private/charter schools in the probability of consulting

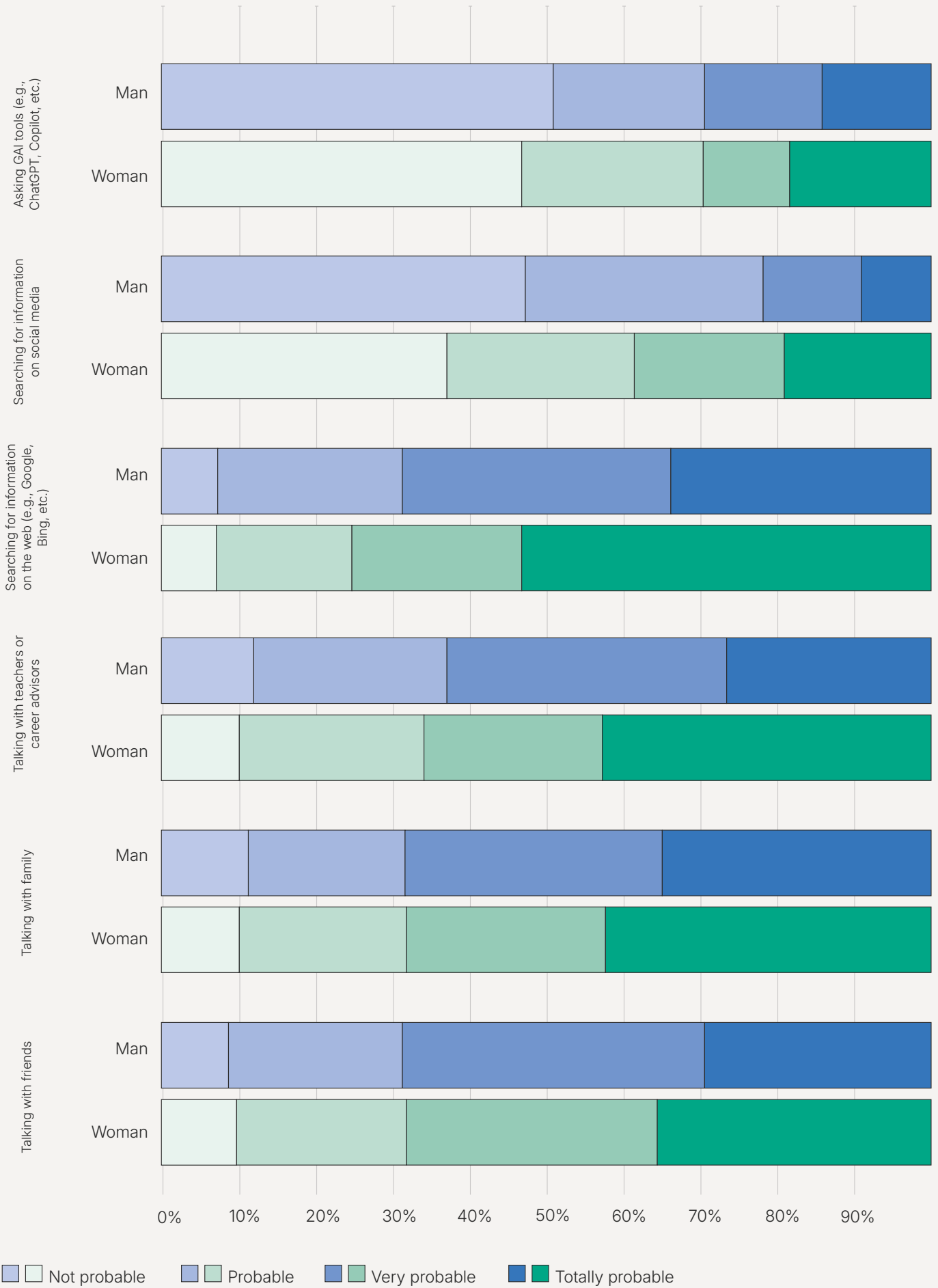
relatives for guidance. A total of 54.3% of the respondents who study in a private/charter schools consider it totally probable (values of 9 and 10) to consult their relatives, compared to 32.7% of the respondents in public schools (graph 24).

The probability of students using GAI to seek training or career guidance varies with age. Despite the fact that in the survey the probability of use received very low scores at a general level, a slight increase in use for this purpose can be seen among young people. There is also an upturn in the evaluation of its use from the age of 24 onwards, albeit somewhat in the minority (graph 25).

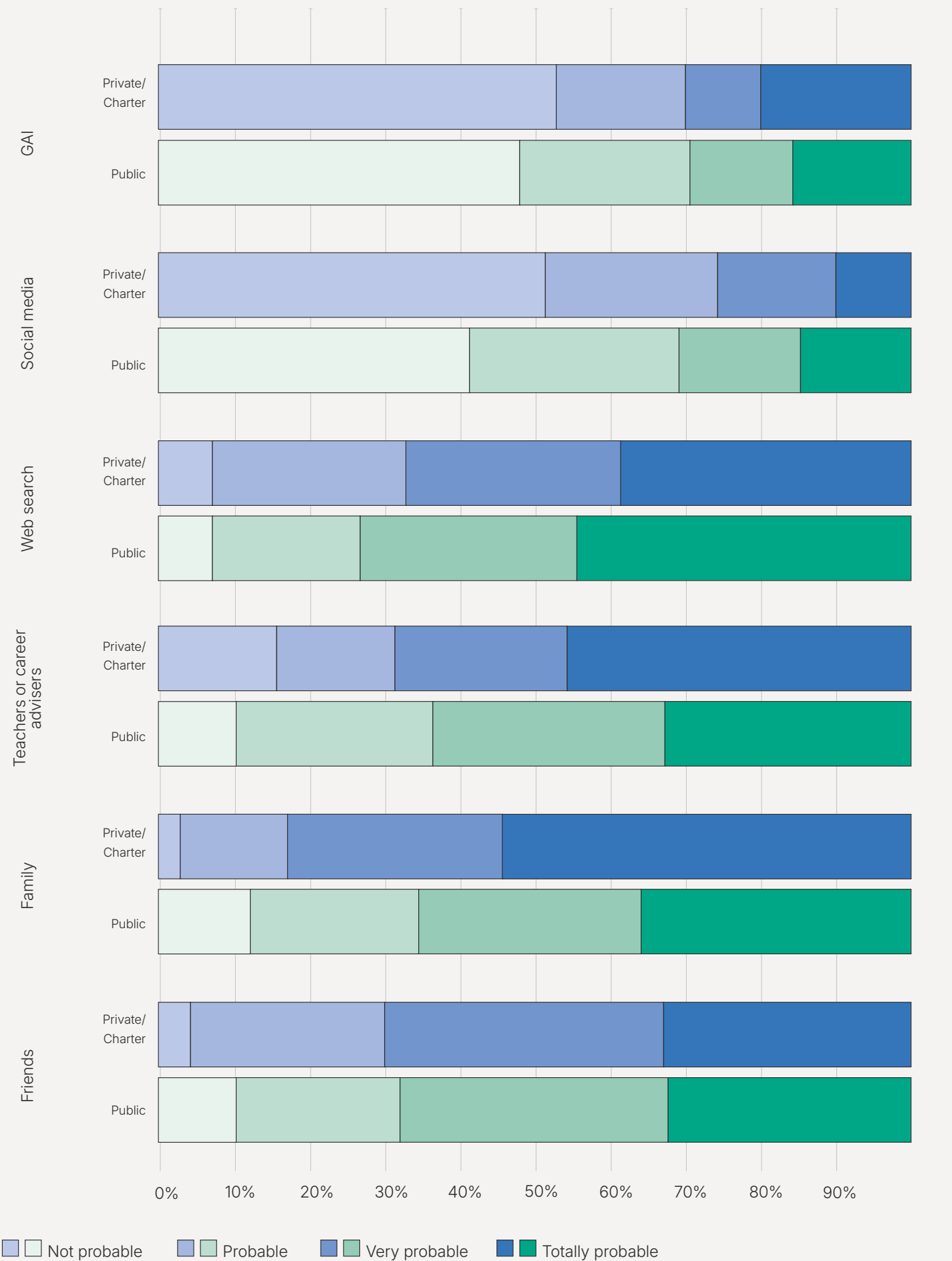
There are no statistically significant differences in the possibility of using AI tools to receive guidance from students, according to the educational level of the parents (graph 26).

Most of the students surveyed (66.2%) have not made use of the guidance services of their school, either because their school does not have them or does not know about

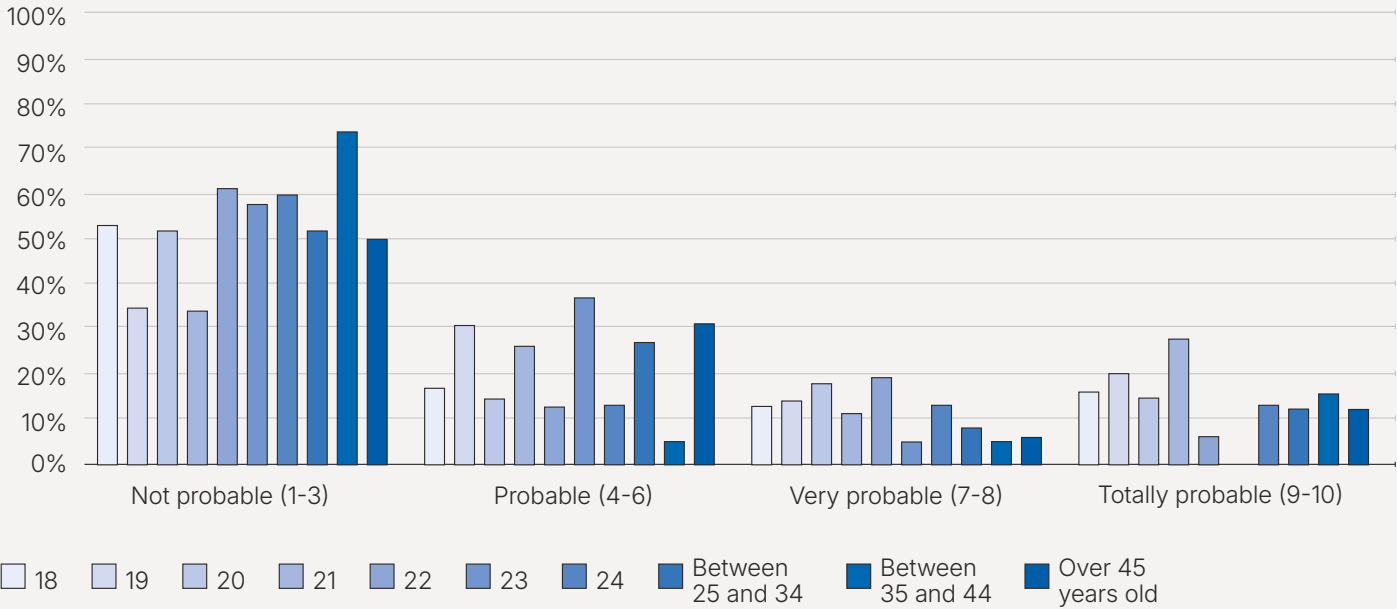
Graph 23. Mark from 1 to 10 how likely you are to seek career and training guidance in the following ways, by gender



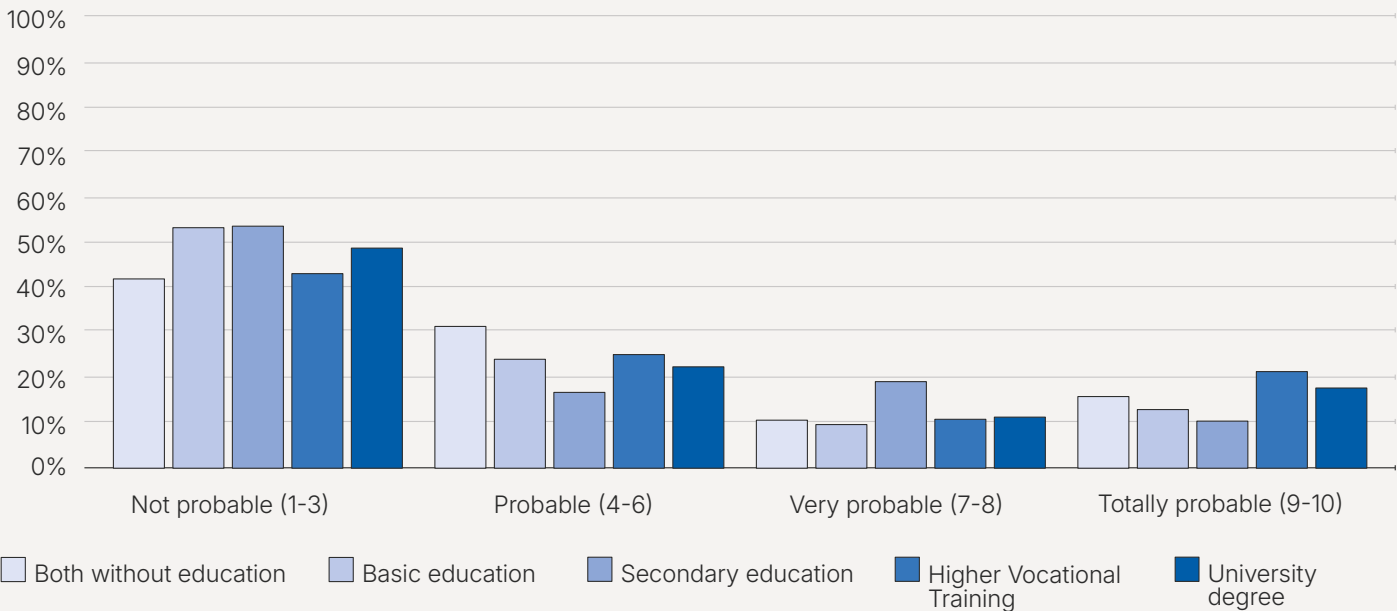
Graph 24. Mark from 1 to 10 how likely you are to seek career and training guidance in the following ways, by school type



Graph 25. Probability of using GAI for career counseling, by age group



Graph 26. Probability of using GAI for career guidance, by parents' educational level



them (28.1%) or because they consider that they do not need them (38.1%). The relationship with the school's guidance services is similar for men and women (graph 27).

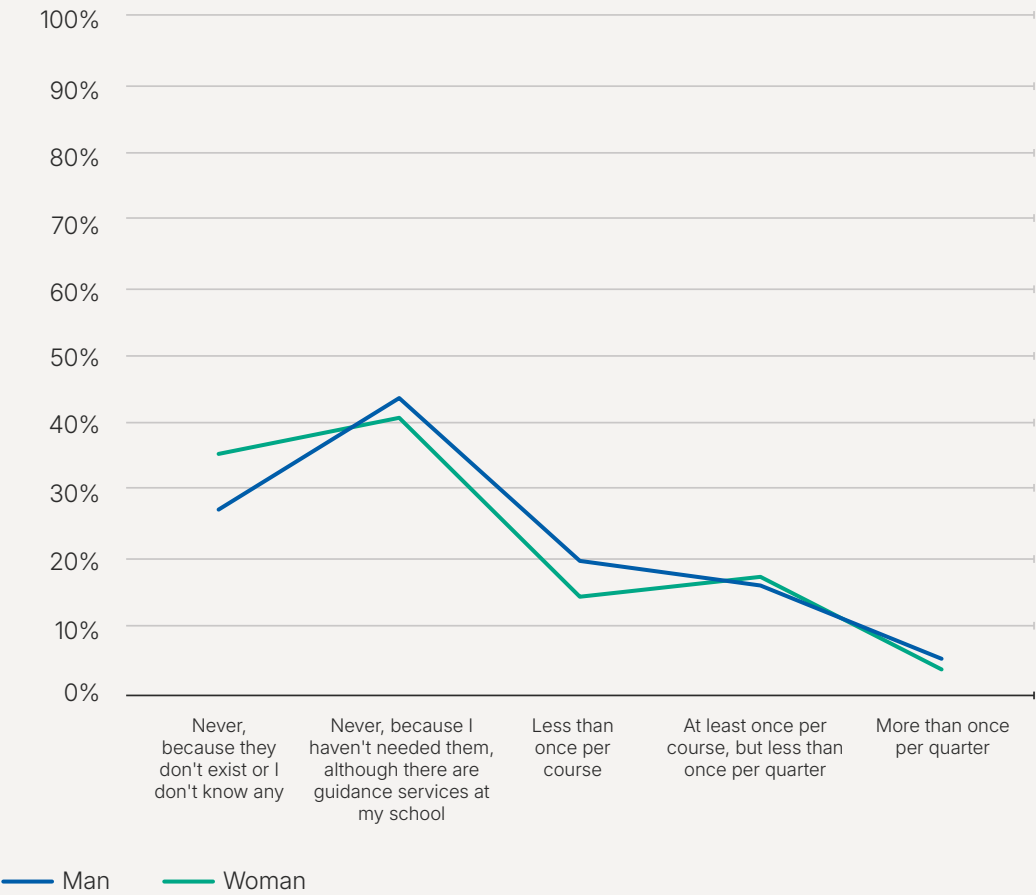
However, there are differences in relation to the use of the school's guidance services according to school type. In private/charter schools, the main reason for not making use of the guidance services is that they either do not exist or are not known by the students (47.8%). On the contrary, in public schools, students do tend to be aware of

the existence of these services, but they do not make use of them (40.3%) (graph 28).

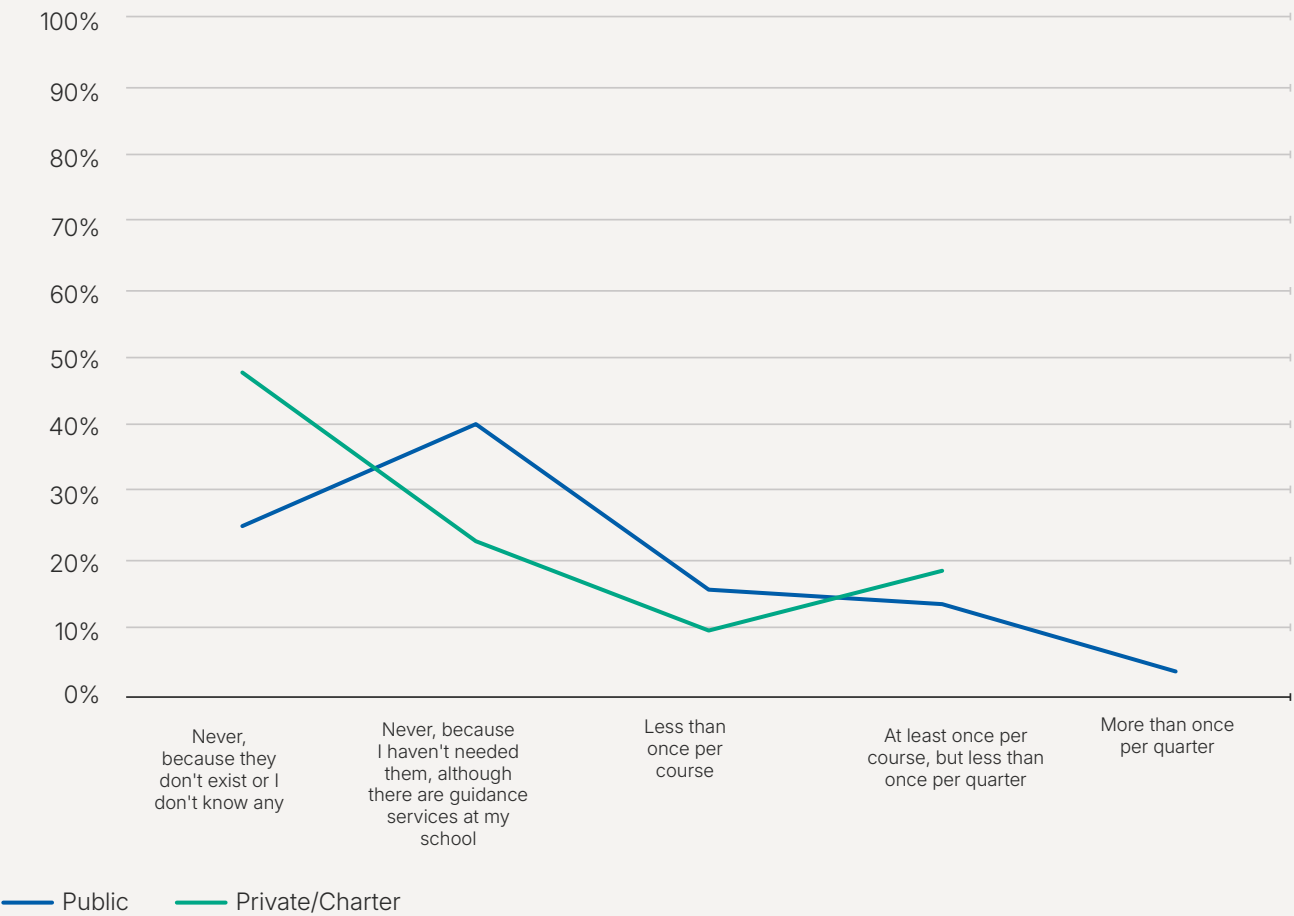
### 5.8. Probability of using GAI for career/training guidance if students use other resources

The greater the probability of turning to other resources for training or career guidance, the

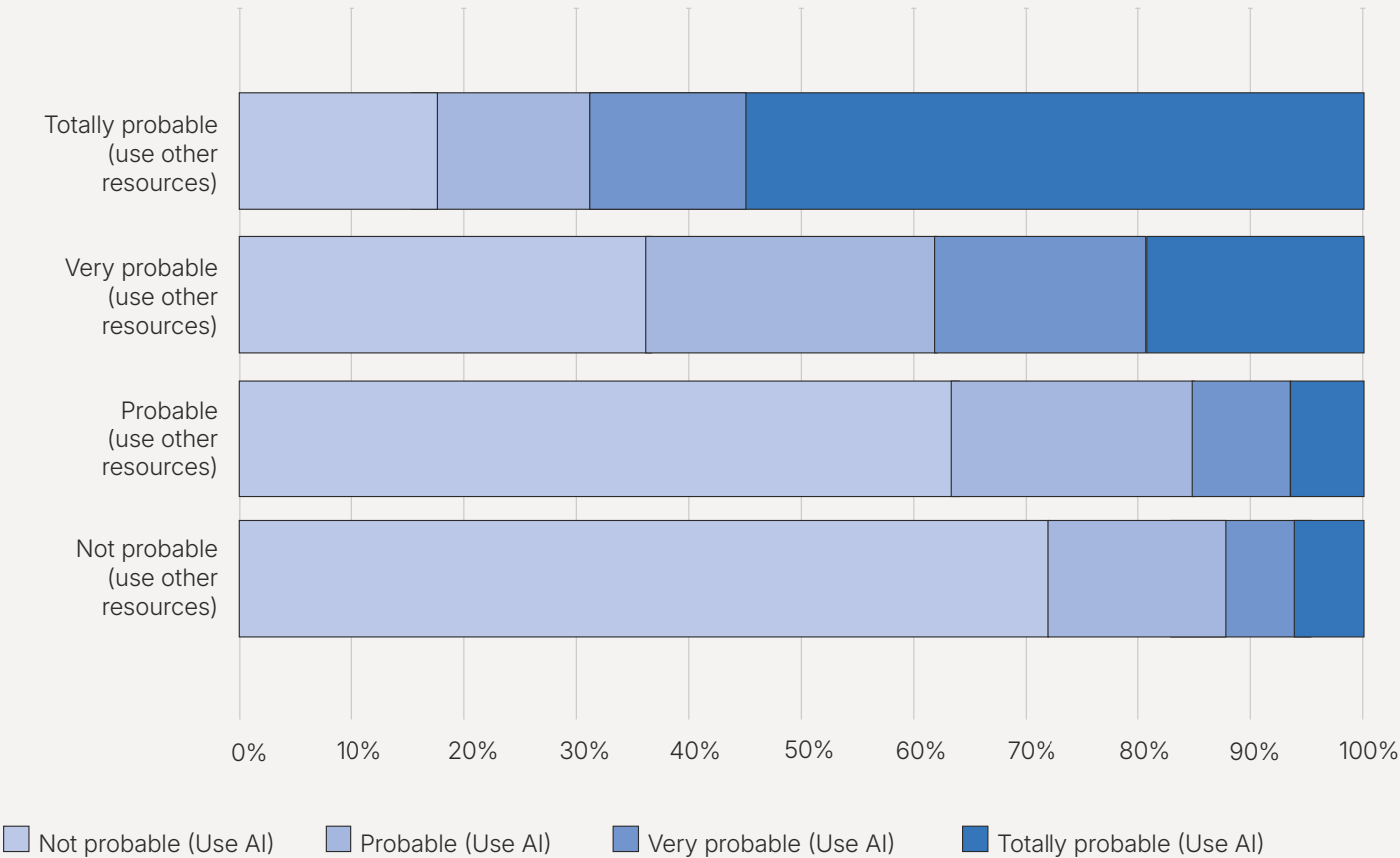
Graph 27. Use of the school's guidance services, by gender



Graph 28. Use of the school's guidance services, by school type



Graph 29. Probability that you will use AI if you use other resources to receive guidance



greater the probability of turning to AI for this purpose.

The variable "other resources" groups together the possibilities of resorting to friends, family, teachers or the school's guidance services, web search engines and social networks (graph 29).

The probability of using AI for those who use each of these resources is shown individually below.

The greater the probability of consulting friends for training or career guidance, the greater the probability of using AI for this purpose (graph 30).

The greater the probability of consulting family members for training or career guidance, the greater the probability of using AI for this purpose (graph 31).

There is no statistically significant relationship between the probability of consulting teachers or

the guidance services of the school and the use of AI for guidance (graph 32).

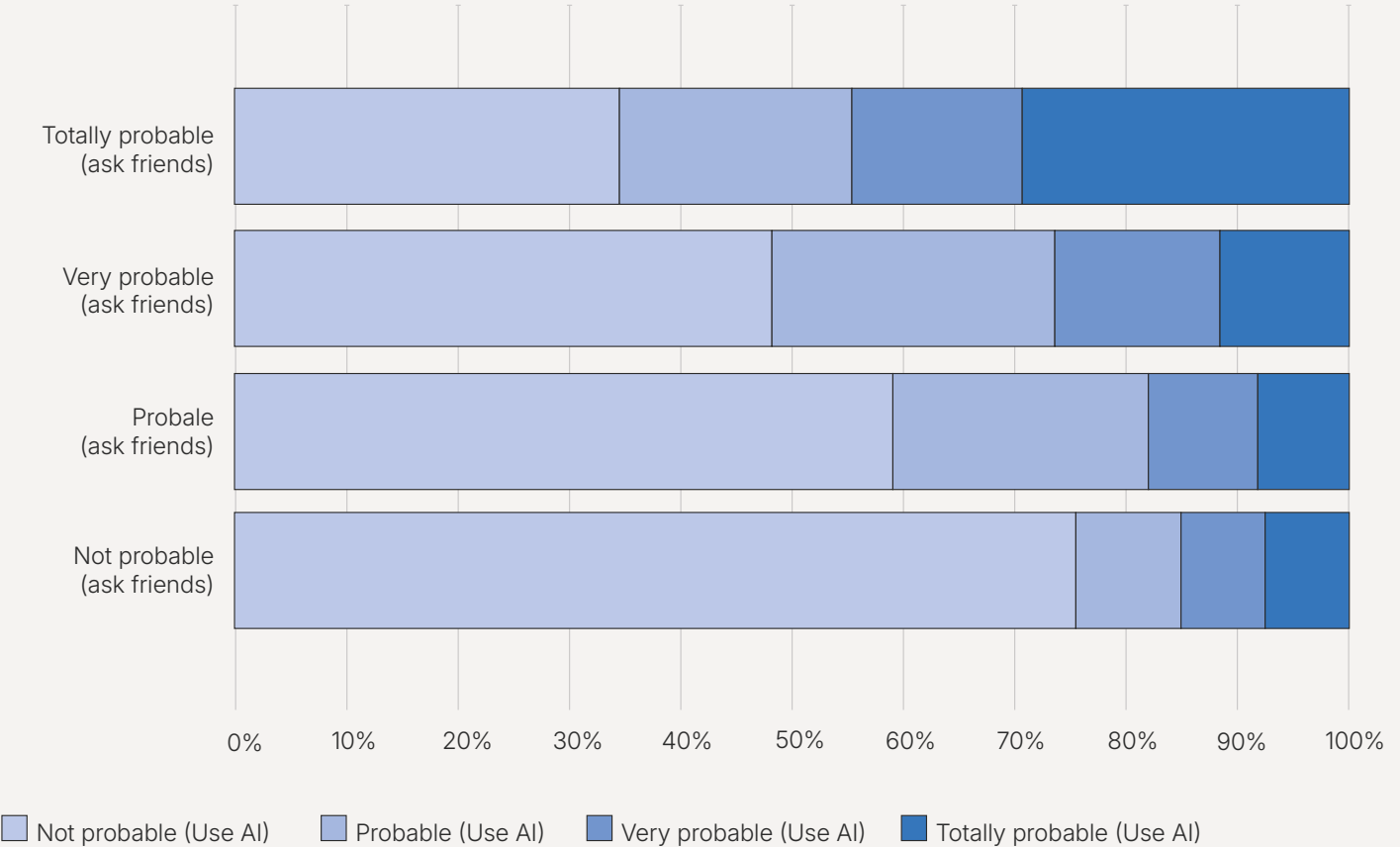
The greater the probability of consulting web search engines such as Google for educational or professional guidance, the greater the probability of using AI for this purpose (graph 33).

The greater the probability of consulting social networks for training or career guidance, the greater the probability of using AI for this purpose (graph 34).

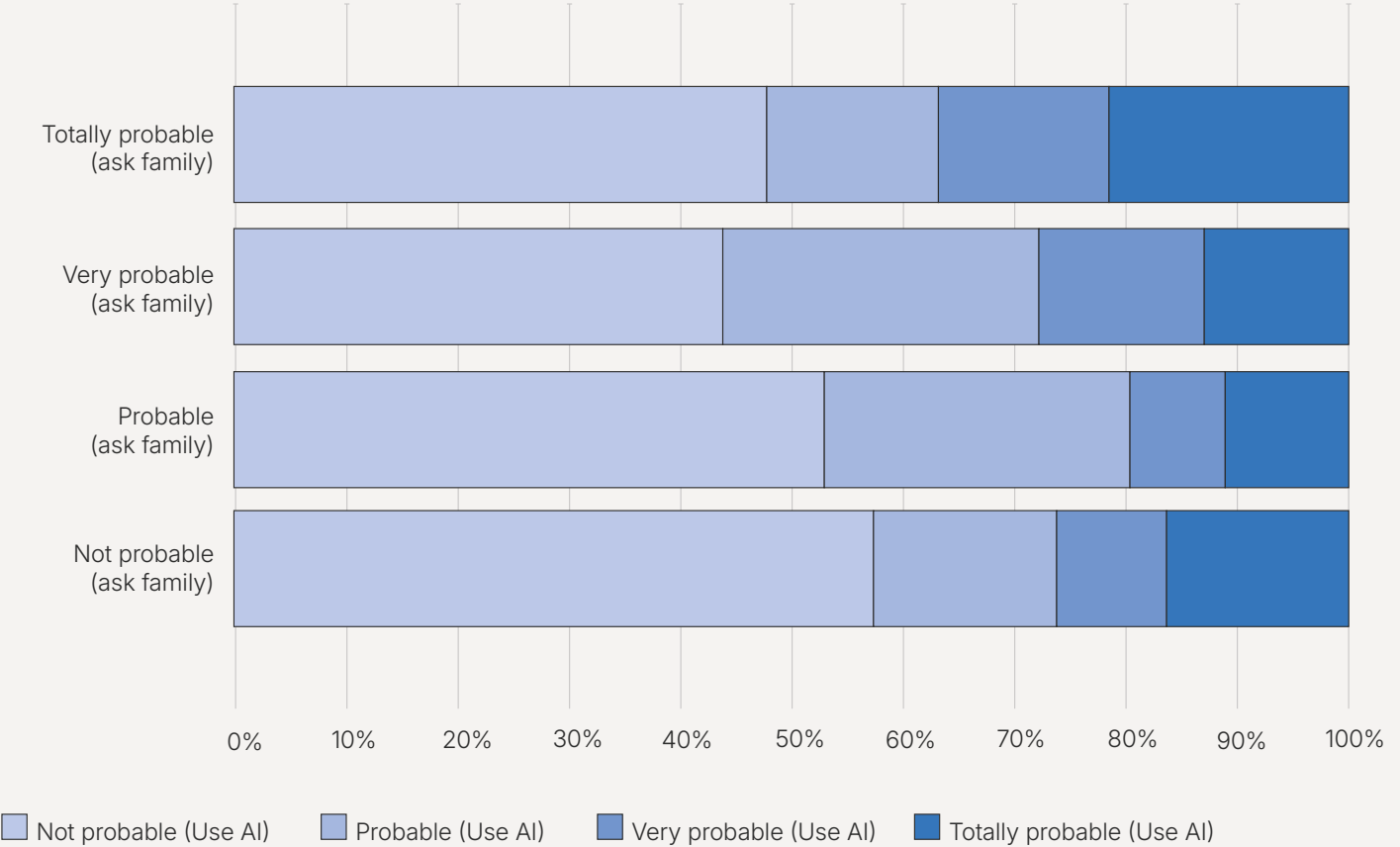
## 5.9. Assessment of AI in education

The answers to this question were obtained from the recoding of an open-ended question, in which respondents were asked to explain in one sentence their assessment of the impact of AI on

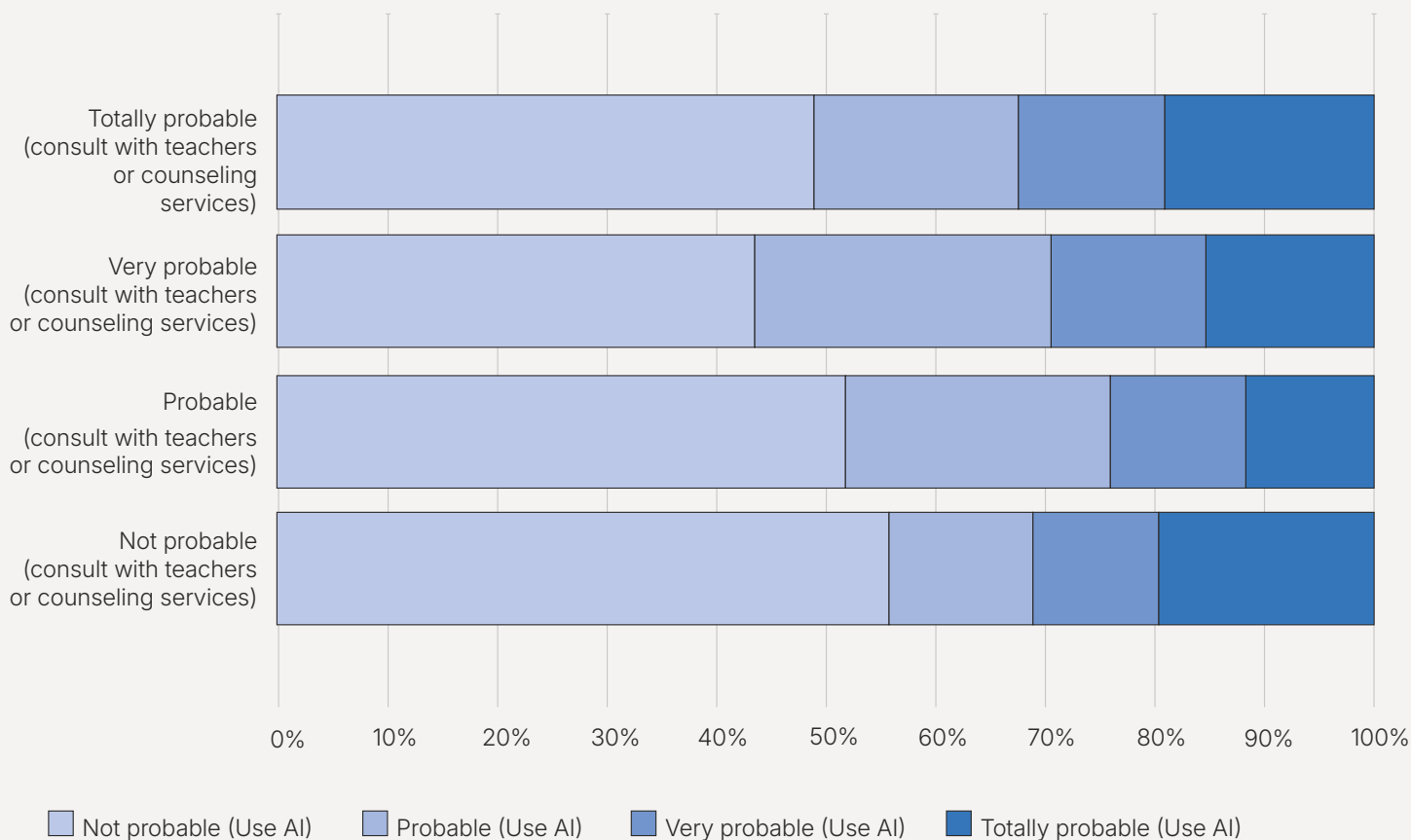
Graph 30. Probability of using AI for guidance if you consult friends



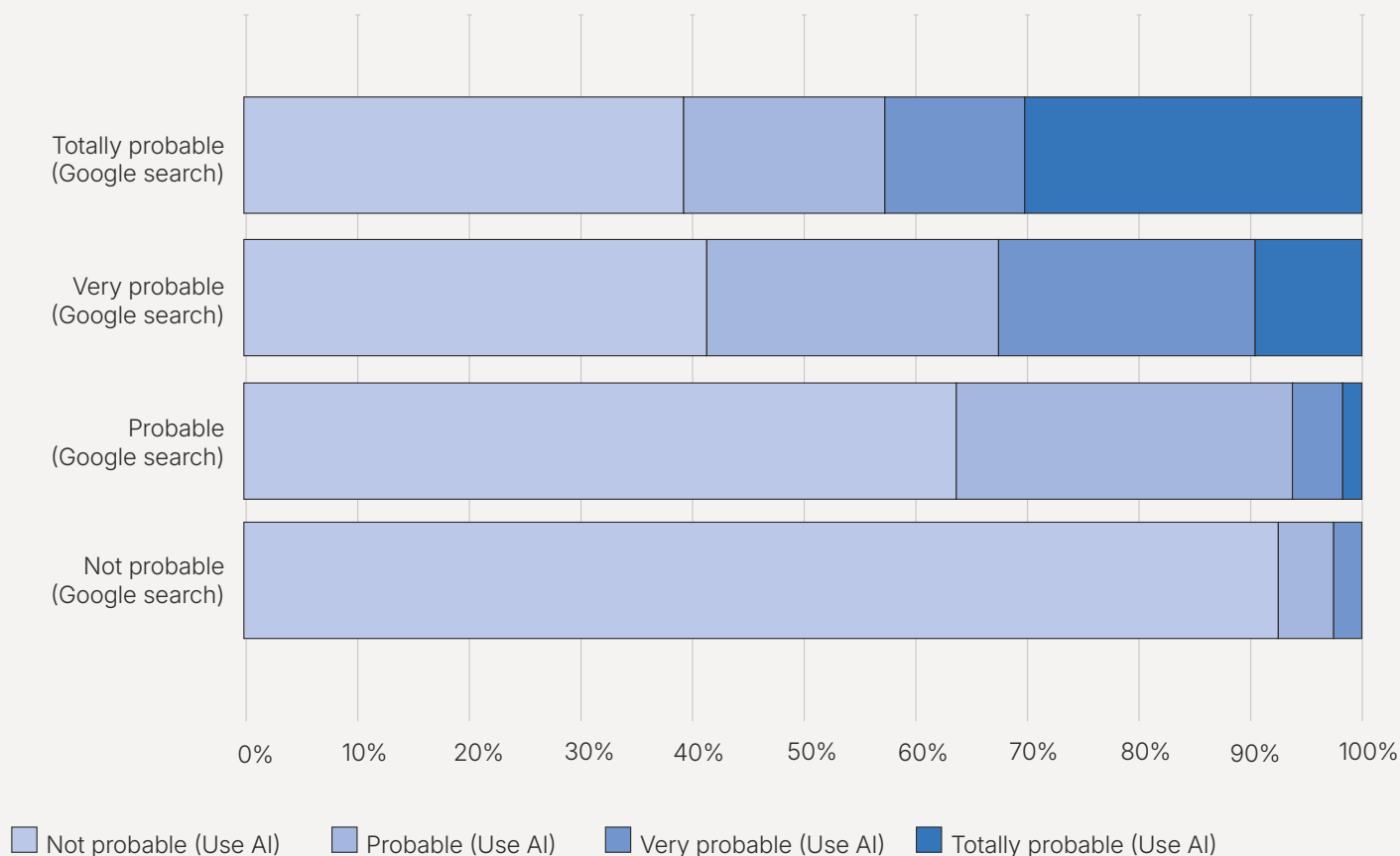
Graph 31. Probability of using AI for guidance if you consult with family members



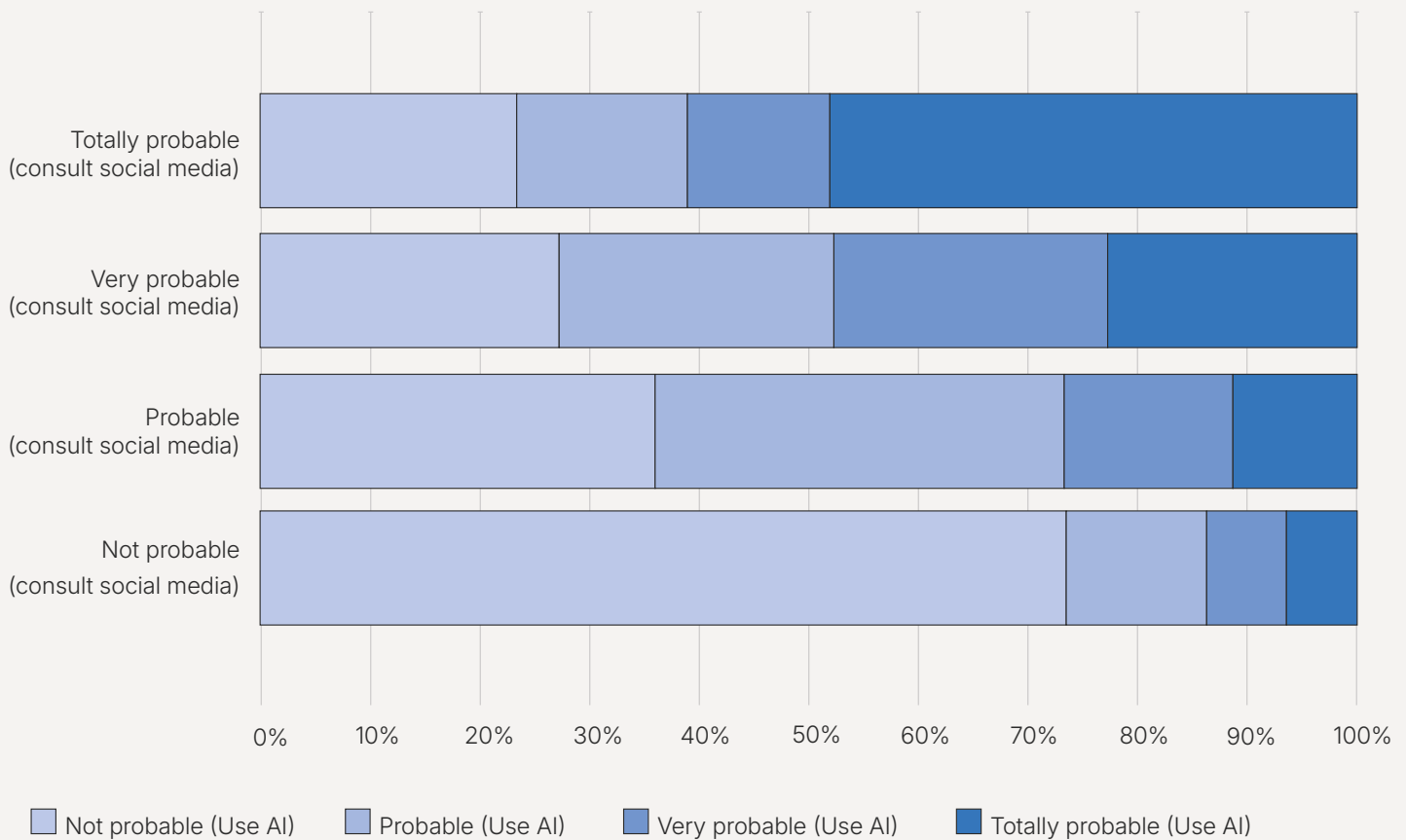
Graph 32. Probability of using AI for guidance if you consult with teachers or counseling services



Graph 33. Probability of using AI for guidance if you consult web search engines such as Google



Graph 34. Probability of using AI for guidance if you consult in social networks



education. The responses obtained were recoded and grouped into the 5 statistically analyzed categories.

The students' assessment of AI is mostly favorable, with only 7% taking an explicit position against it. However, nearly 40% (39.3%) have some nuances in their response, pointing out issues such as that it should be used responsibly and thoughtfully, that it provides vague and unspecific answers, or that its use involves dilemmas related to data protection (graph 35).

Although slightly, Spearman's correlation shows that there is also a significant relationship between age and AI assessment, since the higher the age, the lower the assessment (graph 36).

## 5.10. Conclusions

### Use of AI and resources for assignment preparation:

Of the students surveyed, 43% frequently use AI, while 46.5% have tried it and 10% have not used it. More than 60% are likely to use AI to prepare assignments, although traditional web search engines (such as Google) and peer help are still the resources they are most likely to use. There are differences according to the type of school: students in private/charter schools are more likely to use peers and books, while in public schools there is a greater inclination to use GAI.

### Frequency and reasons for use of GAI:

Of the students surveyed, 77% use it to write papers and 55.7% to study for exams. However, frequent use is low: only one third of students use it regularly. In public schools, 35% use it frequently, while in

Graph 35. Assessment of AI in education, by gender (recoded from open-ended question)

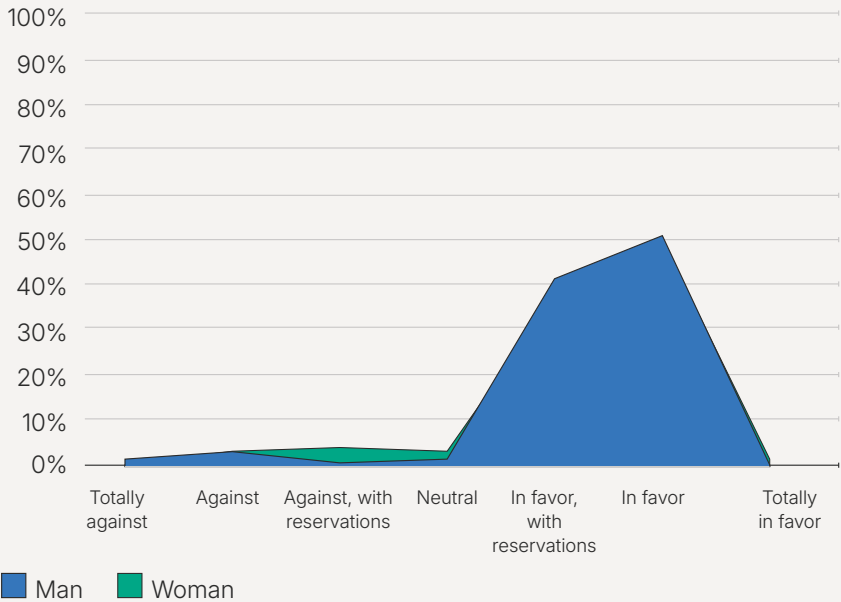
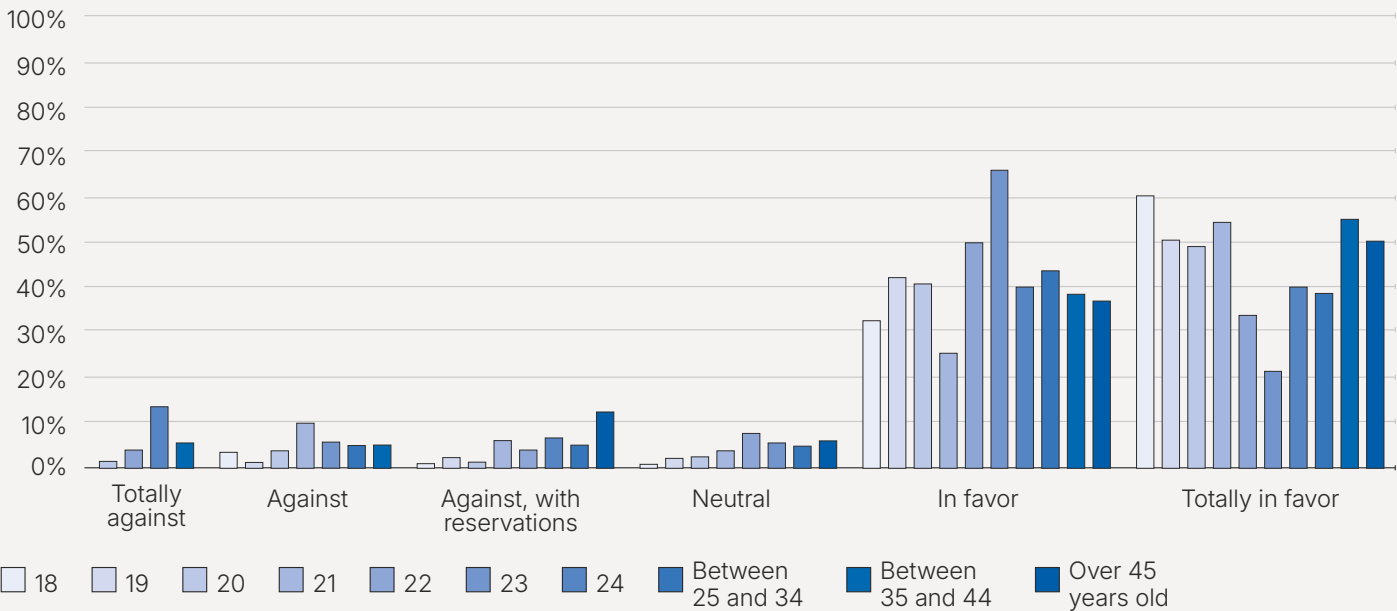


Gráfico 36. Assessment of AI in education, by age group (recoded from open-ended question)



private/charter schools less than 20% do so. A higher propensity to use AI is observed among young students and those who consult Google or social networks.

**AI training in schools:**

It's been found that 61.4% of schools have provided information on AI, although almost 40% of students say they have not received any training on the subject. Most of the information is general (50%) or about responsible use (37.2%),

while training on privacy, programming, and bias is less common. In private/charter schools, training on AI is more common than in public schools.

**Use of AI for academic and career counseling:**

Of the students surveyed, 48.9% consider it unlikely that they will use AI for guidance, preferring web search engines (75%), friends (68.1%), family members (67.6%), and teachers (63.9%). In private/charter schools, 54.3%

seek advice from family members, compared to 32.7% in public schools. The majority of students (66.2%) have not used the guidance services at their school.

**Assessment of AI in education:**

The perception of AI is mostly positive, although 39.3% point to the need for responsible use. Only 7% expressed a negative opinion. There is a trend towards a lower appreciation of AI as the age of the students increases.

**Overall assessment:**

HVT students have a high level of access to technology and a growing willingness to use AI in their studies, although its application to career guidance is limited. The use of GAI is not to the detriment of other existing digital resources, since the students who make most use of other forms of support from digital technologies and their peers are also those who make most use of the support of GAI. This relationship, however, is inverse in the case of the use of books and manuals. There are significant differences according to the school type and the age of the students, which highlights the need for differentiated educational strategies for the introduction and responsible adoption of AI in VT.

## 6. Survey of HVT students

### 6.1. Introduction

Interviews have been conducted with students of Basic and Intermediate Vocational Training in order to know first hand the use given to AI and to understand in depth the reasons they give to this use. It is also relevant to carry out these interviews as a complement to the information obtained from the survey of students in higher education.

In this way, 17 interviews were conducted with people who are studying some type of basic or intermediate vocational training cycle (Table 5-8).

The information obtained from the different interviews conducted has been structured into the following themes:

- Formative context of AI use
- Consideration of AI by students
- Specific uses of AI
- Forms of guidance

Table 5. Interviews by Autonomous Community

| Autonomous Community | n  |
|----------------------|----|
| Catalonia            | 7  |
| Valencia             | 10 |

Table 6. Interviews according to school type

| School type | n  |
|-------------|----|
| Charter     | 10 |
| Private     | 7  |

Table 7. Interviews by gender

| Gender | n  |
|--------|----|
| Man    | 15 |
| Woman  | 2  |

Table 8. Interviews according to degree

| Qualification  | PFI | Basic Vocational Training | Intermediate Vocational Training |
|----------------|-----|---------------------------|----------------------------------|
| Computing      | 7   | 2                         | 1                                |
| Electronics    |     | 1                         | 2                                |
| Administration |     | 1                         | 1                                |
| Mechanics      |     | 1                         | 1                                |

## 6.2. Formative context of AI use

Understanding how students in basic and intermediate vocational training use AI requires an in-depth understanding of the educational context in which

they receive their education. Through interviews, it has been possible to see these levels of vocational training as a more practical alternative for those who felt disconnected from learning in secondary school and were looking for an alternative.

*E14: Secondary school, for example, I... didn't like it. I felt like studying was hard work, I didn't feel like doing anything, I just wanted to play... [...] I got very bad grades because I never studied. Here, on the other hand, I care more about my homework, I study for exams, I pay attention in class, everything is going much better for me.*

VT therefore represents for many of them a way to re-engage with their studies and have the possibility of having an educational qualification. The very fact that they feel more motivated by the way VT is taught and by the interest they have in their respective fields leads them in many cases to moderate their use of AI systems.

*E14: When I was in secondary school, I wanted to leave completely. I didn't want to know anything. I thought, the sooner I leave, the better. I thought: the sooner I leave, the sooner I'll get the work done. I open ChatGPT, which takes less than two minutes, copy it, paste it, send it, and that's it. From there, because I care more and want to learn, I think about the questions and summarize them. Although sometimes it's hard and I need help, there are times when I can do it on my own.*

Thus, the characteristics of this pathway largely condition the uses that students can make of

## Understanding how students in basic and intermediate vocational training use AI requires an in-depth understanding of the educational context in which they receive their education.

AI. In this regard, the more practical content of the subjects requires different rhythms than in secondary school and other pathways that lead to specific forms and contexts for the use of AI.

*E10: I use it more this year because... I use it more to look for information. Last year, it was more for doing schoolwork. Here, I sometimes look up things about cars, about... Before, it was more for schoolwork, language, literature, Valencian, biology, subjects I didn't know much about. And now it's to look up things like shock absorbers, for example, because I'm curious about them, and to find out how to install a certain shock absorber in a certain car.*

### 6.2.1. Theoretical and Practical Distinction

The more practical content of VT is generally perceived by the students interviewed as one of the strengths of this training path and one of those that contributes most to motivating them in their studies. However, it is noteworthy that anything that does not have a strong component of practical activity is associated with a more theoretical teaching. This creates a duality in the students interviewed in which the practical is seen as good and motivating while the "theoretical" is seen as a necessary evil: they understand that they should know it and be familiar with it, but would prefer to skip it.

*E3: The thing is that here we do more theory, for example, cables, electricity, things like that. It's something that bores me a little more because maybe it's not something I had in mind, because of course, you say IT and you think you're going to use the computer a lot and things like that, and then in the end it's more theoretical, like plants, Wi-Fi, synchronization and so on. Which is also relevant, right? But it's different from what I had in mind.*

In this way, the scope of what they understand as theoretical is defined as the area of AI use, allowing them to eliminate the parts of their

activities that they find most cumbersome and focus on creating more practical content.

*E11: Because it's like the periodic table in physics and chemistry. They make you learn the periodic table. I don't think it's important or necessary at all, but they make you learn it anyway. It's a complete waste of time, in my opinion. When you're a chemist and you're using it every day, you learn what you need from the table, as normal. If you can't remember something, what are you going to do? Look it up in the table. You're not going to know it by heart for the rest of your life. Well, it's exactly the same thing.*

### 6.2.2. Areas of use of IA

It should also be taken into account when assessing the use of AI at these levels of vocational training that most of the work is done in the classroom itself, with very little work reserved for the student to do outside the classroom.

*E6: It's true that you go in, they explain everything to you, you do it, and when you're done, you're done. And if, I don't know, they give you assignments and you don't finish them, well, you'll do them at home. But you've had plenty of time in class.*

The fact that there is plenty of time in class to prepare assignments and exams makes working outside class hours optional and encourages restricting work to the time spent in the classroom. Thus, autonomous work outside of class is only considered in cases in which one wants to opt for better grades.

*E9: I want to get the highest grade. So, I work really hard at home. And I get overwhelmed, stressed out, and even upset... But that's because I'm very... I don't know. I want to get the most, most, most... And I'm not a conformist, I want... the best. But, of course, that's why I work so hard at home. Yes, there are people in my class who don't work at home and just bring it to class.*

Added to this is the fact that in many of the training cycles in which interviews have been conducted, student contact with computers is very limited. Apart from computer science and administration cycles, the use of digital equipment in other families to access AI is very limited, requiring more of other types of work and activities.

*E10: Not so much with computers. They make us work harder on the subject matter, which is paper, and then transfer it to the computer and upload it to the application. But when it comes to*

*computers, the only thing we use them for is colorimetry to find out the colors and stuff like that, we look up the values and all that, and the car and things like that, but not for work and doing that.*

Thus, the fact that most of the work is carried out in class and that access to computers or digital devices is measured and controlled leads to a limitation of the possibilities that students have in accessing AI and the possibility of solving assignments or exercises using it.

*E13: Earlier, in class, we were all using Chat GPT, and when the teachers walked by, we would close it.*

### 6.2.3. Lack of clear guidelines on the use of AI

Along with the above, there does not seem to be a clear consensus among teachers as to whether they should or should not use it. While some students say that they have had subjects where teachers have been strict with its use, others say that they let them use it as they wish, and others say that they have not received any guidelines as to whether they should use it or not.

*E4: No. But, you know, they haven't told us it's bad, no. So far, I've handed in two or three assignments and they haven't*

## This lack of guidelines can lead to confusion among students, who do not always know in which situations it is appropriate to use AI and in which situations they should not use it.

*said it's wrong for using it or not. [...] Let me explain. They haven't given you any guidelines, they haven't told you. Don't use this, don't use that, they've left it open.*

*E13: Rather than telling us about ChatGPT, etc., they simply told us that we can use it, that it is a very good aid and that, for example, as I said, if we get stuck, it is a great help and can be useful.*

*E15: Here we are not allowed to use artificial intelligence to do our tasks and so on.*

This lack of guidelines can lead to confusion among students, who do not always know in

which situations it is appropriate to use AI and in which situations they should not use it. As a result, some may rely too heavily on these tools without developing certain key skills.

### 6.3. Consideration of AI by students

It has been observed during the interviews that there is no clear and unanimous opinion among VT students on the use of AI. On the one hand, some of the interviewees have a totally positive and uncritical view on its use in education, but on the other hand, there have also been several cases that defend the opposite position, being reluctant to its effects. Between one extreme and the other, a wide variety of arguments for and against its use have been detected, which are summarized below.

#### 6.3.1. Positive view of AI

Thus, the argument most repeated by those who are openly in favor of AI has been the time savings and ease of access to information. In this sense, it is emphasized that in view of the workload that AI systems may have, they can be very useful in facilitating the study and preparation processes for certain exercises.

## Between one extreme and the other, a wide variety of arguments for and against its use have been detected.

*E6: Well, let's see, it's actually fine, because you also have to think about young people and... the work they do, because there are people who kill themselves studying and stuff like that, and they don't have time to copy, summarize, and all that stuff. So it's pretty convenient and you can do it all pretty quickly. And to understand it better too.*

The fact that tools such as ChatGPT are understood as an extension and refinement of web search engines such as Google or information pages such as Wikipedia stands out here. In this regard, the advantage of ChatGPT is that a wide variety of information and content can be accessed through the same page, without the need for an active search.

*E16: It's incredible, and I think the information ChatGPT gives you is much better than Google, which, yes, but... with Google you have to search a lot and with ChatGPT, I think the first option that comes up is very good.*

Understanding GAI tools as an evolution of what was already available with Google gives some legitimacy to their use. If Google is a legitimate tool in which to search and gather information, why shouldn't GAI be, which after all only represents a sophistication and simplification of what web search engines were already doing?

*E8: Some people, especially some teachers, call it "cheating". I see it as a very useful tool. You could always do the same thing with Google, well, you can do exactly the same thing as with Google, but you save a lot of time. You don't waste so much time selecting information and so on, it does it all for you.*

### 6.3.2. Negative views of AI

While the identified arguments supporting the use of AI are easily grouped together, the arguments shown by the students interviewed against its use are quite varied and diverse. However, it should be understood that, although in many interviews arguments emerged that led the person to

negatively evaluate certain aspects of AI, this did not necessarily go hand in hand with a complete refusal to make use of it. While there were cases of students who refused to use it completely, in other cases it led them to continue using it more or less carefully.

Among the most prominent arguments against its use are those who lament that they are losing skills or knowledge by delegating basic tasks to AI. On this point, a widespread concern has been detected among students that by delegating to AI systems such as ChatGPT the resolution of assignments or activities, they will not be able to replicate what they should have learned in an exam or in their future job.

*E8: According to the student, the teacher gives him an assignment and tells the artificial intelligence to do it. And he washes his hands. He does it and... and washes his hands and says, okay, I've got it. But then if the teacher asks him something, he has no idea. Of course, he has no idea.*

As noted above, this argument is not necessarily related to stopping the use of AI, but it does have some bearing on becoming aware of the implications of its use on the individual learning process.

E11: You can rely on artificial intelligence to look for some data, to get different

reports or something to get an opinion that is yours or a true opinion, but not to complete a paper on a topic that you should understand perfectly.

Similarly, there are also those who distrust the results that AI can provide. In this sense, they highlight the technical limitations of AI when it comes to providing reliable knowledge, reducing the usefulness they see in its use.

*E12: For example, in the maths work I mentioned earlier, I used AI, but only a small part of it. Otherwise, it's like, I don't know, I don't trust something that I don't think is 100% developed, because there's still a lot of things that need to be added, of course. But I trust it to a certain extent, because sometimes I enter information and it gets stuck, so I say, well, I won't enter any more, and I do it by hand, which is easier for me.*

Along with those who distrust the results that AI can provide, there are also those who point out the ease with which it can be detected if it is not checked. Ways of speaking or expressing oneself that are not typical either of the students or of the context of the work are easily detected by teachers, which can lead them to suspect that AI has been used and to suspend the work or exercise in question.

Along with those who distrust the results that AI can provide, there are also those who point out the ease with which it can be detected if it is not checked.

*E10: Last year, especially when it came to speaking. More than anything else, speaking, not writing. Using words that were very appropriate for our age, for example, they used formal language in some situations, which also... I mean, we didn't usually speak formally, but they did... Yes, they used formal language in many cases, for example, let's say... if it was a recipe, put X eggs in X. Or things like that. And of course, in the end, what we said, if it was very quick and we didn't have time, they would write that and in the end the teachers would notice.*

This is why some of the students consider that solving assignments or exercises with AI is not

worth the time needed to check that the answers are correct and that the way of writing is optimal.

*E5: I don't really like to use it. And also because it makes me lazy to have to be looking at everything that an artificial intelligence has written and have to correct it and try to make it to be human. But for that I just write it myself and that's it. Less hassle.*

This also highlights the fact that those who do not see the need to use it because they find that the materials from which to extract information are easily accessible.

*E11: Well, because most of the things they asked me, if you paid attention in class or more or less listened to the advice the teacher gave you, you could get everything, very easily. Now, if you were playing or not paying attention, you couldn't get it.*

Finally, some students are also concerned about AI-related dilemmas such as data protection breaches and the fear that it may be trained by all the content uploaded to it.

*E5: The truth is that I'm a little skeptical about artificial intelligence, yes, I am. Because I know they collect data to train them and all that, and it makes me a little uncomfortable.*

## 6.4. Uses of AI

### 6.4.1. General Uses

Apart from the personal opinion on AI expressed by the students interviewed, when asked about the specific uses they make of these tools, various forms of application were found. Among these uses, we found occasions in which these AI technologies are used to give a direct response to assignments and exercises:

*E4: Sometimes they send us a photo, and we usually... Well, I usually copy it because the questions appear, and I copy and paste them. And that's it.*

Along with this, one of the most common practices is to use it to search for information specifically and quickly. As mentioned in the previous section, the students interviewed highly value having AI to simplify the searches they would do with Google and similar search engines and have all the information available on a single website, considerably reducing the time they spend searching for information.

*E12: For example, I have to look for, I don't know, information about an object, but I have to go to six different pages. I ask it to look for information about this object, detailed and summarized, and AI gives it to me.*

Another of the most prominent uses in interviews has been to use AI to summarize the syllabus to significantly reduce the amount of information they have to prepare for an exam.

*E1: I use it normally because I'm currently studying for my high school diploma exam. I have to study a lot and take an exam in March to get my diploma. And since there's a lot of text and a lot of things to learn, I do ask it to summarize things for me.*

There are also those who use it for specific issues such as correcting faults.

*E7: It also corrects my mistakes...*

Or to complete tasks that are not so much related to the content of the assignment, but have more to do with tangential aspects: in the following case, designing logos or graphic content in an assignment about creating a fictitious company.

*E9: Yes, because at work we had to make logos, everything, and with ChatGPT, you told it what it was about and it gave you... and it was really close to what I was talking about.*

However, as we have seen in the previous section, there is concern among some students

about the effect that GAI may have on their learning: either because they are worried about not having certain skills or knowledge, about having prepared for the exam, or about the ease with which AI use may be detected. In this way, it can be seen how these concerns are transferred to the ways in which they make use of these technologies in a way that is either more aware of their risks or more sophisticated to avoid detection.

Along with this, one of the most common practices is to use it to search for information specifically and quickly.

#### 6.4.2. More complex and detailed Prompts

Among those who express greater concern about its use being detected, we see how they advocate making complex prompts that provide concrete and detailed information about the task that the AI must perform.

*E7: If you prepare the prompt well and know exactly what to ask, I have never seen it detected. Then, if you put very generic, you put directly the statements that are put in the exercise, I have seen that it has been caught and result in a fail.*

The need to provide detailed information in order to write a good prompt that accounts for the specific task required of the AI entails a prior study, albeit limited, of the subject matter of the task in question. Thus, in the interviews it

was argued that writing a good prompt required knowing and knowing, albeit superficially, the topic that the AI should talk about.

*E6: Let's see, they all do the same as me. You look over the book a little bit, you know what fits in the subject and you explain it to AI and it does it well.*

To refine this process, some people, after using an AI tool to write or develop a paper or exercise, turn to other AI tools, known as AI humanizers, to make the text look more like something they might have written independently. With this dual process they ensure that it is more difficult for teachers to identify whether they have used AI or no.

*E5: Some of my colleagues, the first thing you see them do is pull out ChatGPT*

*and then pull out an AI humanizer so it doesn't look like it's written by an AI. Yes, now there are some of those that make the texts that ChatGPT writes not look so robotic, that they look more human.*

#### 6.4.3. AI for initial ideas to be reworked

We have also seen how some of the interviewees are opposed to the AI writing the work and reduce its use to giving them ideas or general information on which they can then work. As in the previous case of writing prompts, we see students who do not want their use of AI to be detected by teachers and therefore prefer to write what the AI tells them in their own words, but they are also concerned about the effect that these tools may have on their ability to reason and write.

*E10: But above all, rely on it and then take it and say: OK, I've taken it and drawn some conclusions, as if I'd used Google, but it really comes from me. That's what I really think, not what the machine says.*

Similar to this approach, one of the students interviewed presented a way of working with AI in which he first wrote the required work on his own and then sent it to the AI to write the same work. Once he had both pieces of work done, he compared them and saw if he could improve

**The need to provide detailed information in order to write a good prompt that accounts for the specific task required of the AI entails a prior study.**

anything he had done or if he could add other types of information.

*E10: I used it last year, for example. I mainly used ChatGPT. I've also used image AI sometimes, but mostly ChatGPT. I would search for information, read what it gave me, read my information, the information written by ChatGPT, and then I would mix it all together. Then I would write down the most important points and at the end I would compare everything and write a general summary.*

#### 6.4.4. AI in leisure time

Outside the educational process itself, the use of AI for different leisure and free time activities has

also been detected. One of the most repeated has been to entertain oneself by asking questions or playing with the options it allows:

*E15: If not, to do random things. Like, pick a number from 1 to 12. And if it's 5, then I do something with that friend, which is what we know how to do when we play. If this number comes up, you do this, and if this one comes up, I do something else.*

But it is also used for more specific functions such as searching for information about their hobbies:

*E10: I also like watches, so I usually look at how much it would cost to make a new watch, the price of a second-hand one, I usually ask around to see what people say. The watches that increase in value so that you can invest and sell them later, and things like that. And that's about it, class issues more than anything else.*

In this case you can also see again how they understand the use of AI tools as a more refined form of web search engines. What they would previously search for on Google they now search for through AI to come up with more concrete answers.

*E8: For example, this weekend the Play servers crashed. I asked what time they crashed and if they would be back up.*

## 6.5. Guidance

The interviews carried out confirmed the importance of close references as the main means by which Basic and Intermediate Vocational Training students receive guidance. This guidance, in which the person's environment plays a fundamental role, occurs at different levels.

### 6.5.1. Guidance on the professional family

First, we can look at those who receive guidance from those around them on which professional field to focus their training on. In this regard, close family members who work in a particular profession and act as role models for the person seeking guidance are particularly important. In this sense, the professional career of parents or close family members has a significant influence and is an option to consider.

*E1: My father-in-law is also a web developer and he is doing very well. And he has explained a little bit and I am very interested.*

On other occasions, choosing the same profession as parents or other relatives is related to being able to find work more easily by using

their contacts or by joining the family business or the company where they work.

*E3: Or, to be honest, this is something new that came up a few days ago, well, a week ago. It's helping my dad, like helping him manage all the marketing, advertising, etc., with his logistics business. He already has coworkers, a van, etc., and he already has clients and stuff, so I think I can start there, in whatever position, for example, doing advertising, get... I don't know, create a brand, a corporate image, etc., and start a company, right?*

In this regard, it is also important to have close friends who are working in a particular sector to encourage them to train in it. This way, they will see that they will have more opportunities when it comes to entering the job market.

*E5: I have a friend who already works in that field. He has been working in that field for many years. And that makes it much easier for me to get into a company. That way I have a guaranteed internship and I also have someone who can help me get into that job.*

In the interviews conducted, studying something that offered many career options was a priority for many. In this regard, some of the

interviewees mentioned how they would have preferred to do something else, but ended up choosing their studies in order to prioritize finding a job in the future.

*E11: If I didn't have any problems at work, I would devote myself entirely to sports, because that's what I like most.*

In this regard, parents also play an important role in suggesting and guiding their children toward educational paths that can guarantee them employment.

*E12: I want to finish high school and go to college, but what I really want to do is join the military, the army. But my father says that I have to finish my studies, otherwise I'll be in trouble...*

## 6.5.2. Choice of school

When it comes to choosing the specific school in which to study vocational training, knowing people close to you who are studying or have studied there is still fundamental.

*E4: Well... because of acquaintances or because my brother told me that this school was good and that's it.*

In this sense, one of the most important factors is that of friendships. Many of the interviewees sought to enter a cycle in which they knew they would find a pleasant environment and this, in part, was sought through friends they knew they could count on.

*E15: I didn't know what to do. And there's a colleague [...] who told me he was going to sign up here. And he told me that so I wouldn't do anything, I should sign up with him.*

Having friends who have taken the same courses, even if they have already finished them, are a year ahead or are going to a higher level, is also a decisive factor to be considered by the students interviewed. In this way, they can be of help when faced with possible problems or can help answer questions or doubts about the content of the subjects and the school itself.

*E9: Yes, I expected it that way, because I have a friend who studies... she is already in higher education, but when I told her that I was going to get in, she explained everything to me and explained it well. And what I don't understand this year, I ask her, we meet and she explains it to me.*

In this sense, family members are also an important point of guidance for seeking

information about schools where they have studied.

*E7: Because my uncle studied here and he highly recommends it to me and I am going to try this one, to see if they will take me.*

### 6.5.3. Teachers and counseling services

It has also been detected how teachers can play a key role in guiding students, identifying their interests and those studies that may suit them.

*E3: So, first, IT. They taught me a lot about IT there too, and they said, "Look, you've got IT and all that, it's pretty good." I said, "Well, yes, I like IT too." Then they recommended this PFI to me and put me straight into it.*

Similarly, the guidance services of the school have also appeared in some interviews as key factors in the student's decision to choose one educational option or another.

*E6: Well, in my old high school there was a psychologist or trainer, I don't know how to say it, and she recommended me this school, she recommended me here, and that's supposedly why they took me.*

Having friends who have taken the same courses, even if they have already finished them, are a year ahead or are going to a higher level, is also a decisive factor to be considered by the students interviewed.

However, the figure of the guidance counselor is not clearly perceived by most of the students interviewed. Many do not know specifically the position they have within the school or their functions. Some of those interviewed are not even aware of the existence of these services.

*E5: No, actually I've never used the guidance services or anything like that [...] Honestly, I had no idea. I don't even know what guidance services are offered here.*

## 6.6. Conclusions

In the levels of vocational training analyzed, where teaching is practice-oriented and geared toward preparing students for the world of work, the possible uses of AI appear to be highly conditioned. On the one hand, classroom work and the high content of applied exercises make it more difficult to use AI tools than in other

educational contexts. On the other hand, greater interest in the subjects taught and the topics covered makes students less inclined to use AI tools to complete all their work. However, the fact that they distinguish the applied part of the subjects as truly important and interesting and the knowledge learning part as boring and not so important leaves room for reducing efforts in the latter aspect through the use of AI.

Although some interviewees defend its use to reduce their workload by simplifying information searches and writing assignments, others warn of the risk of losing essential skills by relying too much on these systems. Given negative experiences with the use of AI, such as being caught using it or arriving at exams without the necessary skills to solve problems, some students have found themselves in a position where they have had to reflect on the appropriateness of its use. In addition, some students express mistrust regarding the reliability of AI-generated answers

and try to highlight their own ability to reason in order to develop answers.

As a result of these concerns, different strategies have been identified to integrate AI into their studies without compromising their learning or being discovered by teachers. Some students have developed more sophisticated methods, such as writing detailed prompts or using tools to humanize AI-generated texts. Others have chosen to limit its use to obtaining initial ideas or generating summaries, arguing that this limits the impact of AI on their abilities. In this way, students seek to strike a balance between the benefits they see in AI and their training and educational requirements.

Vocational guidance is strongly influenced by close role models, such as family members and friends, who play a key role in choosing specializations and educational institutions. Many students make educational decisions based on the experiences of people around them, which gives them confidence about future job opportunities. While teachers also play an important role in this regard due to their close contact with students, the school's guidance services have a more limited impact in comparison.

In the levels of vocational training analyzed, where teaching is practice-oriented and geared toward preparing students for the world of work, the possible uses of AI appear to be highly conditioned.



# PHASE IV:

## OPPORTUNITIES AND RISKS



## 7. Main conclusions

In the context of the rapid expansion of AI, and especially since the emergence of ChatGPT from the end of 2022, education is facing many challenges and debates. In this scenario, this research represents an important advancement of knowledge of the impact of AI in VT, how it is currently being introduced in schools, what are its uses among teachers and students, what are the main concerns for the educational community, what risks are identified, as well as what opportunities it offers to improve the experience, the educational trajectory and the professional insertion of VT students.

The approach used in this research approaches AI from the perspective of Science and Technology Studies. From this approach it is understood that the effects and consequences of AI cannot be isolated from the social context, educational values and the priorities and situation of the VT system itself. The problems and challenges of AI are intertwined with the structural tensions of the educational system, pedagogical discussions and social inequalities. However, they are not simply introduced, they do not merely reproduce what already existed. They can intensify biases and forms of inequality or soften them, add new pedagogical practices and transform the dynamics of school organization, but starting from the existing conditions

In the context of the rapid expansion of AI, and especially since the emergence of ChatGPT from the end of 2022, education is facing many challenges and debates.

of possibility. For this reason, the study of opportunities and risks has not focused on the consequences or the evaluation of using specific applications with AI for specific tasks. On the contrary, the focus has been on understanding how AI, and especially GAI, participates in existing educational practices and trajectories in VT.

Therefore, beyond the strictly technological and the short-term assessment of specific applications, any educational policy or program in relation to AI must integrate a medium- to long-term view. This necessary future perspective comes at a time of uncertainty about the role of AI in contemporary societies,

This necessary future perspective comes at a time of uncertainty about the role of AI in contemporary societies, an uncertainty that goes beyond the educational field and requires caution, evidence and citizen participation, known as the 'precautionary principle and measured action'.

an uncertainty that goes beyond the educational field and requires caution, evidence and citizen participation, known as the 'precautionary principle and measured action'. Measured action integrates in-depth knowledge of what is happening in schools, discussion of educational

priorities around VT, as well as the needs and concerns of the main stakeholders, i.e. teachers and students. This is the approach that has guided the elaboration of this study and that underlies the methodological design and the analysis of results.

This chapter summarizes the main results extracted from the different forms of analysis carried out during the study: the analysis of academic literature, interviews with experts, and surveys and interviews with teachers and students of basic vocational training, IVT and HVT.

### **Scarce empirical evidence**

The systematic study of the effects and transformations of AI in the different levels of VT education is limited and the evidence recognized by the international scientific community is scarce. Debates on its uses, opportunities and risks are highly polarized and little evidence-based on its effects on students, the learning process or professional insertion. The existing studies deal with contexts far from ours (especially in China) and focus on the description of specific applications with AI and its potential benefits, with the study on the impact on GAI in VT being practically non-existent. For this reason, this is a pioneering study on AI in VT in Spain and a relevant, evidence-based contribution to the debate on the opportunities and risks of AI in VT.

However, the novelty of the research is its virtue and also its main problem. This is a limited study whose limitations must be acknowledged, which cannot cover a detailed analysis of the situation in the different professional families, the integration of AI in the different levels of VT, the situation in the different territories or the interaction of AI with the educational policies of the autonomous communities.

For this reason, the specifications and nuances in this case are relevant and point to a necessary caution in the interpretation and reading of the results, which should be understood as a starting point for future research.

### **Old and new challenges**

Despite the narrative about the disruptive capacity of AI in education, and the enormous challenge that AI implies for the educational process, AI in VT does not introduce completely new issues, but rather intensifies challenges already present in the educational system.

As happened with the advent of web search engines or the use of digital devices, AI tends to reproduce pre-existing inequalities, amplifying the gaps associated with cultural capital, digital skills and access to resources.

In this sense, the lack of coherent and consensual strategies, the scarce critical digital

literacy of teachers and students, as well as the subordination of technological innovation to educational priorities, can spread biased patterns that reproduce social dynamics, such as the increase of inequalities in the choice of itineraries, the continuation or abandonment of the educational process or the different accompaniment in the use of digital devices by students according to their family socioeconomic context.

### **The need for a responsible approach to GAI in VT**

One of the most relevant concerns associated with GAI is the transformation of the link between students and their educational process, deep learning and knowledge acquisition, since this technology is associated as a way to automate the resolution of tasks. This concern is transversal in all educational fields and levels and intensifies a series of debates in VT on the traditional forms of evaluation, the updating of practical content and the construction of meaning in the classroom.

In this sense, although both teachers and students value the use of this type of technology positively, they also identify the need to develop knowledge and critical thinking about the functioning of the GAI and to learn about ways of working in the classroom on the responsible use of this technology, both for teaching and for sharing knowledge with students.

In the field of educational management, AI is recognized as having a potential similar to that of other previously applied technologies, such as academic monitoring platforms or school management systems. The use of AI from this perspective could be very interesting for schools to have systematic information on professional, training and specialization resources in the territory. However, its use in guidance or accompaniment functions with students is viewed with great caution, due to the risk of replacing the expert judgment of teachers with opaque and biased algorithms that can stigmatize the most vulnerable students. Anything that has to do with the introduction of automation systems in personalization and professional guidance runs the risk of reproducing forms of stigmatization and social discrimination and is not recommended by experts or used by teachers.

### **Normalization and generalized use of AI among students and teachers**

The results of the surveys and interviews show that the use of GAI (basically ChatGPT) is quite widespread, both among teachers and students, especially as progress is made towards higher cycles. The introduction of this type of technology takes place in a context of educational digitalization, in which, also as progress is made towards higher cycles, the use of digital devices in the classroom or outside the classroom for training activities is normalized.

However, despite the widespread use of free commercial AI systems in general use, there is no reference to the use of other AI systems specifically designed for educational purposes, neither in the interviews nor in the surveys, neither among teachers nor among students. The use of traditional web search engines is not associated with AI technologies (Google, Bing, Safari, etc.), nor is the regular use of social networks (TikTok, Instagram, etc.), so that the debate and critical knowledge about these applications is not present in the discussion on AI in VT.

### **Uses of GAI by teachers to prepare materials and activities**

More than 60% of the VT teachers surveyed (BVT, IVT and HVT) claim to have used tools such as ChatGPT, similarly among men and women. However, as mentioned above, this use intensifies as one moves towards higher cycles. It is important to note that despite the fact that the use of GAI is around 50% among BVT and IVT teachers and 63.7% among HVT teachers, its frequent use on a regular basis is much lower, being also more intense for HVT. Among the BVT teachers surveyed, the habitual use of GAI is 10.7%, among the IVT teachers 19% and among the HVT teachers 29.6%.

Among the most common uses by teachers are the creation of rubrics, the design of activities, the writing of examples, and the search for teaching resources. Despite the positive assessment of its usefulness, there is a polarization between teachers who use it and those who do not, with those who use it pointing out the reluctance of those who do not.

In other words, systems that are not designed or evaluated for educational purposes are used, yet other specific and audited technologies with AI systems are not used for learning in vocational training. This may be due to the lack of validated applications for use in vocational training, lack of access to these applications, or lack of awareness of them.

### **Critical perspective on GAI among teachers**

The main reasons for their use are the optimization of time to prepare content, activities and exams, the lack of resources for updating specific VT content and the difficulty of linking practical and theoretical learning. No reference is made in the automation of content development or activity design, to the standardization of learning or to the pedagogical model inscribed in them. Despite their use of ChatGPT, explained by the reasons given for efficiency and time optimization, teachers consider that the use by students of ChatGPT or other GAI systems can be problematic for their learning and acquisition

of competencies, associating the widespread use among students to a lack of motivation and interest in their training process.

The practically non-existent use among VT teachers of using these technologies to correct activities or to offer tutoring and accompaniment is noteworthy. Both teachers and students prefer human attention and the personal link in this type of matters, placing value on the expert judgment of teachers and highlighting the possible errors and biases that this automation could entail.

### **Common uses of the GAI among HVT students**

Of surveyed HVT students, 90% say they have used tools such as ChatGPT, with similar rates among men and women, 30 percentage points above the rate among HVT teachers. Despite this, regular use stands at 43%. Therefore, based on these results, it can be said that the use of GAI is widespread among HVT students. No significant differences were observed by gender or parents' educational level, but there were differences by school type, especially in the probability of using GAI tools to prepare assignments, which is 35% in public VT schools, compared to less than 20% in private or charter schools.

The use of GAI tools among HVT students varies greatly depending on the type of task. Some 77% of students have used these tools to prepare

assignments or essays, although only a third do so regularly. For exam preparation, GAI has been used by 55.7% of students, who use this tool to summarize the content to be studied. Its use is low for writing emails to teachers, motivation letters, or CVs, as well as for educational or professional guidance. The use of ChatGPT for homework or assignments is noteworthy. More than 60% of the students surveyed consider it very likely or totally likely (60%). However, when faced with difficulties in doing their work, students would first turn to traditional web search engines (such as Google or Safari, which also work with AI, although in this case the technology is part of the black box and is not associated with the use of AI systems), followed by asking classmates and, subsequently, GAI tools.

### **Significant relationship between the uses of GAI and other resources**

It is interesting to note that there are statistically significant relationships between the probability of using ChatGPT or similar and the probability of using other resources. Students who are more likely to use the GAI to do assignments are also more likely to use peer support, traditional web search engines and social networks (such as Instagram or TikTok), integrating this type of technology with the use of other digital tools and peer support. In other words, the probability of resorting to GAI is not detrimental to the probability of resorting to other existing

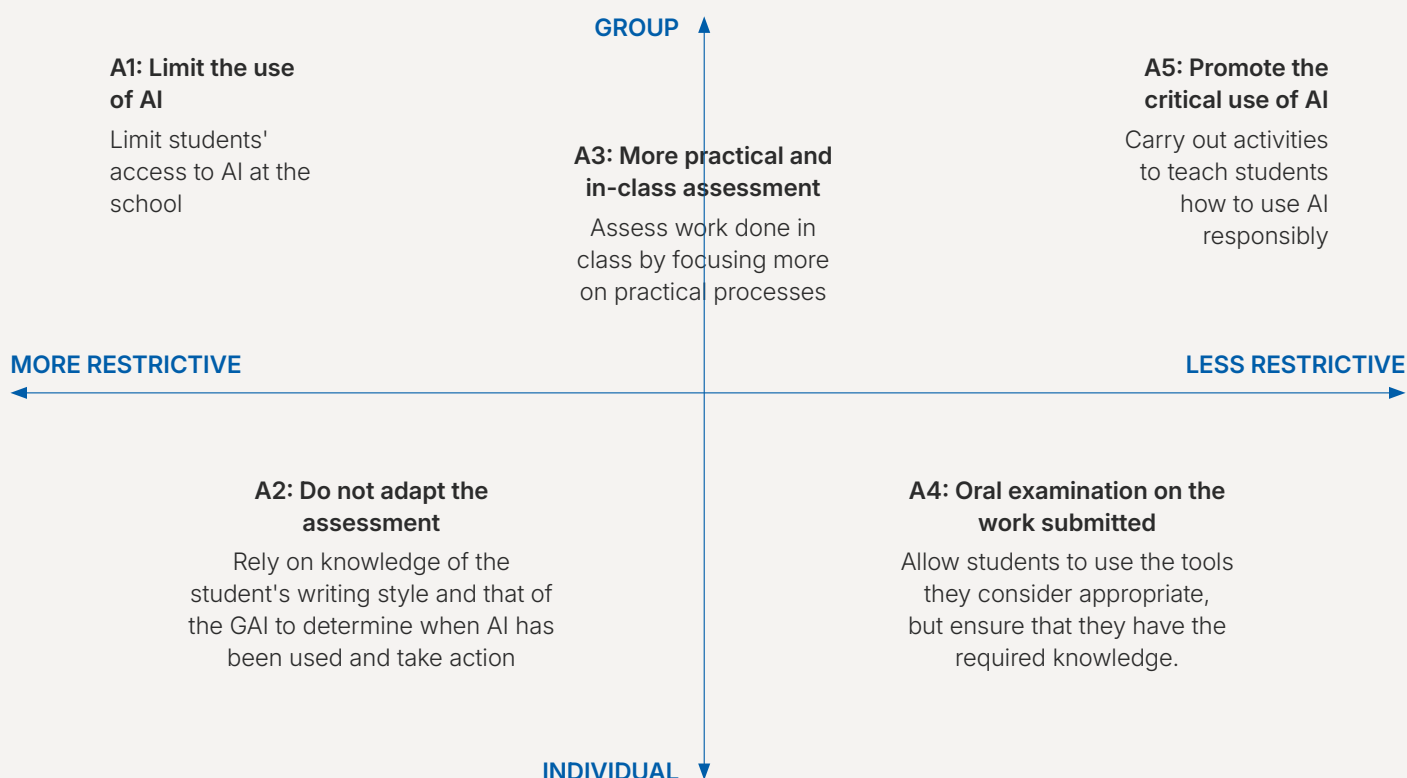
resources. On the other hand, this relationship is inverse to the probability of resorting to books or manuals in the face of difficulties in doing assignments. The greater the probability of resorting to books or manuals for the subject, the lower the probability of using GAI tools. The more accessible the information is for students, through books, manuals, class explanations, etc., the less they resort to ChatGPT or similar tools.

### **Less common uses of GAI among students in BVT and IVT**

There are no statistical data available on the use of GAI among students in BVT and IVT, but from the interviews we can infer that the use of GAI is lower, especially for homework and individual or group work. In these cycles it is especially relevant the link and motivation of students with practical subjects, in which the use of GAI does not make sense.

### **The GAI and the debate on evaluation**

One of the most relevant debates around the irruption of AI in VT and education in general, among experts and teachers, refers to the evaluation processes, due to the concern of verifying the authorship of students' work. There is no unified position on this issue, but a series of strategies for adapting to this technology have been identified that can be organized around two axes: the level of regulation (more or



less restrictive) and the approach (individual or collective). The following graph shows the various strategies.

### The GAI and the link between VT students and the educational process

Another debate and discussion that has intensified the use of AI in vocational training is the lack of motivation among students, as teachers interpret the widespread use of AI among young people to carry out work and tasks as being related to a lack of motivation in their learning process. However, if we explore this issue in more detail, what we see is that when reference is made to 'lack of motivation', different issues are being referred to:

On the one hand, reference is made to a tension between the expressive link and the instrumental link in vocational training. From the teaching

perspective, vocational training is associated with the acquisition of a series of instrumental skills for integration into the labor market. However, this is not the only function that students attribute to their vocational training studies, which are also associated with the possibility of continuing in the education system. Therefore, from this expressive link with the education system, specific professional learning is no longer a central issue.

On the other hand, lack of motivation also refers to the relationship between theory and practice in vocational training. One of the issues that most motivates vocational training students, and this is especially relevant in BVT and IVT, is the practical component of their studies. However, this practice entails a series of tensions. On the part of the students, the practical aspect is experienced on a daily basis as something separate from the theoretical, with the theoretical being what is referred to in the GAI. On the

part of the teachers, there is a demand for constant updating of practical content, which is rapidly changing in the labor market, for which resources are not always available. This issue requires greater automation of the process of creating these materials, as well as their study and resolution. This issue also relates to assessment, as there is a vicious circle in which this content is presented as obsolete by teachers and students, as well as by the job market, and the entire process is automated

## 8. Recommendations

Based on the analysis of the results and conclusions reached, a list of ten key recommendations has been drawn up from this study:

### 1. Match AI to VT priorities and challenges, not the other way around

Beyond the utopian or dystopian polarized positions on AI in education, ensuring a responsible development of AI in VT implies the need to develop a reasoned and evidence-based debate. This social debate, independent of the narratives promoted by large technology

Teachers consider that the use by students of ChatGPT or other GAI systems can be problematic for their learning and acquisition of competencies, associating the widespread use among students to a lack of motivation and interest in their training process.

corporations, must be led by the educational community, put the priorities of VT at the school and adjust to those priorities the possibilities that AI can offer (not the other way around).

## 2. Produce scientific evidence on the effects of AI in the medium to long term

There is little empirical evidence on the medium-long term effect of the introduction of AI systems in VT, in the different professional families and educational levels, as well as on the effects on the uses of AGI among teachers and students. The medium- to long-term impact of these technologies on the acquisition of skills and abilities during VT, student motivation, professional insertion, improvement of teaching quality or optimization of the organization of schools is not known. It is essential to collect and analyze scientific evidence on these issues.

## 3. Develop digital tools (with AI or other technologies) specific to VT content and learning

The use of GAI tools for the development of teaching content and exercises, as well as for the development of assignments and exercises by students, is widespread. However, these tools do not guarantee the veracity of the contents, do not respect copyright issues, nor do they guarantee the privacy of user data, which are essential issues in the educational field. It is necessary

for the public administration to develop specific digital tools for VT, audited, transparent, with educational purposes and easy access, which allow this type of tasks to be carried out.

## 4. Develop digital skills for the critical and responsible use of GAI

There is a lack of knowledge and training on the functioning of GAI and its ethical, economic, social and ecological implications, both among teachers and students. This issue is identified by the educational community itself, which requires organized training strategies that enable the acquisition of critical and responsible digital skills at all levels of VT. Digital skills linked to AI go beyond the use of tools and applications, and involve the development of critical thinking about these technologies and the acquisition of strategies to deal with issues such as fake news, source checking, cyberbullying or digital discrimination, among others.

## 5. Discuss school strategies on the uses and positioning of AI

Currently, despite the fact that the uses of GAI have become standardized among teachers

and students, especially in higher education, there are no clear guidelines or defined and unified strategies on this issue. In a situation of uncertainty about the role and effects of GAI in education, the establishment of common criteria and positions defined by the senates of VT schools is one of the few existing mechanisms for regulating this issue. The discussion, assessment and establishment of clear collective criteria on the use of AI to perform various tasks among teachers and students will make the introduction of these technologies more democratic, critical and responsible.

## 6. Non-assumable risks in the automation of tutoring and mentoring

The use of AI tools for personalizing learning and providing support throughout the training and job placement process is an issue that carries significant proven risks of reproducing biases and increasing inequalities. Mentoring and career guidance are processes that require personal connections and the professional experience of teachers and counselors, which therefore should not be automated.

## 7. Potential of AI to systematize information and local resources

Decision automation processes using AI systems can be very useful to support VT schools in accessing information about training, specialization and labor resources in their territory. The people responsible for tutoring and guidance at the schools should be the intermediaries between these AI systems and the needs of the students, since it is the teachers and those responsible for guidance who have the necessary expert criteria to select, evaluate and transmit the information.

## 8. Potential of AI for bureaucratic tasks, without reproducing the digital gap

Another interesting possibility for introducing AI systems into VT schools has to do with everything related to administrative management and bureaucratic tasks. However, the applications used for this purpose must guarantee data privacy, algorithm transparency, public ownership of software, and be accompanied by the possibility of performing the same processes manually, so as not to intensify possible injustices in access and use of digital

systems by students and families. It is also necessary to monitor these processes to ensure that they do not lead to greater datafication and bureaucratization of the tasks of the school's professionals.

## 9. Provide additional resources to public vocational training schools

In order to optimally mediate between decision automation systems and students and their families, as well as select and adapt educational AI systems to the content of vocational training programs and work on critical and responsible thinking towards GAI in the classroom, additional resources are needed for public VT schools, which already suffer from insufficient resources for personalized tutoring, guidance, and student support.

## 10. Rethink assessment, student engagement, the theory-practice relationship and the criteria for meaningful learning in VT

The emergence of GAI and its widespread use among vocational training teachers and

students has highlighted a series of problems relating to four issues: (a) assessment processes; (b) student engagement and motivation; (c) the relationship between theory and practice; and (d) the establishment of criteria for defining relevant instrumental learning in a changing labor market. These problems and challenges are not the sole responsibility of GAI, even though it has intensified them. One of the main challenges that is emerging is, therefore, rather than intensifying the use of and debate around AI, to take the emergence of GAI as an opportunity to rethink existing problems and break a vicious circle that GAI illustrates so well.

## 9. Bibliographic references

Ball, S. J., & Grimaldi, E. (2021). Neoliberal education and the neoliberal digital classroom. *Learning, Media and Technology*, 0(0), 1–15. <https://doi.org/10.1080/17439884.2021.1963980>

Holmes, W., Bialik, M., & Fadel, C. (2023). Artificial Intelligence in Education. In *Comparative Research on Diversity in Virtual Learning: Eastern vs. Western Perspectives*. <https://doi.org/10.4018/978-1-6684-3595-3.ch012>

Knox, J. (2020). Artificial intelligence and education in China. *Learning, Media and Technology*, 45(3), 298–311. <https://doi.org/10.1080/17439884.2020.1754236>  
<https://doi.org/10.1080/17439884.2019.1623251>

Morozov, E. (2016). *La locura del solucionismo tecnológico*. Katz Editores.

OCDE (2021a). Effective and Equitable Educational Recovery. <https://www.oecd.org/education/ten-principles-effective-equitable-covid-recovery.htm>

OCDE. (2021b). *OCDE Digital Education Outlook: Pushing the Frontiers with Artificial Intelligence, Blockchain and Robots*. [https://www.oecd-ilibrary.org/education/oecd-digital-education-outlook-2021\\_589b283f-en](https://www.oecd-ilibrary.org/education/oecd-digital-education-outlook-2021_589b283f-en)

OCDE (2023) "Opportunities, guidelines and guardrails for effective and equitable use of AI in education" en *OECD Digital Education Outlook 2023: Towards an Effective Digital Education Ecosystem*. [https://www.oecd-ilibrary.org/education/oecd-digital-education-outlook-2023\\_2b39e98b-en](https://www.oecd-ilibrary.org/education/oecd-digital-education-outlook-2023_2b39e98b-en)

Liu, Z. (2021). Planning and Practice of Smart Campus in Higher Vocational Colleges from the Perspective of Education Informatization 2.0. 2021 2nd International Conference on Big Data and Informatization Education (ICBDIE), 497–500. <https://doi.org/10.1109/ICBDIE52740.2021.00119>

Perrotta, C., & Selwyn, N. (2020). Deep learning goes to school: Toward a relational understanding of AI in education. *Learning, Media and Technology*, 45(3), 251–269. <https://doi.org/10.1080/17439884.2020.1686017>

Selwyn, N. (2024). On the Limits of Artificial Intelligence (AI) in Education. *Nordisk Tidsskrift for Pedagogikk Og Kritikk*, 10(1). <https://doi.org/10.23865/ntpk.v10.6062>

UE (2018). Plan coordinado sobre la inteligencia artificial. <https://eur-lex.europa.eu/legal-content/ES/TXT/?uri=COM%3A2018%3A795%3AFIN>

UE (2020a). Libro blanco sobre inteligencia artificial: un enfoque europeo orientado a la excelencia y la confianza. <https://op.europa.eu/en/publication-detail/-/publication/ac957f13-53c6-11ea-aece-01aa75ed71a1>.

UE (2020b). *Plan de Acción de Educación Digital 2021-2027*. <https://eur-lex.europa.eu/legal-content/ES/TXT/PDF/?uri=CELEX:52020DC0624>.

UE (2021). Revisión de 2021 del Plan coordinado sobre inteligencia artificial. <https://digital-strategy.ec.europa.eu/en/library/coordinated-plan-artificial-intelligence-2021-review>.

UE (2023). *Ley de inteligencia Artificial*. [https://www.europarl.europa.eu/doceo/document/TA-9-2023-0236\\_ES.html](https://www.europarl.europa.eu/doceo/document/TA-9-2023-0236_ES.html)

UNESCO (2021). AI and education: guidance for policy-makers. <https://unesdoc.unesco.org/ark:/48223/pf0000379376>

UNESCO (2023). Guidance for generative AI in education and research. <https://unesdoc.unesco.org/ark:/48223/pf0000386693>

UNESCO. (2019). Beijing Consensus on Artificial Intelligence and Education. <https://unesdoc.unesco.org/ark:/48223/pf0000368303>

UNESCO. (2022). Recommendation on the Ethics of Artificial Intelligence. <https://www.unesco.org/en/articles/recommendation-ethics-artificial-intelligence>

UNESCO. (2023). K-12 AI curricula: a mapping of government-endorsed AI curricula. <https://unesdoc.unesco.org/ark:/48223/pf0000380602>.

Vallès-Peris, N., & Domènech, M. (2023). Care robots for the common good: Ethics as politics. *Humanities & Social Sciences Communications*, 10, 345. <https://doi.org/10.1057/s41599-023-01850-4>

Williamson, B., & Eynon, R. (2020). Historical threads, missing links, and future directions in AI in education. *Learning, Media and Technology*, 45(3), 223–235. <https://doi.org/10.1080/17439884.2020.1798995>

