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Young People's Perceptions of Artificial Intelligence and Digitalisation and the Role of Digital Skills and Psychological Resources for Labour Market Entry

Anthony Abrome

anthony.abrome2@unibo.it

University of Bologna

Marco De Angelis

University of Bologna

Martina Benvenuti

University of Bologna

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Abstract

Artificial Intelligence (AI) and digitalisation are transforming the world of work, raising important questions regarding young people's preparedness for labour market entry. The present study investigated young people's perceptions of AI and digitalisation in the workforce, their perceived preparedness for labour market entry, and the digital and psychological resources they consider essential for navigating these changes. Adopting a qualitative design, participants were purposively sampled and comprised students and recent graduates aged 18–29 who were approaching the completion of their studies and preparing to enter the workforce. Data were collected through eight semi-structured interviews and nine focus groups, each comprising 8–10 participants. The study was guided by the Integrated Framework of Graduate Employability, integrating digital competencies (DigComp) and psychological resources from Psychological Capital and Career Adaptability as complementary factors. Data were analysed using a hybrid thematic analysis approach implemented in MAXQDA software. Findings revealed ambivalent perceptions of AI and digitalisation, with participants recognising potential efficiency gains alongside concerns about diminished creativity. Participants reported a moderate level of preparedness for workforce entry and emphasised the need for continuous training and upskilling to effectively navigate technologically intensive work environments. Key digital competencies for labour market entry included communication, collaboration, and problem-solving. Optimism and curiosity emerged as the most salient psychological resources, with resilience and confidence also briefly mentioned. These findings highlight the perceived importance of integrating digital competency development with psychological resources in initiatives designed to support young people's transition into an increasingly digitalised work context.

Introduction

In recent times, the nature of work has undergone a significant transformation due to advances in Artificial Intelligence (AI) and the increasing digitalisation of work processes. Digital technologies have fundamentally altered traditional modes of work, reducing dependence on human labour and compelling organisations to restructure workflows to remain competitive [1]. Existing research presents divergent perspectives on the impact of AI and digitalisation on work. Scholars believe that digital innovation and automation assist workers in their roles and positively impact work performance and working conditions [2, 3]. In contrast, others argue that AI and digitalisation complicate job tasks, eliminate work responsibilities, and blur work-life boundaries [4, 5]. AI in this context refers to technologies that perform tasks typically requiring human intelligence, such as information analysis and content generation [6]. Digitalisation, on the other hand, relates more broadly to the transformation of work through digital technologies, including AI, automation, online collaboration, and remote work [7]. Hence, the digital labour market describes an employment context increasingly shaped by these technological developments and the evolving skill demands they entail. As digitalisation and AI are increasingly integrated into corporate processes, the skill set required to work in modern labour-market organisations is rapidly evolving to meet these demands.

These transformations are particularly consequential for young people at the point of labour-market entry, where initial career trajectories are shaped. In this context, the school-to-work transition is a critical period during which young people must develop the capabilities to adapt to evolving labour market demands. According to [8], young graduates require digital skills and competencies to successfully navigate the transition from school to work and attain employment. This view is consistent with a growing body of literature demonstrating that, within an increasingly digitalised labour market, digital competencies constitute a critical resource for strengthening young people's employability and fostering positive perceptions of their employment prospects [1, 9, 10].

Given that the school-to-work transition and the current labour market are characterised by considerable uncertainty and stress [11, 12], digital skills alone may not be sufficient to facilitate successful labour market entry. Psychological resources that help individuals effectively adapt to and manage challenging circumstances have been proposed to complement digital competencies in enhancing young people's perceptions of employability. The Future of Work report contends that success in an AI-driven labour market depends not only on possessing digital competencies but also on psychological resources that enable individuals to respond effectively to technological disruption, uncertainty, and continuous change [13]. Thus, both digital skills and psychological resources work in tandem to enhance individuals' ability to navigate the uncertainties and evolving demands of an employment landscape characterised by AI and digitalisation.

Despite the growing scholarly attention devoted to the role of AI and automation in shaping the employment landscape [14, 15], previous research has often studied AI perceptions, digital skills, and employability-related psychological resources separately [16, 17, 9, 18]. Consequently, relatively little is known about how young people themselves make sense of the connections among AI-enabled labour-market changes, digital skills, psychological resources, and their preparedness for labour market entry. Understanding these perceived connections may provide valuable insights for educational institutions and vocational guidance practitioners, who increasingly need to prepare young people not only with digital competencies but also with the adaptive resources required to navigate rapidly changing labour-market conditions.

The need for such an integrative perspective is further reinforced by inconsistent findings regarding young people's experiences of digitally transforming labour markets. Existing evidence presents mixed findings regarding young people's perception of the AI-driven workforce. While some studies highlight concerns about job displacement and the misuse of AI [19, 20], they also emphasise its benefits across sectors such as healthcare, education, and entertainment. Similarly, findings on young people's preparedness for the labour market are inconsistent, with some research reporting anxiety about adapting to a digital workforce [21] and employers noting deficiencies in practical and soft skills [22]. In contrast, other studies suggest that young people perceive themselves as adequately prepared for employment [23].

To address these limitations, the current study draws on the Integrated Framework of Graduate Employability (IFGE) [24], which conceptualises employability as the interaction between individual resources and labour-market conditions. The IFGE emphasises the importance of human capital and individual attributes, but does not explicitly specify which resources are particularly important in AI-driven labour markets. We therefore use the IFGE as an integrative lens, drawing on the Digital Competence (DigComp) Framework for Citizens [25] to indicate relevant components of human capital and on psychological capital [26] and career adaptability [27] as potentially relevant psychological resources within individual attributes. This integration provides a framework for exploring how young people perceive these resources in relation to their preparedness for the school-to-work transition in a technology-mediated working context. From the foregoing, the present study adopts a qualitative approach to investigate the following objectives.

1. To examine young people's perceptions of AI and digitalisation in the labour market.
2. To explore young people's perceived preparedness for labour-market entry.
3. To identify digital and psychological resources that young people consider important for successful labour-market adaptation.

Theoretical Background

To provide a coherent theoretical foundation for the current study, the Integrated Framework of Graduate Employability (IFGE) [24] was adopted as an overarching framework to examine the resources that support young people's transition from education to work in a digitally transforming labour market. It conceptualises employability as dependent on human capital, social capital, individual behaviours and attributes, and the labour-market conditions. The framework stipulates that these factors, in combination, influence employability outcomes. Given that the school-to-work transition is an important stage in which young people begin to translate educational experiences into labour-market participation [28], it provides a valuable context for investigating employability. The IFGE was further deemed appropriate for this study, as it extends employability beyond securing employment to encompass skills, personal resources, and external labour market factors. According to [24], employability emanates from an interaction between individuals' supply-side resources (human capital, social capital, individual behaviours and attributes) and demand-side labour-market conditions that shape employment opportunities.

Although the IFGE recognises human capital and individual attributes as strong determinants of employability, it was not originally developed to explain a labour market characterised by AI and digitalisation, and therefore does not specify which competencies and personal resources are essential in an AI-driven employment context. However, its emphasis on the interactive relationship between individuals and their employment context provides a suitable foundation for investigating employability amid rapid technological change. Consequently, we extend the IFGE to contemporary labour markets by drawing on the DigComp framework to conceptualise digital skills as a focal component of human capital, and on psychological capital and career adaptability to conceptualise the psychological

resources that underpin individual attributes. This integrated approach specifies the forms of human capital and individual attributes that may be essential for understanding employability in a labour market undergoing digital transformation.

Digital skills, as proposed in the DigComp framework, include information and data literacy, communication and collaboration, digital content creation, safety and problem-solving [25]. We adopt the DigComp framework as it provides one of the most comprehensive conceptualisations of digital competence and has been updated to reflect emerging technologies, including AI and digitalisation [25]. In the present study, digital skills are viewed as central elements of the broader human capital construct within the IFGE, recognising their pivotal role in enhancing employability amid digital transformation. Moreover, the IFGE specifically mentions adaptability, flexibility, and optimisation as individual attributes that enhance perceptions of employability [24]. In the present study, psychological resources are considered key aspects of individual attributes, drawing on the psychological capital and career adaptability frameworks, which encompass constructs such as resilience, optimism, control, and confidence [26, 27]. Although the literature identifies numerous psychological resources, psychological capital and career adaptability have emerged as specifically vital for understanding young people's transition from education to work [29–31]. External labour-market conditions, on the other hand, reflect the increasing digitalisation of work, shaping the demands and opportunities encountered during the transition to employment.

In light of these considerations, we investigate how young people perceive digital competencies, psychological resources, and changing labour-market conditions in relation to employability during the school-to-work transition. The integrated perspective adopted informed both the design and interpretation of the present study. Table 1 shows a conceptual mapping of the frameworks used in the study.

Table 1
Conceptual Mapping of the Theoretical Frameworks Used in the Present Study

Framework	**IFGE Component**	**Contribution to the Study**
Integrated Framework of Graduate Employability	**Overarching Framework**	**Provides the overarching structure linking individual resources and labour-market conditions in shaping employability.**
Digital Competence Framework for Citizens	Human Capital	Specifies digitally relevant competencies as a focal component of human capital.
Psychological Capital	Individual Attribute	Describes positive psychological resources, including optimism and resilience, as key aspects of individual attributes.
Career Adaptability	Individual Attribute	Indicates career-related adaptive resources, including concern, control, curiosity, and confidence as relevant dimensions of individual attributes.

Methods

Research Design

An exploratory qualitative approach was adopted to reach the objectives of the present study. This approach was utilised because the study's objectives required participants to express their views on the introduction of AI and automation in contemporary labour markets. According to [32], a qualitative inquiry enables exploration and understanding of the meanings individuals attribute to social or human phenomena. To obtain both individual and socially constructed perspectives, data were collected using a combination of semi-structured interviews and focus groups.

Participants and Sampling

Participants were recruited from a region of Northern Italy using purposive sampling to ensure inclusion of individuals with relevant experience of the school-to-work transition. Since the study focuses on transitioning from school to work, we included secondary school and university students nearing the completion of their studies and preparing to enter the workforce. Job seekers entering the labour market were also included as participants, as they are transitioning into the contemporary employment landscape.

A total of 94 participants took part in the study. Eight participants were involved in semi-structured interviews. The remaining participants took part in nine focus groups, each comprising 8–10 individuals. Given the exploratory design and heterogeneous sample, the study sought breadth of perspectives across the school-to-work transition rather than applying a predetermined numerical saturation threshold to each data-collection modality or participant subgroup. The participants' ages ranged from 18 to 29 years, with a mean of 23.8 years. The sample was predominantly composed of secondary school students (n = 57), with university students (n = 34) and a small number of job seekers (n = 3). As a result, the study regarded them as representing different roles within the larger transition from school to work. Additional participant characteristics are reported in Table 2.

Table 2
Participants' Characteristics (n = 94)

Gender	**n (%)**	**Mean**	**Range**
Male	23 (24.5)		
Female	71 (75.5)		
Age		23.8	18–29
Participants' Status			
Secondary School Students	57 (60.6)		
University Students	34 (36.2)		
Job Seekers	3 (3.2)		
Mode of Participation			
Interviews	8 (8.5)		
Focus Group	86 (91.5)		

Data Collection Procedure

We recruited participants through secondary schools, universities, employment centres and agencies as they provided access to young people at different stages of the transition from school to work. Data collection was carried out through semi-structured interviews (approximately 30 minutes) and focus groups (approximately 40 minutes). Both interviews and focus groups followed the same topic guide, with participation in either modality determined by availability rather than participants' characteristics. Interviews enabled in-depth exploration of individual experiences, while focus groups facilitated interaction and the co-construction of shared perspectives on AI, digitalisation, and adaptive labour-market preparedness [33].

Interviews took place online via Microsoft Teams, and focus groups were conducted in person. With participants' consent, online sessions were audio-recorded using Microsoft Teams' built-in transcription feature. In-person sessions, on the other hand, were audio-recorded using an external digital recorder. Ethical approval was obtained from the authors' institutional review board (protocol number: 0410027). Participants signed a written informed consent form and a data processing agreement prior to participating in the study. To ensure anonymity, participants' real names were pseudonymised with alphanumeric codes (e.g., P01, P02 for interviews, and FG1-P1, FG2-P1 for focus groups), so that no identifying information remained in the transcripts. Data collection was conducted in Italian or English, depending on participants' language needs. For reporting purposes, quotations originally in Italian were

translated into English by the first author and subsequently checked by bilingual members of the research team to preserve conceptual equivalence.

The interviews and focus group guides were informed by the integrated conceptual framework presented in the theoretical background. Participants were initially asked a broad set of open-ended questions that explored perceptions of AI, labour-market preparedness, and the school-to-work transition. Theoretically informed prompts, based on the DigComp framework and the psychological capital and career adaptability literature, were then used to guide participants in reflecting on the digital skills and psychological resources they deemed essential for labour-market entry. The prompts were adopted to enrich the discussions rather than limit participants' responses. Examples of the initial open-ended questions and subsequent theory-informed prompts are provided in Table 3 in Appendix A.

Table 3
Examples of Initial Open-Ended Questions and Subsequent Prompts Used in Interviews and Focus Groups

Theme	Initial open-ended question	Subsequent prompt
Perceptions of AI and Digitalisation in the labour market	In your opinion, how do you think AI and digitalisation are influencing, or might influence, the world of work?	Participants were prompted to consider opportunities and challenges associated with technologies such as AI in work environments, and to assess whether these developments were perceived positively or negatively.
Perceived Preparedness to Navigate the Digital Labour Market	In what ways do you feel you are prepared to enter the labour market? Why?	Participants were subsequently prompted to consider whether they possessed the skills needed to adapt to the digital labour market.
Digital Skills for Labour Market Adaptation	What kind of digital skills do you think are the most important for success in this labour market characterised by AI and digitalisation?	After participants' initial responses, the interviewer explained digital skills, provided examples based on the DigComp competencies, and then probed which specific digital resources participants considered important.
Psychological Resources for Labour Market Adaptation	What psychological resources do you think are most essential to succeed in the current labour market?	After the initial responses, the facilitator explained psychological resources grounded in psychological capital and career adaptability to facilitate further reflection.

Data Analysis

Transcriptions of audio recordings from both interviews and focus groups were analysed using a hybrid inductive-deductive thematic analysis approach [34], with a codebook approach to thematic analysis, as characterised in the typology of [35]. We employed a data-driven inductive analysis in which codes and subthemes were closely linked to the data rather than to an existing theory. Specifically, patterns regarding perceptions of AI and digitalisation in the labour market, as well as readiness to enter it, were

derived from participants' actual accounts during data collection rather than from prior theoretical assumptions.

A theory-driven deductive analysis was further adopted, in which coding and theme development were guided by the IFGE. In this phase, participants' views on digital and psychological resources essential for labour-market entry were organised according to the framework's conceptual categories. In particular, digital skills, as conceptualised in the DigComp Framework, were mapped to the human capital dimension. At the same time, psychological resources, as outlined in the psychological capital and career adaptability frameworks, were aligned with individual attributes and behaviours, as proposed in the IFGE. Participant responses that did not fit any of the theoretically informed categories were retained and coded inductively, allowing additional patterns to be captured rather than forcing all accounts into predetermined categories.

Transcripts were imported into MAXQDA 24 software for data analysis. Interview and focus group data were analysed using the same thematic framework to identify patterns across the dataset rather than differences by data-collection modality. Initially, transcripts were repeatedly reviewed to ensure familiarity with the data and to develop a holistic understanding of participants' reports. Meaningful segments of participants' responses, ranging from phrases to longer passages, were then used as coding units. Coding was done by the first author, who developed and refined the codebook throughout the analyses. Codes with similar meanings were organised into preliminary subthemes, which were then grouped and refined into three overarching themes that addressed the research objectives. Themes were discussed with co-authors to refine conceptual boundaries and enhance the credibility of the analyses. Throughout the analyses, coding decisions and theme development were documented through successive revisions of the codebook. Previously coded transcripts were reviewed and refined as new insights emerged from the data, ensuring the consistent application of codes.

The analyses centred on identifying patterns of meanings across the entire dataset rather than comparing opinions and experiences across participant groups. Formal subgroup comparisons were therefore not conducted, also because participant groups were substantially unequal in size, particularly the small number of job seekers.

Researcher Reflexivity

Data collection was conducted by members of the research team, while the first author led the coding and analysis. The analysis was informed by initial assumptions that digital and psychological resources may be relevant to a digital labour market, as evidenced by the theoretically informed prompts and deductive coding categories. To mitigate the potential influence of these assumptions, responses outside the theoretically informed categories were retained and inductively coded. None of the researchers had any established relationships with the participants prior to data collection.

Findings

The analysis generated three overarching themes concerning participants' perceptions of AI and digitalisation, their preparedness for labour-market entry, and the digital and psychological resources they considered important for successful adaptation. Each theme is presented below with illustrative quotations from interviews and focus groups.

Theme 1: Perceptions of AI and Digitalisation in the Labour Market

Participants generally described AI and digitalisation as introducing both opportunities and challenges to the contemporary labour market. Across interviews and focus groups, AI was viewed as valuable when supporting human work but was more critically perceived when seen as replacing human judgement, creativity, or agency.

Subtheme 1: Benefits of AI as a Tool for Efficiency

Findings showed that participants reported AI as useful for enhancing work processes. Among the benefits, participants mentioned the simplification of complex tasks, opening more job opportunities and completing work faster. Participants generally viewed AI as a technology that could support, rather than completely replace human work.

As one participant explained:

FG4–P1: It (AI) can be used, for example, to reduce work time or speed up certain tasks

Similarly, another participant commented:

P04: In my opinion, artificial intelligence can help a lot, for example, in managing information or simplifying complex tasks.

Another participant mentioned:

FG6–P2: Artificial intelligence can be something positive. It can open up many job opportunities.

Subtheme 2: Concerns About AI Dependence and Diminished Human Capabilities

Despite acknowledging the advantages of AI, participants further expressed reservations about its increasing integration into the labour market. Their concerns centred on excessive dependence on AI and the possibility that this could diminish human creativity, skills, and contribution to work. Some participants reflected:

P01: There are (AI) implementations that can improve work and make it faster, but at the same time, you risk losing a more human or creative part.

FG6–P2: Artificial intelligence can do the job faster than a person, but the human style and way of working are difficult to replicate.

FG5- P3: If you use artificial intelligence all the time, you risk not using your mind or your skills anymore.

Taken together, these accounts suggest that AI is primarily viewed as beneficial when positioned as a supportive tool, but concerns are expressed when it is perceived as reducing human creativity and skills. This indicates a pattern in which evaluations of AI are contingent on its role in relation to human agency, with participants simultaneously recognising its utility and expressing reservations about its potential to diminish creativity and individual contribution.

Theme 2: Perceived Preparedness to Navigate the Digital Labour Market

In general, participants reported partial preparedness for the digitally mediated work contexts. Findings indicated that participants considered themselves somewhat prepared, but also recognised significant gaps in their knowledge and skills, particularly in understanding the rapid pace of technological change. Across interviews and focus groups, participants consistently viewed successful labour-market entry as requiring continuous learning and ongoing skills development.

Subtheme 1: Feelings of Partial Preparedness

Findings indicated that while some participants express confidence in their capacity to grow, they also report uncertainty and disorientation about entering the labour market. Several participants explicitly described their readiness as incomplete yet developing. Essentially, rather than expressing confidence or uncertainty in absolute terms, participants portrayed preparedness as an evolving process that would continue beyond formal education.

Participants described this partial preparedness in different ways:

P03: If the question is like, am I prepared or not? ' I think, like, let's say 70%, I'm prepared. 30% I still need to prepare.

FG3- P3: Although yeah, I feel prepared, but with the current (AI) developments, I'm not really sure if I'm well updated that much.

FG5- P4: If I have to enter the real world of work, maybe I feel a little disoriented.

Subtheme 2: Need for Continuous Learning

While some participants reported partial preparedness, they further believed that they needed additional training to succeed in the current employment landscape. Preparedness to enter the labour market is understood as requiring continuous learning. AI and digitalisation were therefore viewed as creating a labour market in which knowledge and skills require continual updating, making lifelong learning an essential component of employability.

Below are some illustrations from participants:

FG4–P2: In my opinion, we will certainly need continuous training, because technology changes very quickly, you have to keep up-to-date.

P02: I do feel like I would have to push myself into learning more things, even though it might be exhausting.

P03: Nowadays, different companies adopt different tools for operations, but it takes some training to get the hang of the tools.

Collectively, findings suggest that young people's perceived preparedness is conditional and characterised by partial confidence. Although participants express a degree of confidence in their ability to adapt and grow, they recognise that successfully navigating and seizing opportunities in the digital age requires ongoing training, upskilling, and sustained engagement with technological change.

Theme 3: Digital Skills and Psychological Resources for Successful Labour-Market Adaptation

Participants identified a range of digital competencies and psychological resources they perceived as important for successful labour-market entry. Across interviews and focus groups, participants consistently described successful adaptation to a digitally transforming labour market as depending not only on digital skills but also on psychological resources that enable individuals to respond to continuous technological change and evolving workplace demands.

Subtheme 1: Digital Skills for Labour-Market Adaptation

Regarding digital skills, participants particularly emphasised communication and collaboration. These competencies were discussed not only as general interpersonal skills but also in relation to communicating, coordinating, and collaborating through digital tools and technology-mediated work environments. Participants, therefore, associated digital competence with the ability to work effectively with others through technological tools, rather than solely with general interpersonal skills.

This perspective was reflected in participants' accounts:

FG2-P4: I put communication and collaboration, because in my opinion, they are the most fundamental parts in work, especially in teamwork.

P02: So if you don't have the basic skill of communication and collaboration when it comes to digital skills, I think it would be harder for you to even be literate with some new technology.

P03: You will need to be able to collaborate and communicate effectively with the tools that you have.

In addition to communication and collaboration, some participants regarded problem-solving as another digital skill for a successful transition into the technology-driven labour market. However, in contrast to communication and collaboration, which were described as foundational competencies across most

roles, problem-solving was often framed as particularly relevant in situations characterised by unexpected challenges or role-specific demands. Participants' responses indicated the importance of responding efficiently to unforeseen technological or task-related difficulties. Participants associated this competency with responding quickly to problems and generating possible solutions.

As participants described:

P03: If there's a problem occurring and you have good problem-solving skills, you're more likely to, you know, brainstorm.

FG2- P8: Problem-solving is important, that is, the ability to solve problems quickly when unexpected situations happen.

Overall, participants particularly emphasised communication, collaboration, and problem-solving when describing the digital competencies required for labour-market entry, while other DigComp domains, including information and data literacy and digital content creation, featured less prominently in their accounts.

Subtheme 2: Psychological Resources for Labour-Market Adaptation

With respect to psychological resources, participants specifically emphasised optimism and curiosity as resources that facilitate adaptation to a digitalised and uncertain labour market. Optimism was described as the capacity to anticipate favourable outcomes and to focus on constructive aspects of challenging situations. Also, participants associated curiosity with a desire to acquire new information and expand their professional networks, particularly in relation to emerging job opportunities.

Echoing this perspective, two interview participants explained:

P01: Optimism because you have to be a little optimistic when things go very badly, you have to see the side, let's say, in quotes, good.

P07: Optimism because if we have negative sentiments about technological advancement these days, we are going to be left behind.

To emphasise curiosity, participants expressed:

FG2-P5: Curiosity is important because it can increase one's personal network.

P06: Curiosity is also key in this (AI) work context.

Beyond optimism and curiosity, participants further briefly indicated that resilience and confidence were also important for successful labour-market entry. These attributes were primarily discussed in relation to instability, rapid change, and the personal demands associated with technological adaptation.

Participants' narratives indicated that the unpredictability of the contemporary world of work requires the ability to withstand setbacks and maintain psychological equilibrium. Confidence was linked to engaging with unfamiliar digital tools and to persisting in career navigation despite initial unsuccessful attempts.

As some participants commented:

P02: *Resilience is good… because again, the world right now is so uncertain. So really, the resilience being there helps you ground yourself in uncertainty.*

FG7-P5: Resilience, because if you're not resilient, no matter a big problem or a small problem, you'll not be able to deal with it.

Other participants commented on confidence, stating:

P04: Confidence, I could say also. I can't be feeling a bit confident about using it (digital devices), even though maybe it doesn't go the best way, but like you feel confident about trying and stuff.

FG6-P06: When it comes to career, I would say that confidence is important.

Overall, participants consistently described successful adaptation to digitally transforming labour markets as dependent upon both digital competencies and adaptive psychological resources. Whereas communication, collaboration, and problem-solving were viewed as facilitating effective participation in technology-mediated work, optimism, curiosity, resilience, and confidence were perceived as enabling individuals to continuously learn, adapt, and respond positively to ongoing technological change.

Discussion

The present study explored young people's perspectives regarding the introduction of AI and the digitalisation of the current employment context. In addition to examining their perceived preparedness, the study further discussed the digital skills and psychological resources participants considered essential for successful labour-market entry.

Findings revealed that young people hold contrasting views about AI and digitally based work contexts. Specifically, while they hold optimistic perspectives on the efficiency gains from AI and digitalisation, they also express concern about the risks of losing human originality in the workforce. A plausible explanation for this result lies in the different roles participants attributed to AI in relation to human work. Participants evaluated AI positively when it was perceived as supporting work processes and negatively when it was associated with decreasing human skills and contribution. This result aligns with other research findings indicating that while young people acknowledge the relevance of AI in enhancing job safety and improving working conditions, they also express concerns about job security and its potential societal impact [36, 19]. [37] conceptualise this phenomenon as ambivalence toward digital–AI transformation, in which individuals simultaneously acknowledge both the opportunities and potential risks associated with a digitally transformed employment context. This finding can further be interpreted

through the lens of the IFGE, in which labour-market conditions, characterised by rapid digitalisation, shape how individuals evaluate employment opportunities and risks. The observed ambivalence suggests that young people are actively negotiating the implications of technological change for their future employability, balancing perceived efficiency gains against concerns about reduced creativity and potential substitution.

Moreover, participants described their preparedness for labour-market entry as partial and conditional. Although they generally felt prepared for employment, they also believed that additional training would be necessary to enhance their prospects of securing work. This finding may be attributable to the fact that technology and AI are constantly evolving, with the emergence of new tools, platforms, and AI systems, prompting young people to recognise that maintaining employability may depend on continuous learning. This interpretation is consistent with [38], who noted that technological changes associated with AI and digitalisation have intensified the demand for specialised skills, thereby reinforcing the notion that further training is essential to remain competitive. [39] agrees with our findings and reports that young individuals often feel reasonably prepared for the labour market, yet they believe that rapid technological changes require continuous learning and upskilling. However, other studies have suggested contrasting views, stating that younger people may already possess relatively strong digital competencies due to extensive exposure to technology [40]. This difference may reflect the distinction between possessing competencies and maintaining them as workplace technologies evolve. Viewed through the perspective of the IFGE, these findings suggest that employability is shaped not only by the human capital that individuals currently possess but also by their capacity to continually develop that capital in response to changing labour-market conditions.

Additionally, our findings also revealed that communication and collaboration, along with problem-solving, were the digital skills frequently described as essential for successful labour-market entry. One possible explanation for these findings might be that young people prioritise skills they consider transferable across multiple employment contexts and are therefore valuable for evolving work practices. Skills such as communication, collaboration, and problem-solving have been reported as competencies that enable individuals to function across diverse occupational contexts. This result is consistent with that of [8], who report that communication and collaboration, as well as problem-solving, were among the top three digital skills for the future. Although some studies have highlighted other competencies within the DigComp Framework, such as information and data literacy or digital content creation, as essential for navigating the digitalised labour market [41, 42], a growing body of evidence has suggested that communication, collaboration and problem-solving are particularly critical for successful entry into contemporary digital work environments [43, 8, 44]. Moreover, within the IFGE, these competencies represent focal components of human capital that enhance individuals' ability to meet labour market requirements, improve their employability, and facilitate the school-to-work transition.

Optimism and curiosity were identified as the psychological resources participants believed were important for securing employment in the current world of work. A possible reason for this finding is that

both optimism and curiosity are future-oriented resources that may be particularly relevant during a transition characterised by exploration, uncertainty, and future career decisions. The present findings are in line with [27], who argue that curiosity promotes career exploration and information seeking, and with [26], who describe optimism as fostering positive expectations and sustained motivation when pursuing future goals. Even though participants repeatedly referred to optimism and curiosity, they also briefly described resilience and confidence as salient for coping with labour market uncertainty and technological change. These findings suggest that participants viewed successful adaptation as requiring not only a positive orientation towards future opportunities but also the capacity to persist through challenges and confidently engage with unfamiliar technologies. Applying the IFGE to these findings suggests that these psychological resources illustrate key aspects of individual attributes that help young people develop human capital in response to changing labour-market conditions.

From an integrative perspective, these findings suggest that digital competencies alone may be insufficient for successful labour-market adaptation unless supported by underlying psychological resources that enable their activation and continuous development. Within the Integrated Framework of Graduate Employability (IFGE), these observations point to a dynamic interaction between human capital and individual attributes, in which psychological resources complement digital skills, enabling individuals to navigate AI-enabled work contexts successfully.

Implications

The present study offers both practical and theoretical implications for understanding employability in digitally transforming labour markets. The findings suggest that employability interventions should move beyond developing technical digital skills alone and instead combine digital competence development with opportunities to strengthen adaptive psychological resources. Universities could incorporate AI literacy modules, digital team exercises and problem-solving simulations into employability programmes. Also, vocational guidance interventions could integrate career adaptability workshops, guided reflections on responsible use of AI, digital self-efficacy exercises and structured exploration of emerging occupations. Employers could complement technical onboarding with continuous professional development opportunities that strengthen digital collaboration, adaptive problem-solving, and confidence in engaging with emerging technologies. From a theoretical perspective, the findings suggest that digitally relevant human capital and adaptive psychological resources may represent complementary dimensions of preparedness within the IFGE. Participants' accounts indicate that digital competencies are perceived as relevant for engaging with technology-mediated work, while psychological resources are perceived as relevant for adapting to uncertainty and technological change. These findings raise the theoretical hypothesis that psychological resources may support how individuals develop, maintain, or mobilise digital competencies under changing labour-market conditions. This proposed relationship requires further empirical investigation through longitudinal, quantitative, or mixed-methods research.

Limitations and Directions for Future Research

The present study is not without limitations. One limitation of the present study is that a single researcher conducted the coding, although theme development was discussed with the co-authors to enhance analytical credibility. Furthermore, the analysis focused on patterns across the dataset and did not include subgroup comparisons among secondary school students, university students, and job seekers. Future research could involve multiple coders to strengthen analytical rigour and examine whether perceptions differ across these groups. Additionally, data on prior exposure to AI were not collected in this study. Differences in AI exposure and use may influence one's perceptions of technological changes in the workplace and one's preparedness to adopt them. Future research should thus account for participants' level of AI exposure and use. Moreover, although theory-informed prompts were introduced to deepen participants' reflections, their use may have increased the prominence of resources already represented in DigComp, Psychological Capital, and Career Adaptability. Future studies could use more fully inductive questioning to examine which resources young people identify spontaneously.

Declarations

Conflict of Interest:

There is no conflict of interest, and the authors declare that the content of the research is the sole responsibility of the authors.

Ethical Approval and Consent to Participate:

The present study received ethical approval from the Ethics Committee for Research (Comitato Etico per la Ricerca) of the University of Bologna for all research procedures (protocol number: 0410027). All research procedures were conducted in accordance with the relevant ethical guidelines and regulations of the University of Bologna and the requirements established by the approving ethics committee. All participants were informed about the aims of the research, the nature of their involvement, their right to withdraw at any time without consequences, and the measures in place to ensure confidentiality and anonymity. Informed consent was obtained from all participants before participation.

Consent for Publication:

Not applicable

Competing Interest:

The authors declare no competing interests.

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Author Contribution

All authors contributed to the study conception and design. Data collection was conducted by members of the research team. Data analysis was led by A.A, with M.D.A and M.B contributing to the interpretation of the findings. The first draft of the manuscript was written by A.A, and all authors reviewed and commented on subsequent versions. All authors read and approved the final manuscript.

Data Availability

The data supporting the findings of this study are available upon reasonable request from the authors.

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