

Effects of a Project Management MOOC on Employability Skills and Career Self-Perception: Comparing Academic Cohorts and Free Auditors in a Pre-test/Post-test Design

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Abstract

This study examines the impact of a Project Management MOOC on self-perceived employability and career self-perception, comparing academic cohorts (AC) who enroll as part of formal education with free auditors (FA) who participate voluntarily. Drawing on a competence-based approach, we assess skill-based employability through dimensions of occupational expertise, anticipation and optimization, and personal flexibility, and evaluate career self-perception via measures of external marketability, career ambition, and motivation. Prior research tends to show that the active population puts importance on skills and social networks, whereas students view MOOC micro-credentials as a means to access the labor market. However, a research gap remains regarding how different learner groups leverage MOOCs for professional development. Data was collected during the course via two surveys administered at pretest (N = 3,059) and posttest (N = 1,357), with paired analyses on 1,301 participants. Results indicate that FA exhibit significantly higher scores in skill-based employability and career motivation at both pre- and post-test, whereas AC demonstrate better scores in external marketability and career ambition, with no significant differences observed in personal flexibility for both groups. These findings highlight that the subdimensions of employability, whether approached from a skill-based or dispositional perspective, do not behave homogeneously but vary depending on contextual factors such as learner group and course subject matter. The study contributes to the integrative employability research agenda and underscores the importance of contextualizing MOOC effects according to learner status. These results highlight the need for further investigation about the mechanisms through which MOOCs enhance practical competencies and influence career self-conception across diverse learner populations, paving the way for future research to better understand how distance learning settings can better foster employability.

Keywords: Academic cohorts, graduate students, MOOC, employability, skills, disposition

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MOOCs attract a diverse range of learners: On the one hand, many students are required to enroll in MOOCs as part of their formal university curriculum, integrating these courses into their mandatory academic programs (Watted & Barak, 2018). On the other hand, a large population of active individuals enroll voluntarily in lifelong learning and professional development dynamics (Milligan & Littlejohn, 2017). These learners, often professionals seeking to enhance their skills or explore new fields, are motivated by the flexibility and accessibility that MOOCs offer, allowing them to balance education with other personal and professional responsibilities (Chaker et al., 2022). If this dual enrollment pattern highlights some democratic aspect of MOOCs, it also underscores the need to understand the distinct motivations and outcomes associated with each learner group. For instance, while students sometimes view MOOCs as a pathway to enhancing their employability (Santandreu Calonge & Shah, 2016), potential recruiters see them as a means of professional development (Walton Radford et al., 2014).

Specifically, there is a research gap concerning the extent to which these two learner groups differ in their employability outcomes and career self-perceptions within the MOOC context. This article studies the effects of a project management MOOC on participants' self-perceived employability and career self-perception. We employ a person-centered (Monteiro et al., 2022), psychological approach to study employability (Vanhercke et al., 2014), a competence-based approach (Van Der Hayden & Hayden, 2006) to evaluate self-perceived employability, and a dispositional approach of employability (Fugate, Kinicki & Ashforth, 2004) to evaluate career self-perception. The latter refers to "the perceptions regarding one's added value at the (internal or external) labor market" (De Vos et al., 2011), as well as, I might add, the perceptions of one's congruence with the demands of the current labor market. This article aims to answer the following main research questions:

Are there any differences in terms of self-perceived employability between university students and the general population freely enrolled in a MOOC before and after the end of the course? Are those potential differences observed across different employability approaches?

These research questions seek to better understand how dispositional and competence-based approaches result in measurable differences in self-perceived employability and career self-conception after a MOOC. In doing so, this study aims to contribute to three key scientific objectives: 1) the need to better understand differential outcomes for online and distance learning programs, in terms of job- and career-related and professional development outcomes; 2) the need to conduct integrative employability research (Forrier et al., 2015; Römgens et al., 2020); and 3) to bridge the gap about the "limited theoretical or practical exchange" between graduate employability and career development (Healy et al., 2022, p. 799).

MOOCs and Employability

MOOCs in Higher Education: Between Compulsory Programs and Professional Development Dynamics

MOOCs as Drivers and Replacements in Higher Educational Settings

MOOCs (Massive Online Open Courses) were accompanied since their conception by the promises that they will generalize global access to higher education pedagogical contents (Reich, 2020). The idea was indeed to provide students from around the world educational content provided by the best (Western) universities. This would allow different populations to benefit at a reduced cost from course units offered by "prestigious" universities, as well as

people who are employed, who could take advantage of the flexibility of the MOOC format (Alcorn et al., 2015). Rather than transforming the higher educational system, MOOCs were integrated into existing university programs (Reich & Ruipérez-Valiente, 2019).

Building on these premises, MOOCs are progressively integrated into traditional higher education systems, providing an effective means to supplement on-campus instruction with scalable, flexible, and accessible distance learning elements within undergraduate and graduate programs (Griffiths et al., 2015). This integration allows institutions to diversify their educational offerings by embedding digital course components that complement conventional curricula (Bralić & Divjak, 2018; de Lima Guedes et al., 2022). Moreover, some institutions have begun to mandate MOOCs as part of their academic programs, in part to ensure that all students acquire critical digital literacy and lifelong learning skills essential for the modern workforce (Israel, 2015), but also because MOOCs fit well into a busy student and academic program time schedules (Shapiro et al., 2017; Li et al., 2022). This blended approach has been shown to enhance learning outcome (De Moura et al., 2021). It also aligns educational practices with the rapidly evolving demands of higher education in a digital era. For Williams (2024), enrolled higher education students “access MOOCs as learning and teaching resources as part of existing courses, using video lectures, reading lists, and other open educational resources” (p. 2).

Integrated MOOCs and micro-credential programs in universities’ curricula can be seen as a means of better preparing students for the evolving demands of the labor market. These innovative educational approaches not only supplement traditional academic offerings but also equip graduates with supposedly practical, industry-recognized skills that enhance their overall employability (Dillahunty et al., 2016; Rothwell et al., 2008). Indeed, the development of students’ employability “is most effective through a processual approach in which the responsibility for employability development is shared by institution, industry and student” (Bennett, 2018, p. 50). This could take the form of micro-credentials and for-credit activities (Burke et al., 2017; Jackson et al., 2024), or any program that recognises students’ need to develop in advance “a set of person-centred constructs that involve individual proactivity and reflexivity relating to career identity, personal adaptability, and social and human capital” (Bennett et al., 2017; Fugate et al., 2004, as cited in Bennett, 2018, p. 50). In other words, it is the responsibility of higher education institutions to support students in cultivating their dispositional development with respect to these dimensions. However, despite their potential, the efficacy of such programs into university curricula to enhance graduates’ readiness for the labor market remains uncertain. Further research is needed to determine whether these innovations translate into tangible improvements in employability outcomes. Indeed, the low level of graduates’ transferable skills is regularly reported by employers, in part due to “the low connectivity between the studied subject and the subsequent occupation” (Behle, 2020, p. 113). Hence, focusing on the development of self-perceived employability, rather than on immediately transferable skills, can help us understand to what extent a program participated in building employability capacity among higher education students (Bennett, 2018; Jackson et al., 2024).

MOOCs in the Context of Professional Development and Lifelong Learning

With the rapid diffusion of digital technologies and the widespread availability of online resources and networks, new forms of learning have become possible, and MOOCs have emerged in this context as a timely (Barker et al., 2024) key response, offering scalable and flexible formats for ongoing professional development (Torcivia Prusko, 2020). They have become a popular tool for professional development across various industries (Chaker & Bachelet, 2020) for “vocational learners” (Williams, 2024). A large-scale survey of MOOC

completers found that around half of the respondents took the course primarily for career-related reasons (Zhenghao et al., 2015). Among them, 87% reported that the MOOC benefited their professional development, improved skills for their current job (62%), aided them in finding a new job (26%), or provided them support for launching their own business (9%). Indeed, MOOCs are being utilized more frequently not only to enhance current occupational skills but also to specialize further in one's field through the acquisition of new skills (Milligan & Littlejohn, 2014). In their inductive research, Watted and Barak (2018) found that general MOOC completers (vs. "university-affiliated" completers), declared pursuing career benefits across four subdimensions: "professional competence, product development, research relevance, and career change" (p. 14).

For instance, MOOCs may contribute to career advancement not just by fostering skill development, but also by offering micro-credentials from educational institutions (Novella et al., 2024). MOOCs aimed at enhancing professional competencies attract a diverse range of learners with varying educational backgrounds (Milligan et al., 2013). However, continuous professional education presents several challenges, including the need for professionals to independently manage their online learning and the imperative to emphasize the integration of theoretical knowledge with practical skills in professional contexts (Milligan & Littlejohn, 2014; Mori & Ractliffe, 2016; Chaker & Bachelet, 2020; Chaker et al., 2022).

The inherent characteristics of MOOCs—their openness and online accessibility—make them particularly well-suited for workplace learning. This format can facilitate the transfer of skills between professional practice and learning environments, allowing learners to immediately apply new knowledge in their work contexts (Milligan & Littlejohn, 2014; Egloffstein & Ifenthaler, 2017). Furthermore, the flexibility of MOOCs enables professionals to engage in continuous learning without significant disruption to their work schedules, making them an attractive option for both employers and employees seeking to enhance their skills and knowledge base (Bachelet & Chaker, 2017; Castañeda et al., 2018). In their research, Chaker et al. (2022) demonstrated that MOOC performance among free-auditors—primarily active individuals such as managers and job seekers—was largely contingent upon the time they could allocate to course activities.

However, while MOOCs can enhance skill-based employability, they may not offer greater employability benefits to those who have never been able to attend school or had a formal job (Callonge & Shah, 2016; Kizilcec et al., 2017). Therefore, MOOCs should be seen as a complement to formal education and work experience, rather than a replacement (Mohsen, 2016). This perspective aligns with the idea that MOOCs can serve as a strategic resource for professional development within and outside institutions, particularly in higher education settings (Despujol et al., 2022). While MOOCs offer flexibility and accessibility, they are most effective when integrated into a broader educational or professional development strategy. In this context, professional development serves as a catalyst for employability by enabling individuals to align their skills with the demands of the Internet and external job market (Bates et al., 2019; Shiri et al., 2023). In this perspective, university students are also concerned by the need to foster and demonstrate their employability skills (Choate et al., 2016; Cleary et al., 2019).

The Plurality of Employability Approaches

Despite its importance, there is no clear consensus on the exact definition or dimensions of employability. The nature and structure of work have experienced dramatic changes, resulting in an environment where job security has become increasingly uncertain in the broader context of the transition from an industrial to a postindustrial society (Thijssen &

Van der Heijden, 2003). This shift represents a transition from traditional organizational career paths to “boundaryless careers” and “protean careers” (Mirvis & Hall, 1994; Hall & Mirvis, 1995). These modern career models prioritize individual control over organizational control. A protean career involves a variety of personal experiences, including education, learning, working across different organizations, and changing professional fields. Success in these careers can be internally defined, focusing on psychological satisfaction rather than external achievements. Specifically, understanding the evolving career landscape hinges on the concept of employability. In this context, employability has gained prominence as a key factor in addressing labor market imbalances, shaping educational policies, managing employment relationships, and understanding individual job-seeking strategies. Its implications are extensive, affecting political, social, economic, and managerial spheres. In human resource management, employability is increasingly viewed as a mutual responsibility between employers and employees (Forrier, De Cuyper & Akkermans, 2018).

Competence-Based Approach of Employability

Employability generally refers to an individual’s ability to obtain and retain employment: Rothwell and Arnold (2007) define employability as “the ability to keep the job one has or to get the job one desires” (p. 25). For instance, this can involve a variety of competencies, skills, and attributes that make a person more attractive in the labor market, including technical skills, soft skills, adaptability, and commitment to continuous learning. The emphasis on employability highlights a shift from job security to career security, where individuals are responsible for maintaining their employability through ongoing learning and skill development (Guilbert et al., 2016). This competence-based approach to employability focuses on the individual competences, in terms of know-how and knowledge, a person possesses (Van der Heijden et al., 2009). For van der Heijde and van der Heijden (2006), “besides adaptive behavior, employability may contain personal elements such as personality, attitudes, motivation, and ability,” but also: “employability represents the combination of specific and more generic competence,” (p. 453), or as the authors put it, “a more broader competence package” (p. 453), such as corporate sense, anticipation, and optimization, personal flexibility, and balance. The competence-based approach relies on the idea that employability can be enhanced by developing specific skills and knowledge that are valued in the job market. This approach suggests that hiring and employee development should be based on their skill sets instead of their work history (Gabor, Blaga & Matis, 2019). It also encourages continuous learning and skill development to keep up with the changing job market.

Dispositional Approach of Employability

The dispositional approach to employability, on the other hand, emphasizes attitudes, personality, and individual dispositions, in terms of career management and focus. The dispositional approach to employability is defined as a constellation of individual differences that predispose individuals to proactive adaptability specific to work and careers (Fugate & Kinicki, 2008). It postulates that employability depends not only on technical skills but also on a person’s attitudes and behaviors, and considers personal traits and characteristics, such as motivation, resilience, and adaptability, in the comprehension of an individual’s career dynamics. Dispositional employability can then be understood as a psychosocial process that facilitates the enactment of behaviors directed toward career self-management (Brown et al., 2024). For example, a study on dispositional employability and self-regulation in antisocial and prosocial personalities found that career motivation explained 6.4% of the variance in dispositional employability (Lisá & Valachová, 2023). This suggests that career motivation is a significant factor in an individual’s employability from a dispositional perspective. Career motivation, which can be understood as the drive or desire to achieve success and progress in

one's professional life, influences how individuals adapt to their work and career circumstances.

Career ambition can also be considered as part of the dispositional approach to employability. It reflects an individual's drive and motivation to achieve career-related goals and can be seen as a dispositional trait that influences one's adaptability in the workplace (Garavan et al., 2021). It can affect how an individual approaches career development, job changes, and other work-related challenges.

External Dimension of Employability

Both skill-based and dispositional approaches put importance on individual characteristics in terms of employability (Forrier et al., 2018). However, "employability is not only about individual attributes. (...) There are also external factors including the state of the contemporary external labour market" (Rothwell & Arnold, 2007, p. 25). External marketability refers to an individual's perceived attractiveness to external organizations (Park et al., 2022). It is related to how individuals perceive their own skills, experiences, and qualifications that are valued in the external labor market. Self-perceived employability was found in previous research as a positive predictor of perceived marketability (De Vos et al., 2011). Hence, marketability is a belief in one's value to current and future employers (Eby et al., 2003), a construct that appears to be more closely linked with dispositional employability than with purely skill-based factors. Indeed, the way individuals appraise their marketability tends to be filtered through their internal dispositions and self-beliefs (Berntson et al., 2008; Lisá & Valachová, 2023). Therefore, perceived marketability can be seen as a function of dispositional factors, highlighting the role of subjective self-assessment in shaping career prospects (Bargsted, 2017). However, Rothwell and Arnold (2007) also posited that external perceived marketability "relates to individuals' self-perception of their worth (based more on their personal skills than features of their occupation) in the external labour market" (p. 27). Thus, perceived marketability can be seen as an interplay between the objective possession of personal skills and the subjective, dispositional evaluation of these skills. In both approaches, external marketability can although be linked to a relational perspective of employability (Forrier et al., 2018); individual attributes must be aligned with market's needs and realities in order for them to be reified into real employability outcomes.

Thus, it can be argued that external marketability occupies a hybrid position between dispositional and skill-based constructs. On the one hand, it is dispositional in that it involves an individual's subjective assessment of their own qualities and the beliefs they hold about their capabilities. On the other hand, it also reflects a skill-based dimension, as it considers how well these personal attributes align with the demands of the labor market. In fact, perceived external marketability serves as a means of evaluating the congruence or alignment between an individual's characteristics and the external employment environment, as self-assessed by the individual, in a relational and situated perspective. Consequently, some research focuses on determining whether external marketability functions more as a reflection of intrinsic, dispositional factors or as an outcome of acquired skills (Fugate et al., 2004; Rothwell & Arnold, 2007).

What Are the Employability Outcomes for Academic Cohorts and Free Audits in a MOOC?

This research overview highlights possible differences between academic cohorts (AC), who are required to take MOOCs as part of their academic program, and free auditors (FA), who enroll voluntarily. These groups somehow appear to hold distinct perceptions and use different strategies to leverage MOOCs for enhancing their employability.

AC, who enroll in MOOCs as part of their formal education, typically benefit from institutional validation and complementary certifications that bolster their self-perceived employability and career self-conception (Rothwell, Herbert & Rothwell, 2008; Rothwell, Jewel & Hardie, 2009). In contrast, FA, often working professionals or job seekers, must adopt a self-directed, skills-based approach, emphasizing cross-competences and continuous adaptation to labor market demands (Van der Heijden et al., 2009; Forrier et al., 2015; Forrier et al., 2018). These differences raise research questions regarding the extent to which these two learner groups differ in their employability outcomes and career self-perceptions, specifically when taking MOOC. The research questions are as follows: RQ1: To what extent are there between-groups significant differences (AC vs. FA) in terms of competence-based employability and career self-conception at pretest?

RQ2: To what extent are there between-groups significant differences (AC vs. FA) in terms of competence-based employability and career self-conception at posttest?

RQ3: To what extent are there within-subjects significant differences (competence-based employability vs. career self-perception) between pre- and post-test?

RQ4: To what extent are there within-subjects significant differences (competence-based employability vs. career self-perception) depending on group membership (AC vs. FA) between pre- and post-test?

Methods

Context of the Study

The Project Management (PM) MOOC (<https://mooc.gestiondeprojet.pm>) is a biannual MOOC in project management delivered by Centrale Lille (France). It aims to certify already employed individuals through flexible online courses that provide timely professional development (Barker et al., 2024) and also targets higher education students as part of their for-credit programs (Lee et al., 2022). Launched in 2013, it is widely recognized as one of the first certifying French MOOCs and has been offered twice a year ever since, with well over one hundred thousand enrolments across successive sessions (Verzat, 2020). The course is fully online, open to the general public, and delivered in French, with an estimated workload ranging from roughly 20 to 50 hours. It combines short video lectures, quizzes, discussion forums, live Q&A sessions and shared note-taking, organized over a four-week structure with a common “core” track. Each week aims the acquisition of specific skills and knowledge about PM: Week 1 is about project management fundamentals; Week 2 is about the essential tools to get a project started; Week 3 is about advanced tools in PM, and Week 4 is about risks management. Learners can follow a free audit track or complete graded activities and a proctored final exam to obtain a certificate that is recognized for ECTS credits at Centrale Lille, making the MOOC relevant both for initial higher education and for continuing professional development (Chaker, 2017). Hence, a substantial proportion of

participants are already in employment and report using the MOOC to update or formalize project-management skills that are directly transferable to their workplace, which makes it a particularly relevant context for studying online professional development and employability outcomes. Enrolled students constitute so-called academic cohorts (AC) of graduate students: The MOOC is part their master's program, as a mandatory course. These students from partners institutions are enrolled through their professors. AC students come from French higher education institutions (universities and high-rated *Grandes Ecoles*); they were therefore treated as students whose primary status is education and not as members of the active labor force, even if some of them may have held part-time or occasional jobs alongside their studies. In terms of model, those institutions often integrate the PM MOOC in their respective programs as a replacement of a traditional course about project management, with a direct alignment of the MOOC content with the existing courses in the curriculum (Pérez-Sanagustín et al., 2017). By contrast, the free auditors (FA) group is composed of self-enrolled participants, the large majority of whom are already active in the labor market. The present study uses the data gathered in the context of PM MOOC's 19th edition (2022), for which 9,445 participants enrolled, of whom 6,705 validated the core track.

Sample and Procedure

Two research surveys (RS) were inserted into the course: RS1 (pre-test) was integrated in week 0 of the course (before the official launch of week 1) and RS2 (post-test) was integrated in the course's week 4. Answering the surveys was non-mandatory and complete anonymity was assured. The sample is $N = 3,059$ at pre-test (41.60% females, mean age = 29.74) and $N = 1,357$ at post-test (41.90% females, mean age = 28.29). After data alignment using the participants' anonymous course IDs (automatically provided using enrolments tokens), the paired sample (that will be used for pair-wised comparisons between pre- and post-test) involves in total $N = 1,301$. The AC group was identified in the dataset using the "academic institution" field that is automatically generated in the MOOC platform data export, allowing us to sort out learners enrolled via a higher education institution. The number of participants in the surveys recorded a 44% attrition between both RS, as shown in Table 1:

Table 1

Study Samples Across Tests

N	Academic cohorts	Free audit participants	Total
Pre-test	1,770	1,289	3,059
Post-test	867	490	1,357
Aligned data	858	443	1,301

Among FA, the sample consisted of business owners (2.10%), individuals in higher managerial and professional occupations (47.40%), employees (11.70%), intermediate professionals (9.80%), jobseekers (23.20%), and non-active individuals (1.80%).

Measures

To answer our research questions, we used and adapted already existing questionnaires about employability, in such a way that the items of the subscales suit already employed persons but also higher education students. Hence, we selected items from previously validated scales or subscales, when applicable to both students and active population (see Appendix for the list of items). We only selected items from unifactorial scales or subscales, to ensure satisfactory internal consistencies.

Skill-Oriented Employability: Competence-Based and Multi-Dimensional Measurement of Employability

Van der Heijde and Van der Heijden (2006) and Van der Heijden et al. (2009) focus on employability as a skill-based concept. They define employability as “the continuous fulfilling, acquiring or creating of work through the optimal use of competences” (Van der Heijden et al. 2009, p. 453). From Van der Heijden et al. (2018) domain-independent instrument measuring self-perceived employability, we adapted the five items of the Occupational Expertise (OE) dimension (e.g., How would you rate the quality of your skills overall?), the four items from the Anticipation and Optimization (OA) dimension (e.g., I consciously devote attention to applying my newly acquired knowledge and skills), and three items from the Personal Flexibility (PF) dimension (e.g., How quickly do you generally anticipate and take advantage of changes in your environment?). Since the last two dimensions (Corporate Sense and Work/Life Balance) are too work-specific, we did not use them in our research.

Career Self-Perception: Perceived External Marketability

Regarding external employability, as measured by external marketability, Rothwell and Arnold (2007) contend that self-perceived employability “relates to individuals’ self-perception of their worth (based more on their personal skills than features of their occupation) in the external labour market.” This perspective highlights that while personal skills are indeed a component of skill-based employability, the emphasis on self-assessment underscores a significant dispositional element, especially when individuals (such as graduate students) possess only partial knowledge about the state of the job market. In other words, the valuation of one’s personal skills is inherently subjective, influenced by internal factors such as self-efficacy, confidence, and adaptability (Fugate, Kinicki, & Ashforth, 2004). Thus, perceived marketability can be seen as an interplay between the objective possession of personal skills and the subjective, dispositional evaluation of these skills, which, in our case, were dominating among graduate students. We adapted five items from the questionnaire of Rothwell and Arnold (2007) and Rothwell et al. (2009) in relation to the perceived external marketability (EM). For Eby et al. (2003), perceived EM corresponds to “the belief that one is valuable to other employers” (p. 690). Employability thus includes a “personal-organizational” dimension. An example of item: *Professionals in the area you are aiming for are in high demand in the labor market* (Rothwell & Arnold, 2007; Rothwell et al., 2009).

Career Self-Perception: Career Ambition

An internal–external split of employability is structured around a distinction between perceptions of the external labor market and individual self-belief, respectively (Rothwell, Herbert & Rothwell 2008). Internal employability is believed to relate to the perception of “(internal) attributes, skills, abilities, engagement with study, and ambition” (Rothwell, Herbert & Rothwell, 2008, p. 6). For Rothwell and colleagues (2009), the career ambition six-item scale we used in the present study is a “proxy for perceptions of future career success” (Rothwell, Jewell & Hardie, 2009, p. 155), and can be used for both students and general populations.

Career Self-Perception: Career Motivation

In terms of career self-perception, we also aimed to measure to what extent participants project themselves in terms of career planification. We used four items from the *career insight* subscale in Noe, Noe, and Bachhuber's *Career motivation* questionnaire (1990) (e.g., *To what extent do you have a specific career goal?*). Career motivation (CM) is an essential drive of employability, as it relates to individual agency towards career-related goals, and is among the dimensions that compose dispositional employability (Fugate & Kinicki, 2008). It can contribute to employability, as motivated graduates are more likely to actively seek and capitalize on opportunities (Brown et al., 2021).

Ethical Considerations

This study was conducted in accordance with Centrale Lille's institutional guidelines for pedagogical research and with the General Data Protection Regulation (GDPR). In line with these guidelines, formal approval from a research ethics committee was not required for anonymous, voluntary questionnaires administered in the context of routine teaching activities. Participation in the survey was entirely voluntary, no incentives were offered, and no identifiable or sensitive personal data were collected. At the beginning of each questionnaire, participants were informed that their responses would remain anonymous and would be used solely for the purposes of this study.

Results

Descriptive Results

The intercorrelations table yield significant ($p < .001$) relationships between all constructs at pre-test and at post-test. There is an exception for career motivation: There is no correlation with external marketability at pre-test, and the relationship is rather weak at post-test ($r = .036$; $p > .05$ and $r = .070$; $p < 0.05$; respectively). Hence, there is a rather weak or non-existent link between a relational aspect of employability and career insight as a personal trait or internal attribute.

Table 2

Correlation Table Between Constructs at Pre-test (Post-test Between Brackets)

	OE	A&O	PF	CA	EM
A&O	.370** (.420**)				
PF	.366** (.327**)	.431** (.457**)			
CA	.208** (.241**)	.353** (.408**)	.245** (.290**)		
EM	.170** (.186**)	.253** (.298**)	.210** (.228**)	.253** (.279**)	
CM	.193** (.224**)	.310** (.359**)	.173** (.273**)	.236** (.336**)	0.036 (.070*)

Between-Groups Differences: Free Auditors Display Higher Skill-Based Employability and Career Motivation, While Academic Cohorts Display Higher Career Self-Perception

Between-Groups Differences at Pre-test

All constructs at pre-test display satisfying to excellent internal consistencies ($.69 < \alpha < .85$). Results show at pre-test (Table 3) that free audit participants (FA) declare significantly higher skill-based employability than academic cohorts (AC). They score higher occupational expertise (OE) ($M = 3.66$; $SD = .60$ and $M = 3.46$; $SD = .61$; $t = -8.90$; $p < .001$, respectively), and higher anticipation and organization (A&O) ($M = 3.70$; $SD = .72$ and $M = 3.64$; $SD = .64$; $t = -2.26$; $p = .024$, respectively). Differences are not significant for personal flexibility (PF). FA also declare higher career motivation (CM): $M = 3.45$; $SD = .89$ and $M = 3.33$; $SD = .87$ ($t = -3.78$; $p < .001$), respectively.

Conversely, AC declare higher career-related perceptions than FA. They score higher external marketability (EM) ($M = 3.57$; $SD = .73$ and $M = 3.01$; $SD = .82$; $t = 19.67$; $p < .001$, respectively), and higher career ambition (CA) ($M = 3.47$; $SD = 1.13$ and $M = 3.33$; $SD = .87$; $t = 12.81$; $p < .001$, respectively).

Table 3

Employability and Career Self-Perception Scores at Pre-test by Group

	Academic cohorts		Free Auditors				Total		
	M	SD	M	SD	t	p	M	SD	α
Occupational Expertise	3.45	.61	3.70	.60	-8.90	.001	3.54	.60	.79
Anticipation & Organization	3.64	.65	3.70	.72	-2.26	.024	3.67	.68	.74
Personal Flexibility	2.98	.91	3.99	.93	-1.25	.211	3.01	.93	.82
External Marketability	3.56	.73	3.01	.82	19.67	.001	3.33	.82	.80
Career Ambition	3.47	1.13	2.93	1.20	12.81	.001	3.25	1.18	.85
Career Motivation	3.33	.87	3.45	.89	-3.78	.001	3.38	.88	.69

Between-Groups Differences at Post-test

All constructs at post-test display acceptable to excellent internal consistencies ($.70 < \alpha < .82$). The same tendencies than at pre-test were observed (Table 4): between-groups differences are constant in terms of competence-based approach of employability and career self-perception.

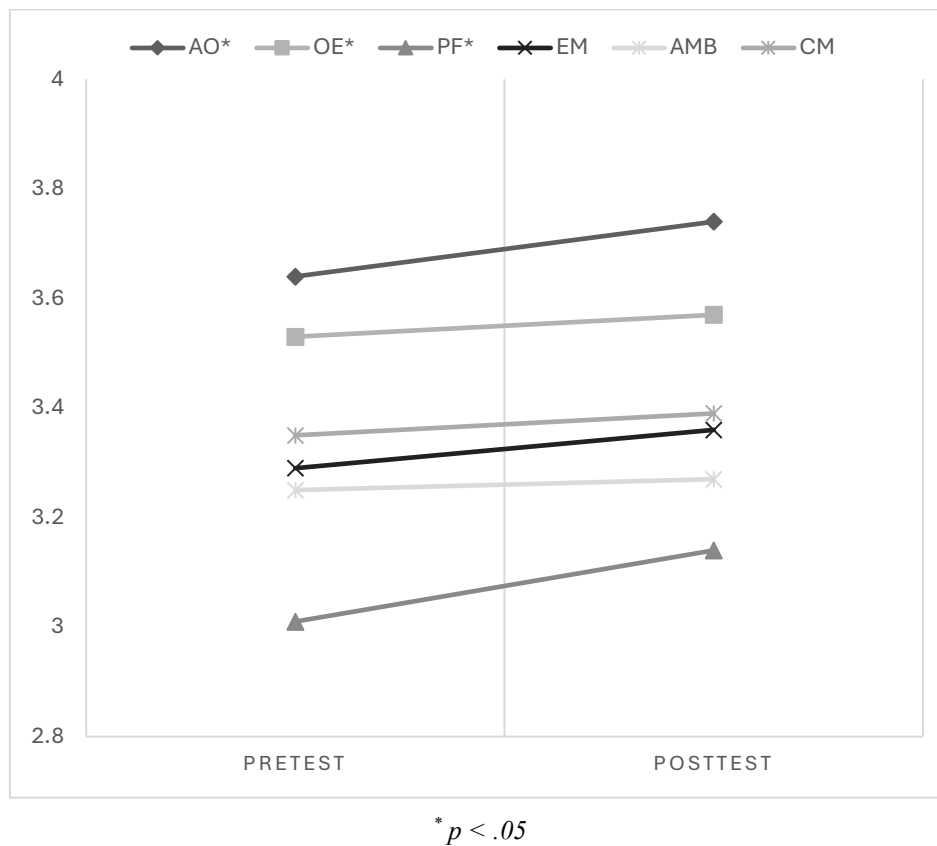
Table 4*Employability and Career Self-Perception Scores at Post-test by Group*

	Academic cohorts		Free Auditors				Total		
	M	SD	M	SD	t	p	M	SD	α
Occupational Expertise	3.44	.63	3.83	.56	-11.45	.001	3.57	.63	.78
Anticipation & Organization	3.71	.64	3.83	.64	-3.44	.001	3.75	.64	.72
Personal Flexibility	3.12	.85	3.18	.89	-1.69	.102	3.14	.86	.80
External Marketability	3.53	.74	3.04	.83	10.42	.001	3.56	.81	.82
Career Ambition	3.41	1.15	3.01	1.20	5.17	.001	3.27	1.18	.82
Career Motivation	3.30	.86	3.56	.83	-5.44	.001	3.39	.86	.70

For both pre- and post-test, FA yield significantly higher score than AC for skill-based employability (OE and A&O) and career motivation. Conversely, AC yield significantly higher scores than FA for career self-perception (external marketability and career ambition).

Deltas Between Pre- and Post-test and Within-Groups Differences**Deltas Between Pre-test and Post-test for the Whole Sample**

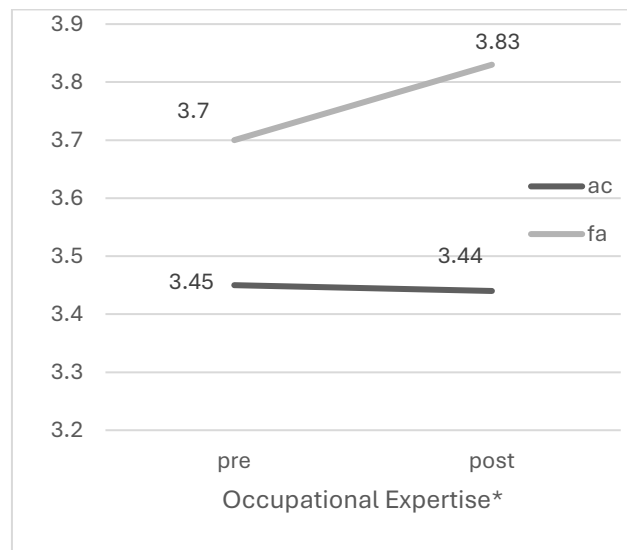
We ran paired *t* tests for the whole sample between pre- and post-test to verify for significant differences between before and after the project management course. Results indicate significant and positive change for the three skill-based employability variables (A&O: $t = 6.27$; $p < .001$; OE: $t = 2.09$; $p = .037$; PF: $t = 4.76$; $p < .001$). For OE, we observe a very small difference ($M = .03$; $SD = .58$), whereas for A&O and PF the differences are $M = .11$; $SD = .61$ and $M = 0.13$; $SD = .99$, respectively. External marketability, career ambition and career motivation do not yield significant change ($p > .05$).

Figure 1*Evolution Between Pre- and Post-test for Each Measured Variable***Within-Groups Differences Between Pre- and Post-test**

To verify for a status effect (academic cohort vs. free audit participants), we ran a repeated-measure ANOVA for each research variable, fixing status as a between-subjects factor. For the skill-based factors, we found a significant status effect for OE (Wilks' $\lambda = .987$; $p < .001$), with the larger difference within free audit participants (FA): $M = .13$; $SD = .01$. No significant effect of status was found for O&A and for PF ($p > .05$).

Figure 2

Evolution of Occupational Expertise Between Pre- and Post-test by Group

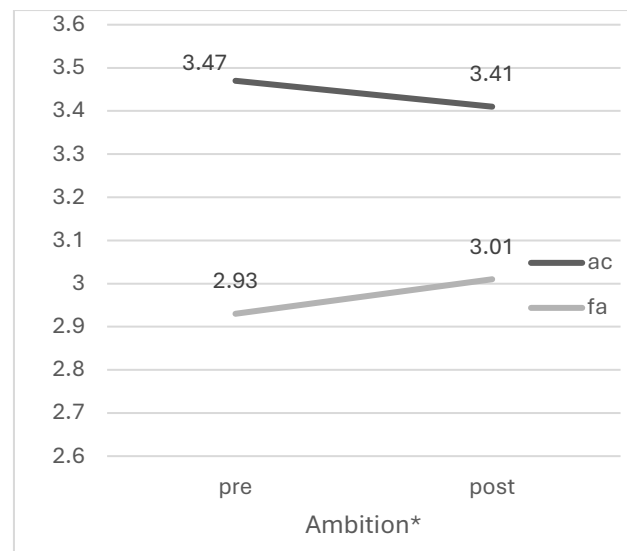


* $p < .001$

As for career self-perception variables, we found a significant effect for AMB: Wilks' $\lambda = .994$; $p = .006$, with the largest difference in favor of FA: $M = .12$; $SD = .02$. No significant changes by status membership were observed for EM and CM ($p > .05$).

Figure 3

Evolution of Career Ambition Between Pre- and Post-test by Group



* $p < .01$

Discussion

Table 5 offers a synthetic overview of the main findings, showing how they connect to our research questions, conceptual framing and the existing literature on employability.

Table 5

Summary of Findings and Links with Literature and Theoretical Concepts

Research question(s)	Key empirical finding	Link with literature	Contribution to conceptual framing	Theoretical implication
RQ1, RQ2 (AC vs. FA)	- Dispositional employability: AC > FA. - Skills-based employability & career motivation: FA > AC. - Difference between AC and FA are constant over time.	- Demonstrability of transferable skills and experiences (Rothwell & Arnold, 2007) - AC display more optimistic career-related perceptions (Rothwell, Herbert & Rothwell, 2008). - dispositional measures: may overlap broader self-concepts constructs (Berntson et al., 2008; Vanhercke et al., 2014).	Reinforces the distinction between skills-based and dispositional employability and shows that different learner groups position themselves differently on these two dimensions.	- Employability profiles appear group-specific: in MOOC contexts, employed participants primarily capitalize on skills and experience, while students mobilize more attitudinal and aspirational resources. - Relying exclusively on dispositional measures may overestimate employability by capturing self-concept rather than labor-market-relevant resources.
RQ3 (overall change over time)	- Changes in skills-related employability > dispositional constructs linked to individual career self-management.	- Distinctions between “hard” employability assets and broader career self-perceptions (Hillage & Pollard, 1998; Fugate et al., 2004; Miller et al., 2013).	- Competence-based employability: the most proximal outcome of a project-management MOOC - Dispositional employability functions: a more stable background orientation.	In MOOC studies: prioritize skills-based indicators for detecting short-term change and treat dispositional employability as a slower-moving construct.
RQ4 (change over time AC vs. FA)	- Differences between AC and FA are not uniform across all sub-dimensions - Significant improvement only for FA (skills-based & dispositional).	FA use online training to update immediately applicable competences (Forrier et al., 2015; Dillahunty et al., 2016).	A short, focused MOOC is more likely to shift skills-related indicators and, for employed learners, can also reinforce career-related attitudes.	MOOCs function as a form of targeted professional development for participants already embedded in the labor market, while students appear to stabilize rather than transform their employability perceptions over such a short time frame.

* AC: Academic cohorts; FA: Free Audits

Theoretical Implications

The results of this study highlight distinct patterns in employability development between academic cohorts (AC) and free auditors (FA). AC consistently outperform FA in dispositional employability, i.e., in career self-perception, specifically in external marketability and career ambition, both before and after the MOOC. Conversely, FA demonstrate higher levels of skill-based employability, more precisely in occupational expertise and anticipation and organization, while also surpassing AC in dispositional employability related to career motivation. For both groups, these differences remain stable across pre- and post-test measures. However, significant evolution is observed only among FA, who improve in two subdomains of both approaches of employability, namely in occupational expertise and career ambition, over the course of the MOOC. This suggests that while AC maintain higher dispositional employability across both tests (only on two constructs), FA benefit more from the MOOC in terms of specific skill development but also in terms of career attitude.

When considering the whole sample, the online training program in project management yielded a higher effect on skills-related employability than on self-perception constructs linked to the individual career: The explanation could be in the operationality of occupational expertise, anticipation, and organization dimensions and personal flexibility (hence not directly linked to the career management and career self-perception *per se*), of the PM MOOC comprising units about project planification and management. It is therefore not surprising to find skills-related variables yielding significant positive changes between Week 1 and Week 4 of the course. However, when dividing the sample, we found that only FA significantly evolved in terms of occupational expertise, as mentioned earlier.

The finding that free participants, already active in the labor market (“dominated by demonstrable transferable skills and experiences” Rothwell & Arnold, 2007, p. 37) and possessing prior work experience, exhibit higher levels of skill-based employability is consistent with expectations (Forrier et al., 2015). In contrast, university students display more pronounced career-related perceptions, particularly regarding career ambition and external marketability (Rothwell et al., 2008). This divergence suggests that while free enrollees are more adept at critically evaluating the alignment of their competencies with market demands, university students may tend to overestimate their employability. The elevated ambition observed among students can be interpreted as reflective of a generally optimistic outlook, possibly influenced by their relatively limited exposure to the practical realities of the job market (Hillage & Pollard, 1998; Fugate et al., 2004). These findings echo those of Rothwell and Arnold (2007), who found that non-graduates felt slightly more employable than graduates. As a possible explanation, the authors propose that this finding may indicate that some already employed subjects have internalized concerns that the rapid expansion of higher education is resulting in an oversupply of graduates relative to the available positions. In our research this could have been translated into a more “optimistic” self-evaluation of their own dispositional employability by university students (in our case, graduate students enrolled in masters’ programs).

One might argue that individuals already active in the job market *should* perceive themselves as more employable than graduate students. This is supported by our study, which revealed that such individuals express higher levels of skills-based employability (*i.e.*, occupational expertise, anticipation, and organization) that are closely linked to practical work experience (Forrier et al., 2015; Dillahun et al., 2016). Conversely, graduate students reported higher levels of dispositional employability (except in career motivation), highlighting the theoretical distinction between these dimensions, in line with previous work.

For instance, Tomlinson (2007) found that, in a fast-evolving job market demanding flexibilization and individualization, “students appeared to be concerned with the need to adopt a more flexible and adaptive approach to careers, involving the active management of their own employability,” p. 288). While the skills-based approach is pragmatic and directly associated with tangible job experience (Miller et al., 2013; Rothwell et al., 2008), the dispositional approach reflects attitudinal factors, such as external marketability and ambition, which are not necessarily contingent on the “real-world” labor market dynamics (Hillage & Pollard, 1998; Fugate et al., 2004).

We also propose another possible explanation of our results: The fact that graduate students tend to express higher levels of self-perceived employability suggests that our measures may capture not solely self-perceived employability, but also broader individual dispositions and self-concepts for this population. Thus, only evaluating employability from a dispositional perspective may raise the risk of evaluating a self-concept rather than a targeted assessment of employability: For instance, Berntson et al. (2008), underline that “perceived employability and self-efficacy are distinct from, yet related to one another” (cited by Vanhercke et al., 2014, p. 595). Consequently, research should systematically adopt a dual approach when measuring employability: Incorporating both skill-based and dispositional frameworks will help discern which segments of the population exhibit greater emphasis in specific aspects of employability. For instance, a study on employers’ expectations about graduates’ employability, found that “professional maturity is the dominant factor considered by employers when assessing graduate student employability” (Chhinzer & Russo, 2018, p. 117).

Although the skills themselves are measurable, how individuals assess their marketability is largely determined by internal dispositions, hence, as suggested by our results, external marketability is more closely aligned with dispositional employability. Additionally, we found that external participants overperformed graduate students in skills-based approach employability, but also in career ambition, and no differences between both groups were observed for personal flexibility, a sub-dimension of employability skills. A possible explanation lies in the somewhat overestimated permeability between both approaches. Indeed, Vanhercke et al. (2014) underline that “there is some overlap between the competence-based and the dispositional approaches, particularly at the measurement level” (p. 596), as they both reside at the psychological, subjective levels.

Practical Implications

The practical implications stemming from this study point toward using MOOCs for promoting employability. First, in terms of MOOC design and integration within formal education, universities should continue embedding flexible, modular courses that incorporate interactive elements and micro-credentialing systems to complement traditional curricula. Such an approach not only helps validate students’ learning through digital badges and certificates (Dillahunt et al., 2016; Yuan & Powell, 2013) but also helps aligning academic content with current labor market demands.

Second, a strong collaboration between employers and educational institutions can leverage MOOCs as cost-effective tools for ongoing professional development. If MOOC content is closely aligned with job-specific requirements, it receives stronger support from employers, particularly for enhancing practical competences needed in both internal and external labor markets (Hamori, 2017; Torrent-Sellens et al., 2016), and can therefore help reducing the graduate skills gap noted in recent literature (Santandreu Calonge & Shah, 2016;

Monteiro et al., 2022). As shown in the present study, both graduate students and active populations can benefit from such for-credit open format university courses.

Third, in light with the results of this research underscores, it would be interesting to tailor MOOC content to different learner groups (in this case, free auditors and academic cohorts). Importantly, our findings show potential to be leveraged in two distinct ways: first, MOOCs can be used to foster positive and proactive dispositions among students by reinforcing self-concept and career identity, and second, they can respond to the active population's need to develop transferable skills that enhance employability in both internal and external job markets. Thus, a dual approach, integrating both skill-based and dispositional measures, can provide a more nuanced understanding of how different groups perceive and enhance their employability (Fugate et al., 2004; Monteiro et al., 2022; Römogens et al., 2020). This differentiated approach allows educators and employers to design interventions that are specifically calibrated to the needs of each subgroup, ensuring that MOOC content not only equips learners with practical knowledge but also cultivates the motivational and attitudinal dimensions essential for successful career development.

Limits and Future Research

While this study offers valuable insights into the impact of MOOCs on self-perceived employability and career self-perception, there are several limitations to be pointed out. Methodologically, sample attrition may have influenced the stability and representativeness of the results. Additionally, the use of a convenience sample combined with voluntary participation in the questionnaires may have introduced a self-selection bias: Respondents are likely to be more motivated, more engaged in the MOOC, or more confident in their skills than non-respondents. As a result, the patterns observed should be interpreted as reflecting the perceptions of this engaged subgroup rather than as representative estimates of the entire PM MOOC population or of MOOC learners more generally, which further constrains the generalizability of our findings. A key limitation of the present study is also the absence of a control group that did not receive the MOOC intervention. This design makes it difficult to rule out rival explanations for changes observed in employability perceptions or career development outcomes, such as natural maturation effects, prior career engagement, or self-selection biases. Future research should address these limitations by employing longitudinal and mixed-methods approaches that capture both subjective perceptions and objective indicators of employability, and by incorporating more diverse samples to enhance external validity. Future research should also replicate this design in MOOCs from other disciplinary fields beyond project management, in order to examine whether the employability patterns observed here generalize across academic subjects and learner populations. Lastly, refining measurement tools to distinguish between dispositional factors and skills-based outcomes will be essential for developing a more nuanced understanding of how MOOCs contribute to career development and for informing targeted interventions that better align educational practices with labor market demands.

Declarations

Availability of Data and Material

The datasets used and/or analyzed during the current study are available from the corresponding author upon request.

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Appendix

Used scales (items with a “*” were adapted to fit both working individuals and students):

Competence-based and multi-dimensional measurement of employability (adapted from Van der Heijden et al., 2018) :

Occupational Expertise

During the past year, I was, in general, competent to perform my work accurately and with few mistakes.

During the past year, I was, in general, competent to take prompt decisions with respect to my approach to work.

In general, I am competent to distinguish main issues from side issues and to set priorities.

I consider myself competent to weigh up and reason out the “pros” and “cons” of particular decisions on working methods, materials, and techniques in my domain*.

How would you rate the quality of your skills overall?

Anticipation & Organization

I spend much time improving the knowledge and skills that will be of benefit to my work or future work*

I consciously devote attention to applying my newly acquired knowledge and skills.

During the past year, I was actively engaged in investigating adjacent job areas to see where success could be achieved.

During the past year, I associated myself with the latest developments in my job domain.

Personal Flexibility

How easily would you say you can adapt to changes in your domain?*

How quickly do you generally anticipate and take advantage of changes in your environment?*

How much variation is there in the range of duties you aim to achieve in your domain?*

Career Self-Perception:

External Marketability (from Rothwell and Arnold, 2007 and Rothwell et al., 2009)

I can easily find out about opportunities in my chosen field

The skills and abilities that I possess are what employers are looking for

People in the career I am or aiming for are in high demand in the external labour market*

Anyone with my level of skills and knowledge will be highly sought after by employers*

I could get any job, anywhere, so long as my skills and experience were reasonably relevant.

Career Ambition (from Rothwell and Arnold, 2007)

I want to be in a position to do mostly work which I really like

I am satisfied with the progress I have made meeting my goals for the development of new skill

I have clear goals for what I want to achieve in life

I regard myself as highly ambitious

I feel it is urgent that I get on with my career development

What I do in the future is not really important (reverse-scored)

Career Motivation: Career insight subscale (from Noe, Noe and Bachhuber, 1990)

To what extent . . .

. . . do you have a specific career goal?

. . . do you have a specific plan for achieving your career goal?

. . . do you feel you are aware of your skill strengths and weaknesses?

. . . have you changed or revised your career goals based on new information you have received regarding yourself or your situation?