mcE

Meta-research on the learner perspective on micro-credential formats and learning services for continuing education and professional development

Executive Summary

Today's society is in continuous change due to fast technological advancement, the changing conditions of both work and climate, the impact of COVID-19, and so on. Because of it, people are required to up-skill and re-skill professional skills and knowledge during their lifespan. Learning offerings by universities and other providers are becoming adapted to lifelong learners' needs, who seek shorter and more tailored learning opportunities. This demand for new forms of learning has led to increasing interest in 'micro-credentials' that certify the outcomes of these short learning experiences. In this context, it is key to understand learners' motivations and preferences towards micro-credentials, in order to generate more learner-centred offerings.

This deliverable presents a systematic literature review describing the available research on the learner's perspective towards micro-credentials carried out in the last five years. After applying the PRISMA methodology, a total of 48 papers were included. Findings reveal that MOOCs and digital badges are the terms most often associated with micro-credentials; data have been mainly collected through questionnaires administered during or after finalizing the courses; just-in-time professional needs, employability and personal curiosity and flexibility for learning are the main learners' drivers to pursue micro-credentials. In addition, little research exists on specific learners' preferences for micro-credentials, such as the duration and dedication of the short learning experience, the preferred modality of instruction, the type of relationship with other courses and the factors related to the course certification. However, inferring these preferences from the results of the selected articles, we find that students see numerous advantages in online self-paced courses with final accreditation. Instead, in line with previous research, students have doubts regarding the impact of credentials on their professional trajectories.

The results of this research can contribute to the further conceptualization of micro-credentials and fill the gap between learners' professional knowledge and skills and the demands of a rapidly changing labour market.

Keywords: Micro-credentials, MOOCs, Digital Badges, Learners' preferences, Higher education, Learner-centered offerings.

Table of contents

1. Introduction

Technological advancements, the need to mitigate climate change, the effects of COVID-19 pandemic and many other aspects, are changing the way we live, work and experience learning. This generates a need for people to continuously update their knowledge and skills to fill the gap between their formal education and the demands of a changing labour market (Andersen, Shapiro and Nedergaard, 2021). Learners' needs for continuing education have led to a rapid growth in the demand for short, tailored learning opportunities that "make possible the targeted, flexible acquisition of knowledge, skills and competences to meet new and emerging needs in society and in the labour market, while not replacing traditional qualifications" (p.1). This demand for short and flexible modalities of learning has produced a corresponding increase in interest in micro-credentials (MCs) that certify the outcomes of these short learning experiences (SLEs). MCs are seen as a promising format in the context of lifelong learning and can help to make education and training more aligned with labour market requirements (Resei, Joanneum, Friedl, Staubitz and Rohloff, 2019). Moreover, this general interest in MCs is expected to stay and even grow during the years that will follow the pandemic (Leong, Sung, Au and Blanchard, 2020, p.92).

In recent years many different definitions, typologies, and synonyms of the term MC, such as "micro-degree", "digital badge", "alternative credential" or "Massive Open Online Courses (MOOCs)", have coexisted, often been used interchangeably, and branded differently by each issuing institution (Cedefop, 2022; McGreal and Olcott, 2022). This variety of terminologies and synonyms for the term MCs have resulted in a general "confusion and low understanding" (p.15) among the different stakeholders involved; universities, employers, policymakers, accreditation bodies and, of course, learners. Nonetheless, the wide variety of practices associated with micro-credentials indicate that they are a real phenomenon (Cedefop, 2022, p.38). However, despite their increasing use, there have been disconnected MCs initiatives within countries Brown, Mhichil, Beirne and Mac-Lochlainn (2021), although, as we have pointed out, different official bodies have made efforts to reach a consensus on the basics of MCs. In this context, the European Union recommended adopting a European approach to MCs to generate a common understanding among stakeholders. The following definition for MCs was proposed:

> "Micro-credential means the record of the learning outcomes that a learner has acquired following a small volume of learning. These learning outcomes will have been assessed against transparent and clearly defined criteria. Learning experiences leading to micro-credentials are designed to provide the learner with specific knowledge, skills and competencies that respond to societal, personal, cultural or labour market needs. Micro-credentials are owned by the learner, can be shared and are portable. They may be stand-alone or combined into larger credentials. They are underpinned by quality assurance following agreed standards in the relevant sector or area of activity" (Council of the European Union, 2022, p.13).

This recommendation also proposed the adoption of the following elements for a MC to be recognized across European countries (p.16):

- Identification of the learner;
- Title of the micro-credential;
- Country(ies)/region(s) of the issuer;
- Awarding body(ies);
- Date of issuing;
- Learning outcomes;
- Notional workload needed to achieve the learning outcomes (in ECTS, wherever possible);
- Level (and cycle, if applicable) of the learning experience leading to the micro-credential (European Qualifications Framework, Qualifications Frameworks in the European Higher Education Area), if applicable;
- Type of assessment;
- Form of participation in the learning activity;
- Type of quality assurance used to underpin the micro-credential.

In parallel to the crystallization of a European approach to MCs, there has been vigorous academic production. Literature reviews on this topic have focused on diverse MCs research aspects, such as MCs trends, how microlearning has been used and implemented in academic and in industry training settings (Taylor and Hung, 2022), the micro-credential phenomena (Brown and Mhichil, 2021), as well as universities' experiences offering MCs and the environment that is needed to do so (Selvaratnam and Sankey, 2021). Among MCs´ related terms, MOOCs have received great interest from the scientific community in the last decade. The literature on MOOCs has focused on aspects such as motivations to enroll and to drop out (Kalansooriya, Gamage and Gamage, 2021); paradigms of questionnaire-based quantitative research on MOOCs (Lu, Cui, Huang, Zhao, Li and Wang, 2021); social, demographic and educational factors that influence learners' participation in MOOCs (Zafras, Kostas and Sofos, 2020); self-regulated learning in MOOCs (Alonso-Mencá, Alario-Hoyos, Maldonado-Mahauad, Estévez-Ayres, Pérez-Sanagustín and Delgado, 2020); or patterns in MOOC research (Zawacki-Richter, Bozkurt, Uthman and Ahmed, 2018).

Despite the variety of topics studied by the MCs literature, to our knowledge, there are no available reviews on the learners' perspective on MCs, a key topic considering that many studies highlight the usefulness of MCs to respond to 'learning needs' (Oliver, 2019; Selvaratnam and Sankey, 2021). Nevertheless, among studies that consider learners' point of view, Brown et al. (2021) highlighted eight main general drivers and attractors for MCs: (1) increase employability, (2) support continuing professional development and workplace training, (3) increase flexibility for learning, (4) close skills gaps for a changing nature of work, (5) promote lifelong learning, (6) develop XXI skills, (7) develop a new 21st century credential ecology and (8) increase access and pathways to formal education. Interestingly, according to these authors, there are differences across world regions regarding drives and attractors for MCs. Increased flexibility for learning, promoting lifelong learning and employability are the three most important reasons in Europe. Instead, enhancing employability, closing skills gaps, and supporting work-based training and professional development are the main attractors in America and Asia Pacific regions.

This study presents a systematic review that focuses on learners' perspectives in relation to MCs, delving into the motivations and preferences of learners towards SLEs and their corresponding accreditation. Having this insight on MCs, as opposed to traditional longer-duration programmes, is of fundamental importance for identifying what are the main learners' needs and what learners expect from MCs. It is also essential for both educational institutions to offer programs tailor-made to the needs of learners; and for policy maker to draw guidelines that take into consideration the end users.

2. Methodology

This report presents a systematic review that identifies and synthesizes all recent high-quality research evidence on the learners´ perspectives on MCs (Byrne, 2017). The PRISMA methodology was applied to ensure clarity and transparency when reporting systematic literature reviews (Moher, Liberati, Tetzlaff, Altman and PRISMA Group, 2015).

2.1. Research questions

The main objective of this literature review is to explore learners' perspectives in relation to MCs, delving into the motivations and preferences of learners for SLEs and for receiving credentials as a proof of learning.

As consequence the research questions investigated are:

RQ1: What are the characteristics of research on learners' perspective on MCs?
RQ2: Which are the different learners' drivers for pursuing MCs?
RQ3: What are the learners´ preferences towards MCs formats?

2.2. Parameters of the search for articles

Guided by the research questions, Table 1 shows the list of inclusion criteria, also referred to as eligibility criteria, for the selection of the studies to be analyzed. The five-years window responds to the will to focus on recent quality publications with the relevant information within a rapidly evolving research field (Brown and Mhichil, 2021), aligned with the current great interest in defining and establishing the common elements of MCs at a European level.

Table 1. Inclusion criteria for the selected studies

Inclusion criteria
Published in the last five years (2018 to April 2022).
English or Spanish publications.
Peer-reviewed articles.
Publications that provide primary data on learners' motivations or preferences for MCs.
Studies related to higher education settings.

The full text is available for the Open University of Catalonia (UOC).

To ensure a comprehensive data collection and a multidisciplinary approach, we looked for articles that were indexed in two social sciences reference databases: SCOPUS and ISI Web of Science. In addition, the first 50 results of Google Scholar were also considered.

A search was conducted using different combinations of key terms grouped into three blocks closely related to the research questions. The search terms included a first block related to MCs, a second block related to learners' motivations and preferences, and a third block related to higher education settings (Table 2). Given that the term 'micro-credential' has been mostly used and characterized in recent years, we included other related terms, sometimes used as synonymous, in block 1 (see table 1 below). Therefore, we casted a wider net at the cost of increasing heterogeneity by including, for example, studies that relate learners´ perspectives on SLEs, such as MOOCs, that may not offer a credential.

Table 2. Keywords used in the search for articles

Search block 1: MCs	A N D	Search block 2: Learners' motivations and preferences	A N D	Search block 3: Higher education settings
Microcredential* OR Micro-credential* OR Micro credential* OR Short learning program* OR Continuing education program* OR Microlearning OR Professional development program* OR MOOC* OR Microtitle* OR Nanodegree* OR Bite-size learning OR learning building block*		Learner* OR "Driver* OR Motivation* OR Learning ambition* OR Preference* OR Requirement* OR Expectation* OR Perspective* OR Study-work-life balance		Higher education OR University OR tertiary education

The previous search filters and keywords were applied to all databases during the search process. Another collection of publications was obtained with the support of key informants, which included partners of the Erasmus + project "Modular Continuing Higher Education by Microcredentials (MCE)", taking advantage of their expertise on the topic. Finally, another set of publications emerged from a snowball technique, selecting related articles from the bibliographical references of other publications.

As a result of this process, we ended up with an initial selection of 2344 studies.

2.3. Study selection

The next step was identifying the articles that met the inclusion criteria. We carried out three selection phases to ensure that the final selection of articles was relevant to answer the research questions and adequately adheres to the aforementioned inclusion criteria. The study selection process is illustrated through the PRISMA flowchart shown in Figure 1.

First, the titles and abstracts of the 2.344 studies were screened for their relevance to this review based on the inclusion criteria, discarding, for example, articles that do not refer to the topic of study in their abstract or keywords. In case of doubt, the study was included. This first phase yielded 229 publications. The full text was then read for relevance to the review, discarding for example studies with an unclear structure or confusing methodology. This second phase yielded 93 publications. These papers were reviewed by the three authors independently and a final selection of papers deemed as relevant by the three authors was made. This third phase yielded 48 publications, which were the ones included in the final revision.
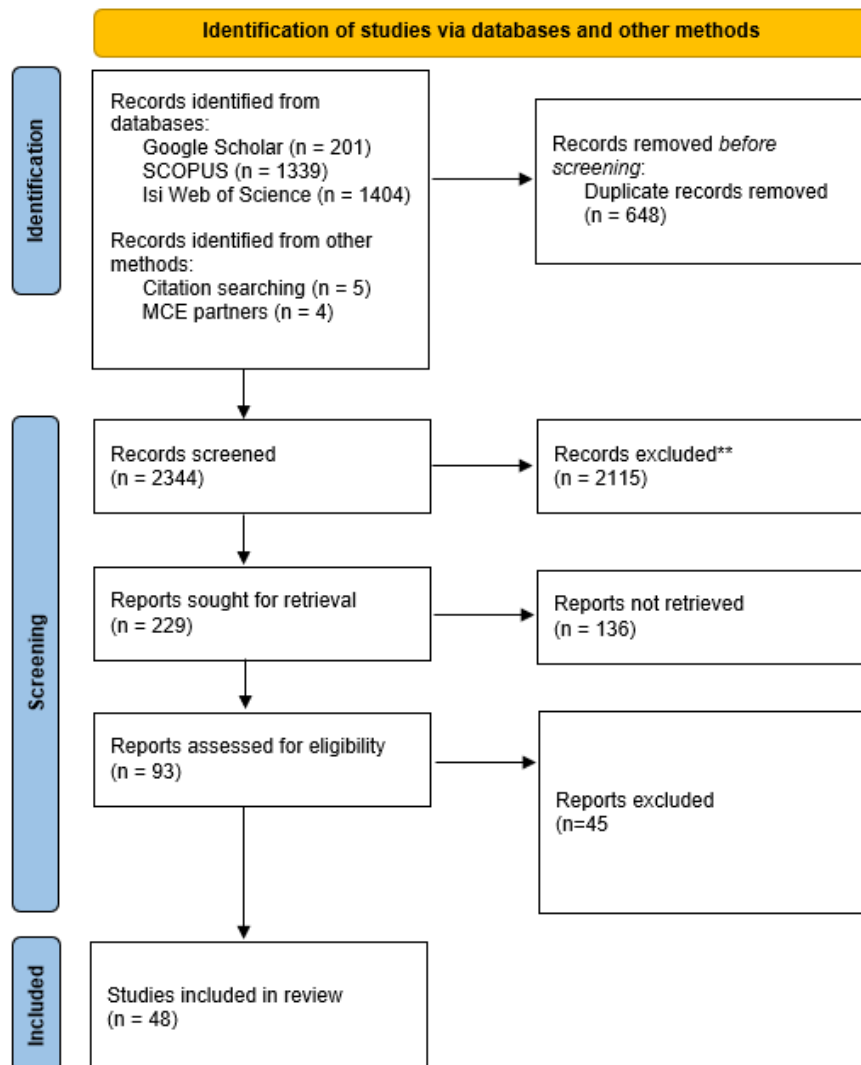
Figure 1. PRISMA flowchart of the article selection process

2.4. Data extraction and research analysis

Once the final set of articles was identified, the fourth step was extracting and analyzing the information of interest from these studies. Data extraction involved collating the results and other information from the studies included in the literature review (Barends, Rousseau and Briner, 2017). The different types of information were extracted from the articles in the form of categories to "obtain key elements of the information obtained in the research articles"

(Arksey and O'Malley 2005, p. 26). The content analysis enabled the information to be organized into categories for further analysis (Gibbs 2012).

We organized the information in existing literature into several categories. First, we recorded whether a paper was concerned with a credentialing experience, a short learning experience or both. Second, for each article, we recorded the title, the year, the journal of publication's impact and the country of the universities to which authors were affiliated. Third, we recorded the characteristics of the populations from which data was obtained, the time at which the data was collected (before, during, after or not related to a short-learning experience) and the research tools and types of analysis performed. Regarding the learners´ motivations, we recorded their answers relative to their motivations for taking MCs and the perceived benefits and disadvantages of their participation. We also recorded their preferences relative to online, face-to-face or blended modalities; synchronous, which means having to be connected at a specific time and day or asynchronous sessions, which means they can connect at the time that is most convenient for them; duration and dedication of courses; preferred schedule; whether full-time or part-time; relation with other courses; with or without official credentials; and willingness to pay for obtaining credentials. All the information extracted was reported in an extensive spreadsheet openly published (Bruguera, Fitó and Pagés, 2022), with each file corresponding to a study and the columns referring to the different categories of extracted information.

To clarify the degree of knowledge that could be distilled from existing research and to detect existing gaps and shortcomings of the literature, we also identified whether a paper formally analyzed learners' motivations or preferences (F.A.) or not (N.F.A) We considered that a paper formally assessed these topics if they were part of the research questions or were included as questions or topics of discussion in the research tools (surveys, interviews or focal groups). Additionally, we also considered instances where learners' motivations or preferences were not formally analyzed, but they could be indirectly assessed (I.A) from respondents' answers in interviews or focus groups participants´ statements. Throughout the analysis, we only considered a paper to deal with a particular topic or expose a certain position if this was substantiated by a sufficiently large number of learners. For example, in quantitative papers, we discarded opinions regarding learners' motivations and preferences for MCs that came from less than 40% of the participant's respondents, considering up to five most endorsed motivations or preferences. In qualitative papers, we considered for the analysis those learners' preferences and opinions that were highlighted by the authors within the main themes of their qualitative analysis.

This information is analyzed and presented in the following sections using figures and descriptive statistics (Babbie, 2013).

3. Results

In this section, we present the data extracted from the selected 48 publications. Categories are grouped according to the types of information extracted, displaying the results in the form of visual representations, frequency tables and text descriptions.

3.1. Characteristics of research

The first group of categories corresponds to research characteristics, type of experience, sample and other methodological aspects.

3.1.1. Publications by years

The 48 articles reviewed were published between 2018 and April 2022 (Figure 2). The highest number of articles was recorded in 2018 (29%); in contrast, 2019[1] is the full year with the lowest number of selected articles (15%).
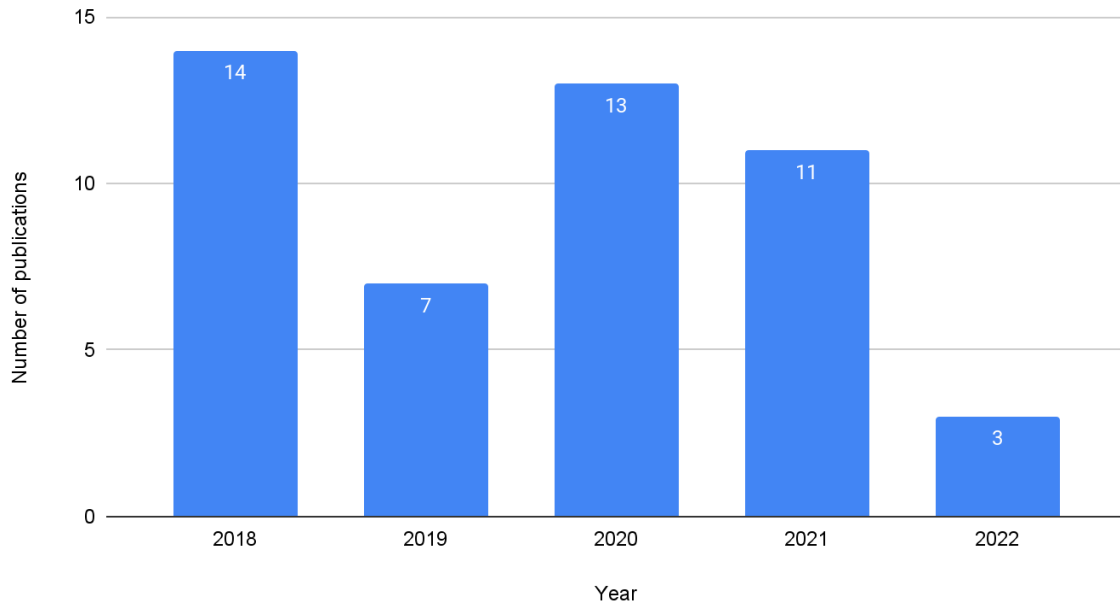
Figure 2. Publications by year.

3.1.2. Journal Impact

Regarding the index impact of the selected publications, a commonly used measure of quality, Figure 3 shows that most journals that have published the articles of this systematic review are Q1 (38%) and Q2 (35%) in a particular area of the SCImago Journal Rank (SJR)[2].

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[1] at the moment in which this study was conducted the year 2022 was not yet passed.
[2] https://www.scimagojr.com
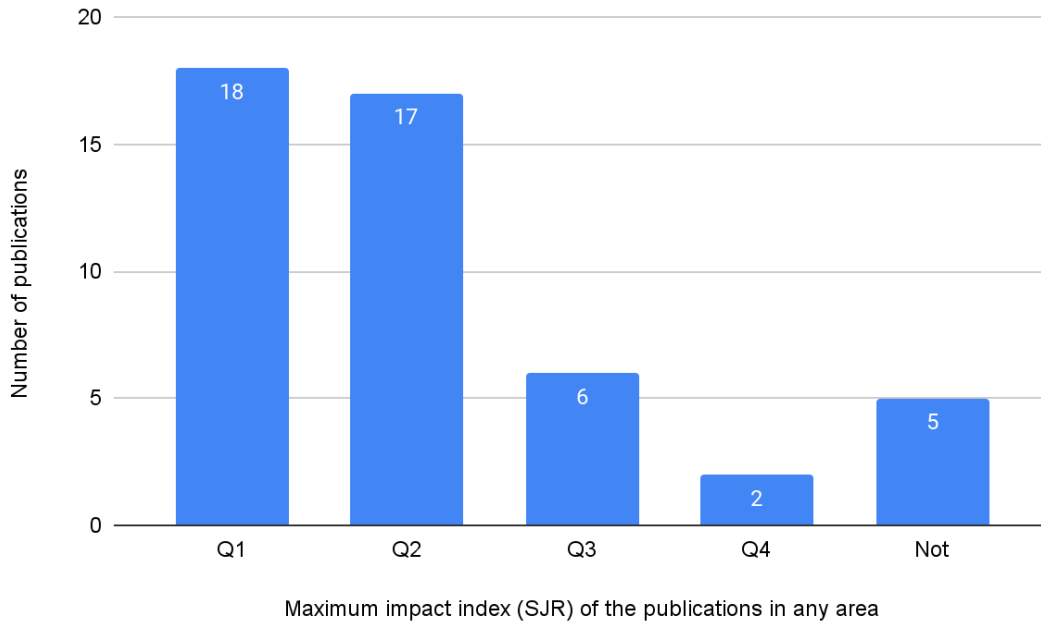
Figure 3. Publications by maximum impact index (SJR) of the publications in any area.

3.1.3. Authors´ keywords

An analysis of the authors´ specified keywords shows that the most common keyword refers to "MOOCs", which appears in 75% of the analyzed papers, followed by "higher education" (17%), "online education" (13%), "micro-credentials" (8%) and "learners' motivations" (8%) (Figure 4). It is worth noticing the reduced adoption of the term "micro-credentials" among the papers analyzed.
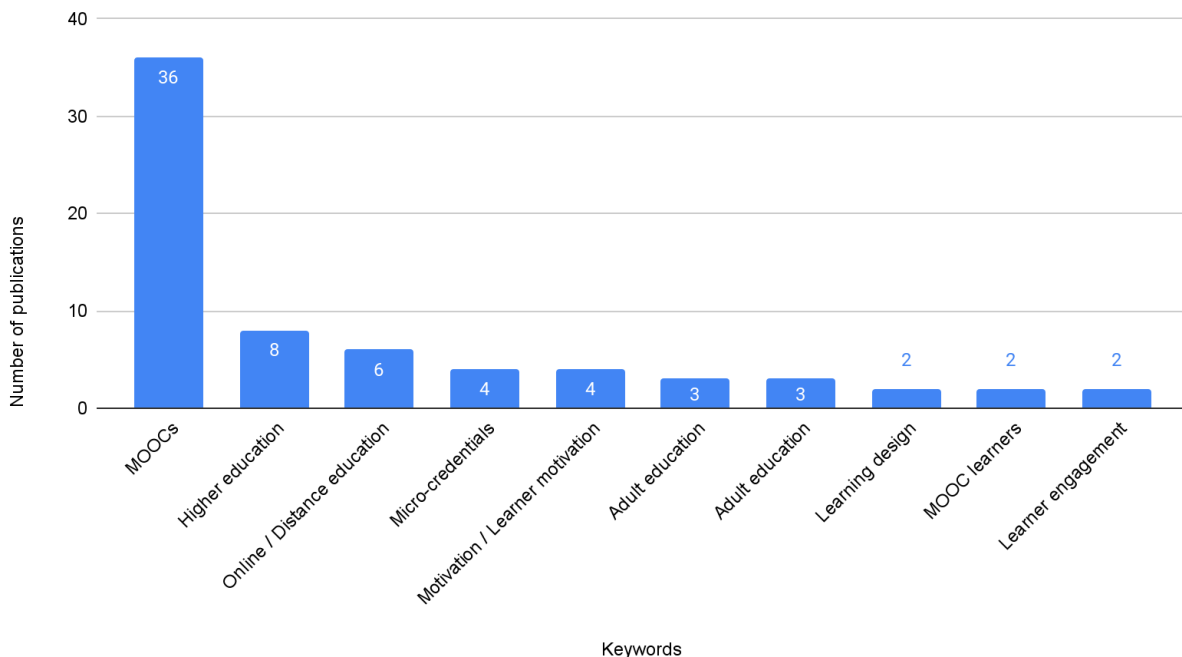
Figure 4. Publications by author keywords.

3.1.4. Country of authors' institutional affiliation

The selected publications were written by authors affiliated to universities from a wide variety of countries (Figure 5). There is an interest in micro-credentials across many

countries/regions. However, authors' affiliation belongs for the majority to the United States (13%), followed by Spain (13%), United Kingdom (8%), China (8%), Malaysia (8%) and India (4%).
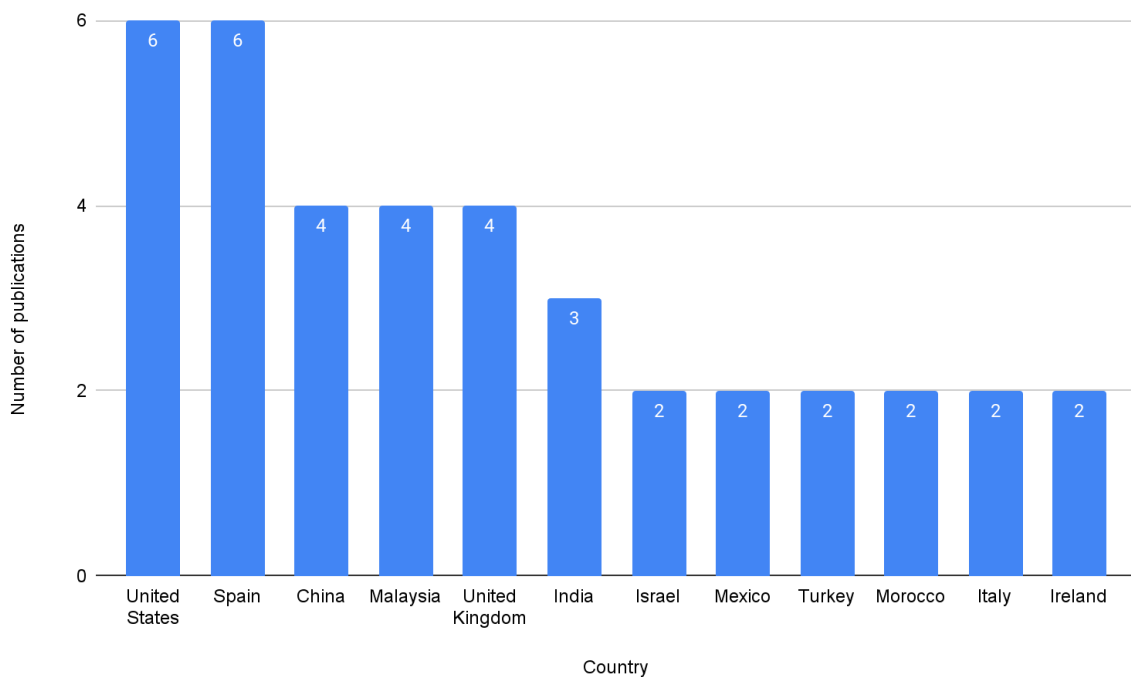
Figure 5. Publications by country

3.1.5. Characteristics of the MCs

In the studies analyzed the term more often used, to refer to what we here call MCs, is MOOCs (82%), followed by digital badges (13%) (Figure 6).
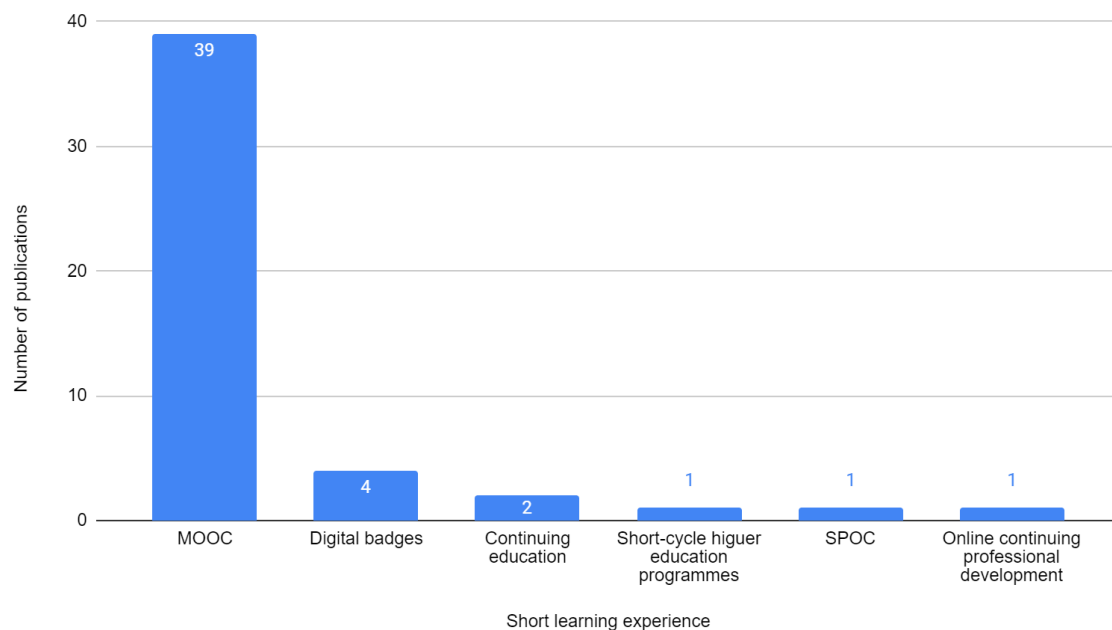
Figure 6. The term most used to describe 'micro-credentials'

Regarding the credential aspect, less than half of the publications indicate the type of certificate, accreditation or badge associated with the SLE (23 out of 48: 48%), and more than half do not discuss it (25 out of 48: 52%).

14

3.1.6. Type of participants

Most studies assess learners´ views on a particular MC in which they enrolled (71%), as seen in figure 7. Fewer studies analyze the views of people who are not participating in a specific MC (33%). These categories are not exclusive, as some studies assess the views of participants and non-participants of a specific MC.
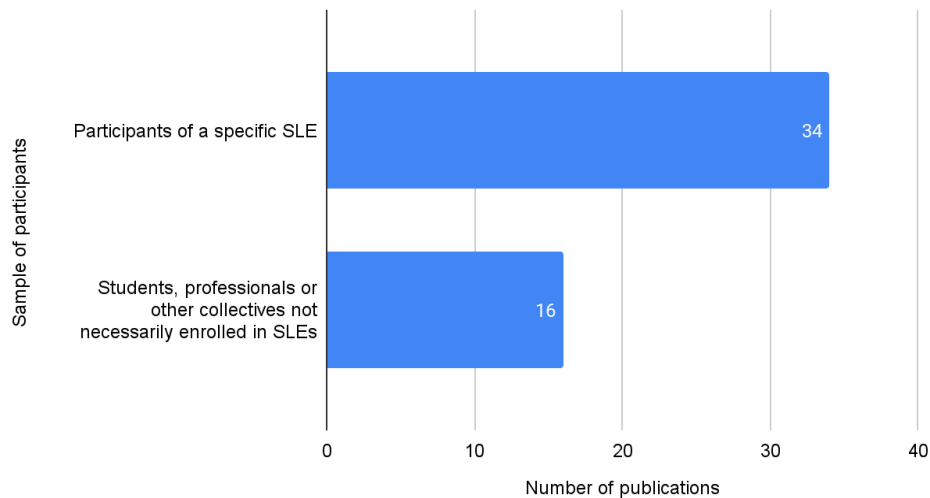
Figure 7. Publications by type of participants

Regarding the types of participants that have most often provided information on the motivations and preferences for pursuing MCs, the general population (population at large) (38%) and university students (50%) have been the most studied collectives (Figure 8). Concerning the latter, 21% of the publications study undergraduate students, 8% postgraduates, and an additional 17% university students without distinguishing between undergraduate and postgraduate.
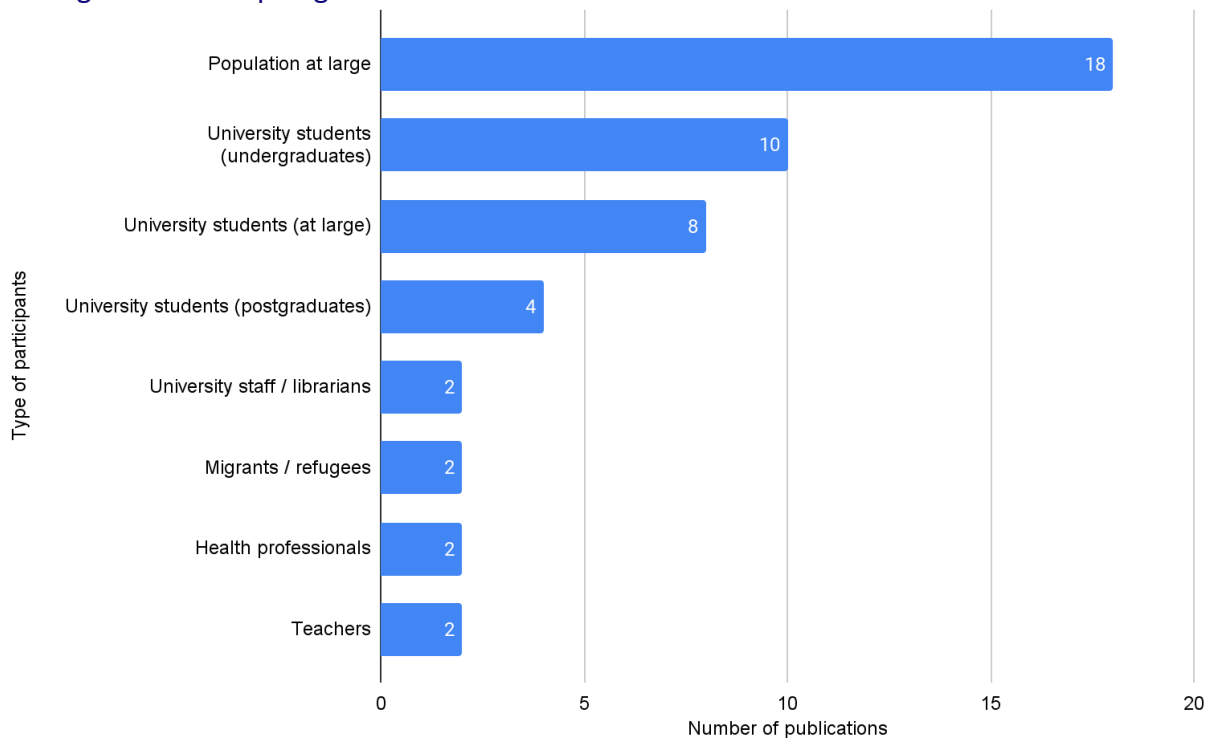
Figure 8. Publications by type of participants of the studies

15

3.1.7. Type of methodology employed

Most selected studies employed a quantitative methodology (42%), followed by mixed methodologies (29%) and qualitative ones (29%), as shown in Figure 9.
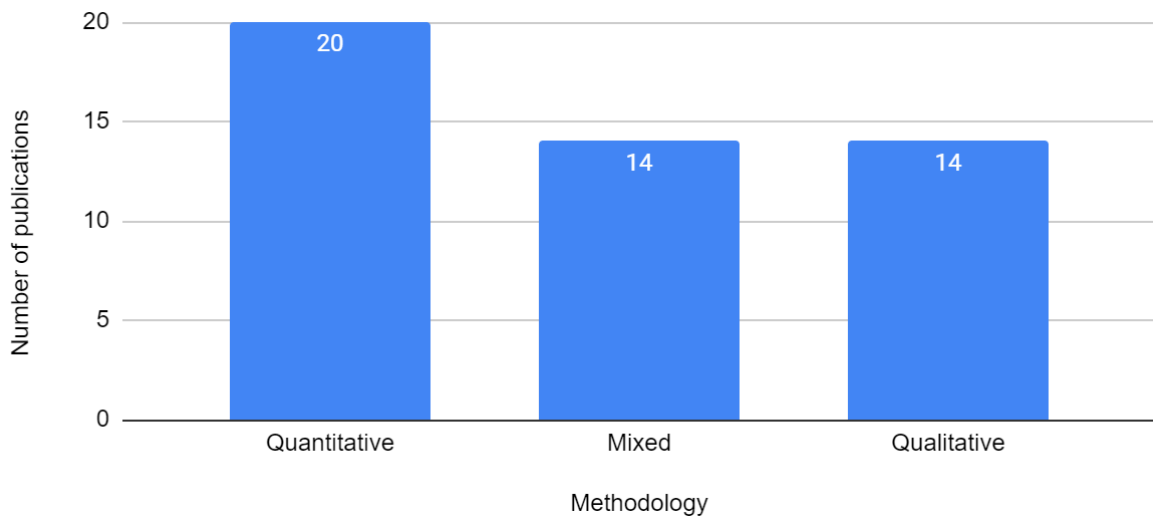
Figure 9. Publications by type of methodology performed

3.1.8. Research tools/means used to collect data

The most employed research tools to gather data were quantitative, most often questionnaires/surveys (75%), followed by qualitative ones such as interviews (19%) or focus groups (6%). These categories are not exclusive since some studies use more than one research tool or technique.
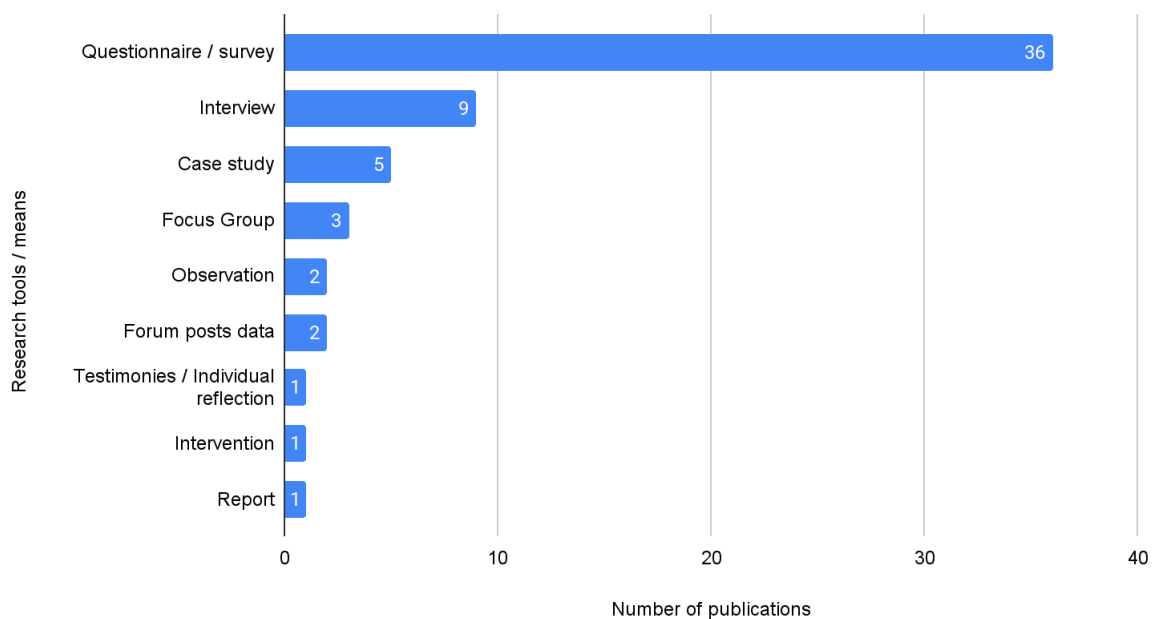
Figure 10. Publications by research methods/tools.

3.1.9. Number of participants

Figure 11 shows that the number of participants typically included in the studies are quite evenly distributed across sample ranges. More than half of the studies (56%) report the

opinion of 150 or fewer participants. In the other half, the number of participants ranges from 151 to more than 1000 (generally questionnaires to MOOC participants).
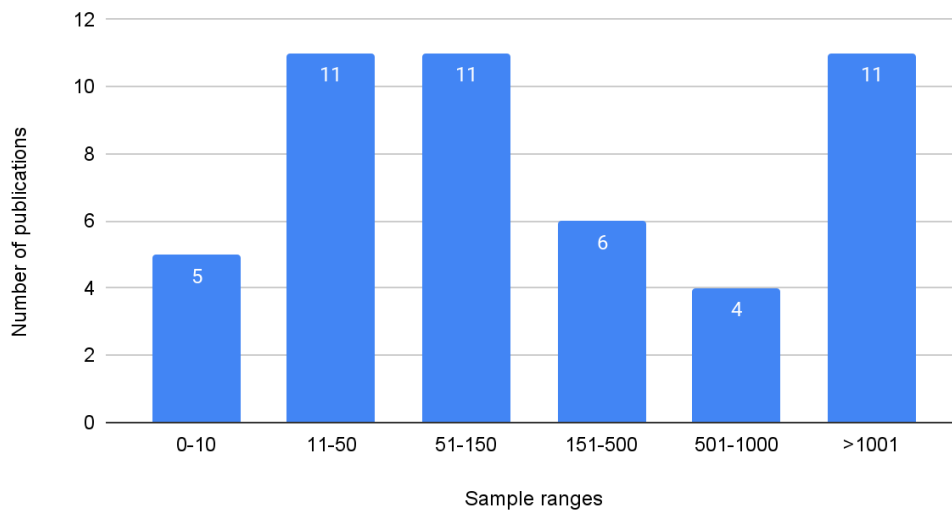
Figure 11. Publications by the number of participants in the studies.

3.1.10. Timing of data collection

Another type of information of interest is at what point the information was collected: whether before a SLE, in its first stages (i.e. studies that aim to gather the expectations of the students or a sample of workers), in the midst of a SLE (i.e. studies that want to identify or observe its development) or after a SLE (i.e. studies that aim to collect learners feedback or see if the expectations of the students have been met). Regarding the timing of data collection, the most recurrent time point was during (38%) or after the completion of a SLE (27%) as shown in Figure 12. Although 14 publications (29%) do not specify when the data was collected. Only 11 publications (23%) collected data before or at the very beginning of a SLE. These categories are not exclusive.
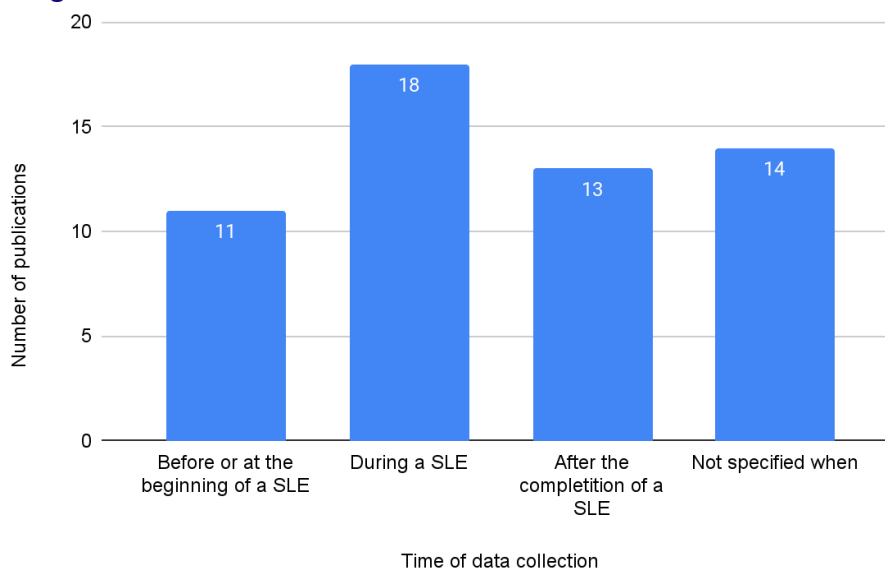
Figure 12. Representation of the time in which the data collection occurred.

3.1.11. Type of analysis

The analysis also yields that quantitative descriptive statistics types of analysis (38%), as well as qualitative thematic (25%) and content analysis (23%), were the most used types of analysis in the selected studies (Figure 13). These categories are not exclusive.
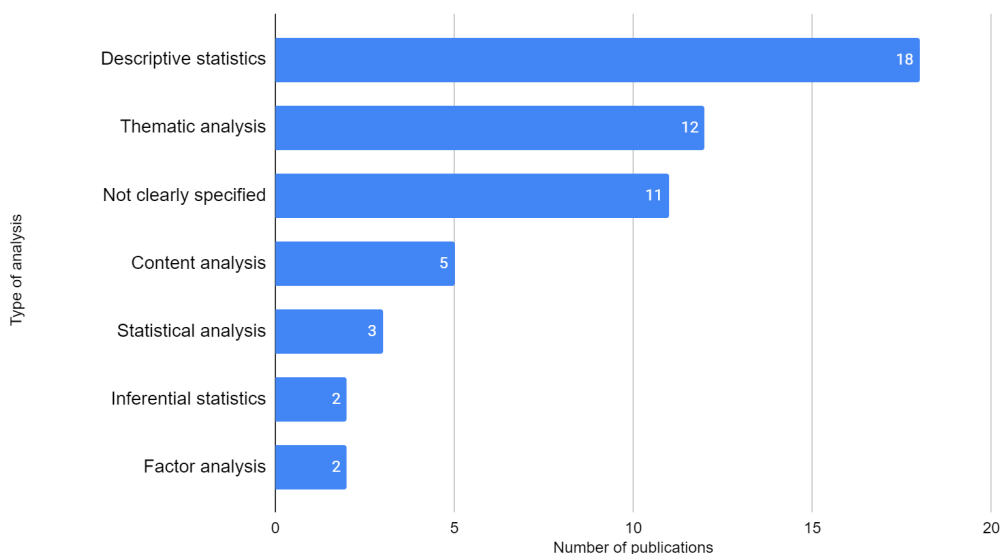
Figure 13. Publications by type of analysis applied in the data.

3.2. Learners' motivations for pursuing MCs

In the following subparagraphs will be detailed the captured data related to both the learners' motives to pursue MCs, as well as their perceived advantages and disadvantages in pursuing MCs.

3.2.1. Main motivations to pursue MCs

To identify learners' motivations for pursuing MCs we build on the 19 drivers and attractors for MCs highlighted by Brown and Michill (2021). We coded the possible motivations from our selected publications by adapting these drivers and attractors. As a result, half of the selected studies directly analyzed learners' motivations for MCs, whereas in 27% motivations were not directly analyzed, but some inference could be made. In the rest (23%) the motivations were neither directly analyzed nor could they be inferred from the results. With this information, we merged and codified ten types of motivations taking into consideration only those main or predominant motivations among the results of the 77% of publications that directly or indirectly assessed learners' motivations to take MCs (Figure 14).

The motivation for pursuing MCs to improve (be more efficient) in the current work appears in 41% of these studies; to have access to selected and relevant updated content, in 41%; to mitigate curiosity or for personal interests, in 32%; to participate in a flexible type of learning (of time, schedule, access), in 32%; to complement other types of traditional training or courses, in 27%; to facilitate professional development and lifelong learning, in 24%; to get a certification or official credits, in 24%; to reverse a situation of unemployment or increase employability, in 24%; to make new social connections or interact with other students or teachers, in 19% and to change one's occupation, in 16%. These percentages do not add up to 100% because studies may state more than one driver.
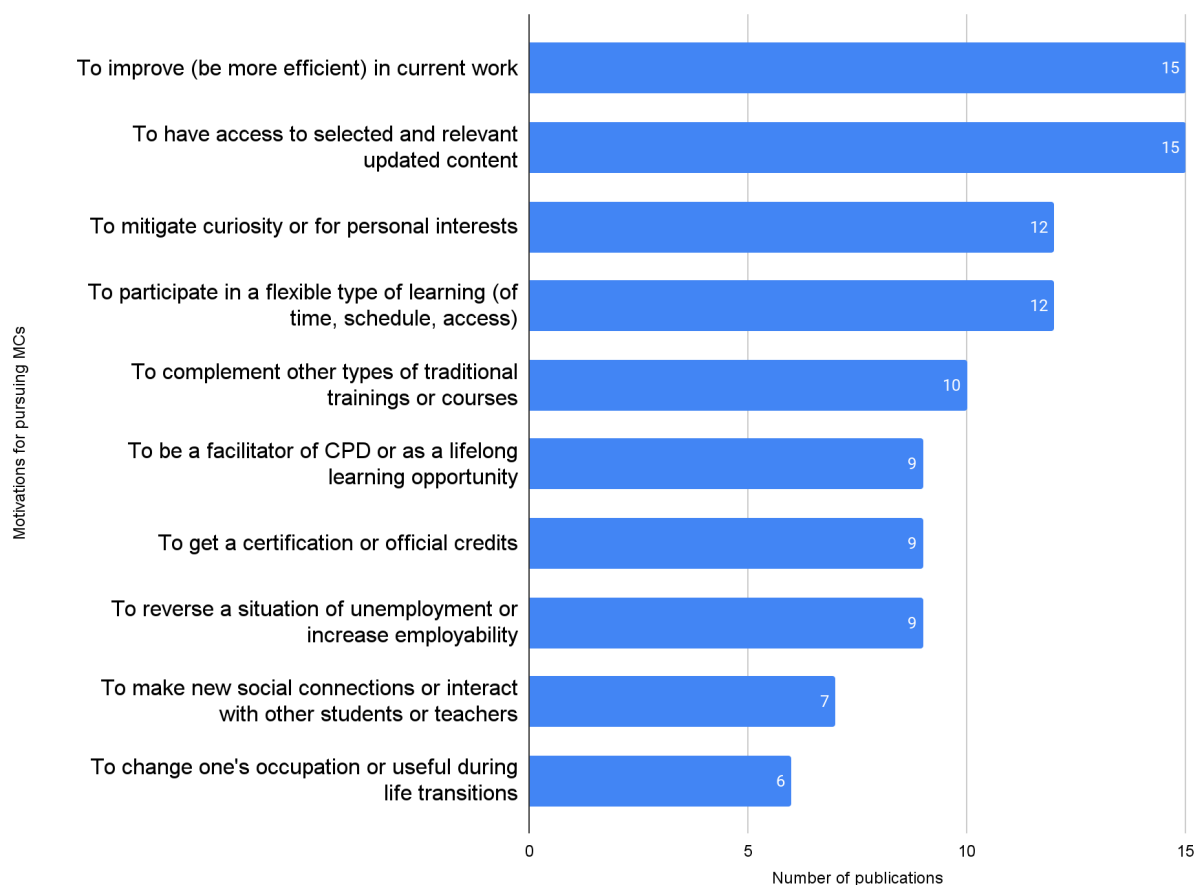
Figure 14. Publications by learners' drivers to pursue MCs.

As mentioned above, it should be noted that most studies assess the students´ opinions of a particular learning experience, typically a MOOC, for which they have registered. In this sense, some of the studies refer to courses with a clear motivation for professional development. In contrast, others describe views on MCs that seek to provide expanded flexibility in learning options or provide pathways to higher education. Therefore, these figures should be best interpreted as a description of the motivations behind particular MCs offerings, rather than motivations over MCs in general.

3.2.2. Advantages of MCs

Similarly, from the reviewed literature, it was possible to identify the benefits perceived by learners in relation to MCs taking into consideration 71% of the studies. Among those, in only 33% of the studies there is an explicit reference to the assessment of the learners´ perceived benefits of MCs, while in the remaining 38% of the study was possible to made interpretations in this matter, by analyzing the studies' results.

The identified learners' benefits have been grouped as shown in Figure 15. MCs main perceived benefits are: their flexibility regarding schedule, time or access, which appears stated in 59% of studies; they complement well other types of courses and enrich one's learning path, which appears in 35%, and they are quick ways to acquire knowledge and professional skills, in 29%.

Figure 15. Publications by learners' perceived benefits for pursuing MCs.

Next table illustrates the benefits stated by students distributed by their opinions on the learning experience, credentials or both aspects.

Table 3. Examples of learners' perceived benefits of MCs.

Results focused on…	Considerations and examples
Learning experience	- MOOC can improve learners' views of online learning in general and **encourage them to enroll in formal online studies** (Kubincova, Dale, and Kerr, 2018). - [Online SLEs] One of the strongest points is the **online format**, which **adapts to the needs of each participant** (Ruiz-Palmero, Fernández-Lacorte, Sánchez-Rivasa and Colomo-Magaña, 2020). - [Online SLEs] High ability to **study independently**. Useful and practical with regard to the students' various occupational needs (Aittola and Ursin, 2019). - MOOCs are good for overall improvement and **lifelong learning** of skills (Ambadkar, 2020). - **Support individuals to make a transition** in some way that may not be available to them from elsewhere (Small, Deacon, Walji, Jaffer and Jawitz, 2019).
Credentials	- **Enhance employability**. **Develop employability skills** relevant to the workplace. **Complement the traditional curriculum vitae (CV)** with micro-credentials (Maina, Fabián Guàrdia, Mancini and Martinez, 2022). - Connect learners with real evidence and certificates **demonstrating their achievements. Motivational** aid for learners (Maina et al., 2022).
Both	- MOOCs are quite helpful for learners' future **careers**. Served to verify that they are in **the right career** (Kundu and Bej, 2020). - MOOCs are helpful in **mitigating** learners' **curiosity for knowledge** (Kundu and Bej, 2020).

	- Freedom of schedules allows learners' to achieve **better organization** and **learn at their own pace** (Hellerstein, Waldman, Solomon and Arnon, 2020). - Support making **new professional connections** and **solidifying existing ones** (Laryea, Paepcke, Mirzaei and Stevens, 2021). - MOOCs are also used as **"soft" credentials** demonstrating the learner's ability, motivation and willingness to learn. Learners particularly value **badges which can be recognized by future employers or college admission boards** (Goglio and Bertolini,; and).

3.2.3. Disadvantages of MCs

Only 27% of the studies formally assessed whether learners perceived any disadvantage with MCs. However, in an additional 33% of them we could capture some information from the corpus of the paper. Based on these studies, our findings indicate that learners perceive the following disadvantages from MCs: Lack of motivation, specially related to MOOCs, which appears in 31% of studies; lack of interaction with other students or teachers, in 28%; technological barriers (i.e. connection problems), in 28%; lack of recognition by employers or other education providers, in 24%; not useful format of course contents, in 17%; miss or prefer the face-to-face environments, in 17%; language barriers due to insufficient knowledge of English, in 17%; do not offer official credentials in 7%; and the price, in 7%. (Figure 16). It should be noted, however, that many of these stated disadvantages relate to the particular format of MOOCs in which they were engaged and do not necessarily cover MCs in general.
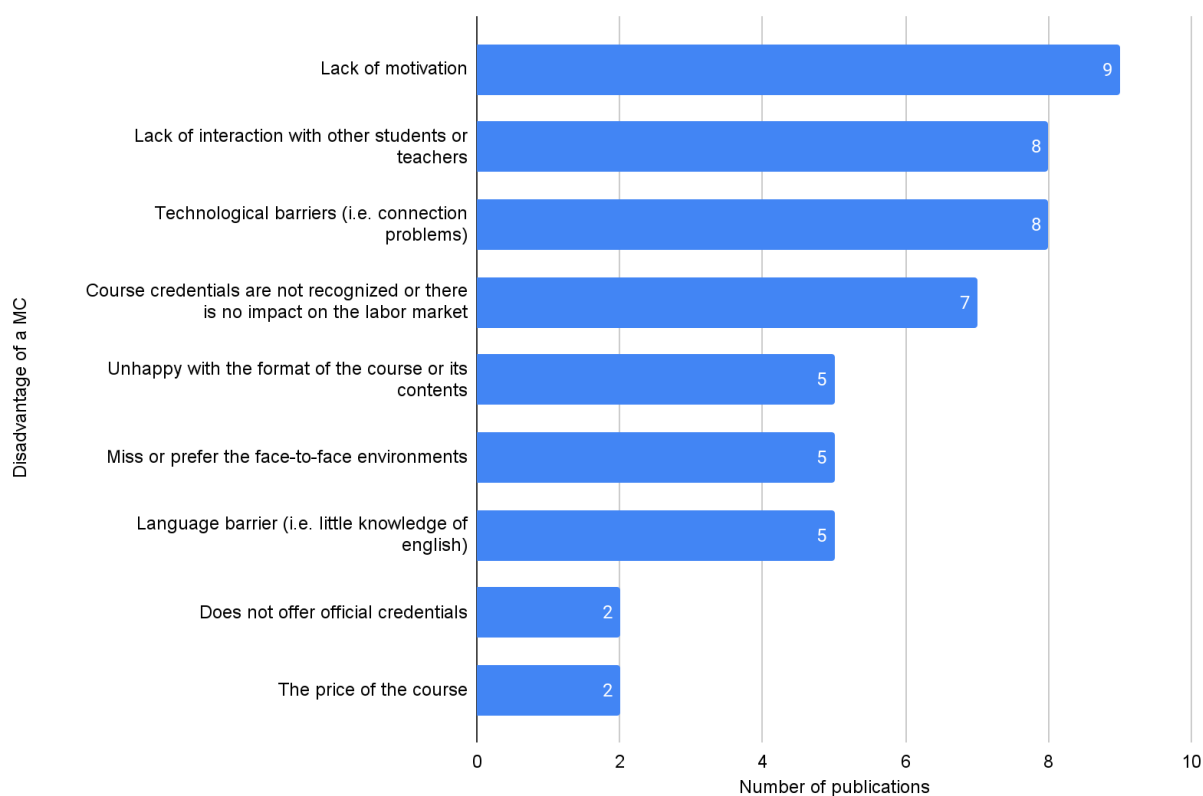

Figure 16. Perceived disadvantages of learners for pursuing MCs.

The following table illustrates the disadvantages perceived by the learners distributed by their opinions on the learning experience, credentials and both aspects.

Table 4. Examples of learners´ perceived disadvantages of MCs.

Results focused on…	Considerations and examples
Learning experience	- [Referring to MOOCs] Inappropriate for people with low intrinsic motivation. **High drop-out levels** (Kundu and Bej, 2020). - [In online SLEs and MOOCs] **Lack of face-to-face contact with teachers and peers**. Some MOOC students **prefer to study in an in-college course**. Nee**d to have more face-to-face interaction**. MOOC students **study better under the guidance o,f and communicate with, a teacher.** Students may benefit **from studying with other students** (Dale and Singer, 2019). - MOOCs do not facilitate learning **for people with special needs** (Sanni, Ajiboye and Hamzat, 2021), - **Too many MOOC options**. **Cost**. Some respondents were **unaware of the term 'MOOCs'** (Ambadkar, 2020).
Credentials	- Students stated that they would appreciate it if **employers were involved** earlier in the SLE as the interaction with them is key to improving their performance (Maina, Fabián Guàrdia, Mancini and Martinez, 2022). - Students were not able to say **whether the certificates were valued by employers**, and they were generally skeptical about their value. A key issue in this regard is the **lack of recognition by certified bodies** of the statement of accomplishments issued by MOOC platforms (Ambadkar, 2020).
Both	- The **online studies** were viewed as **not entirely functional. More personal contacts** could have enhanced the students' learning (Aittola and Ursin, 2019). - **Need to pay** for a verified certificate (Roshchina, Roshchin and Rudakov, 2018). - Many of the participants felt **under time pressure** from their jobs and felt this impacted their ability to engage fully with the course. (Risquez, Cassidy and O'Suilleabhain, 2020). - **Confusion of terms was common**: when talking about the digital badge, participants often did not refer to the micro-credential, but to the course itself. Others did not actually know what we were referring to at all (Risquez, Cassidy and O'Suilleabhain, 2020).

3.3. Learners' preferences for MCs

The third group of categories analyzed in this study, corresponds to different factors related to learners' preferences for the SLEs and the credentials associated with them.

3.3.1. Publications that address learners' preferences for MCs

The issue of learners´ preferences for MCs has been scarcely studied in the literature. Only 4% of the selected studies formally assessed learners' preferences in their research questions or in their research methodologies. However, we extracted some data related to learners' preferences in 34% of the studies. Table 5 shows the different categories of preferences analyzed: Modality of delivery (online, face-to-face, blended), if online, whether synchronous or asynchronous, MC duration, and the intensity of instruction, that is whether full-time or part-time. We also searched for whether learners prefer MCs that can be stacked in micro-qualifications or provide credit validation towards traditional qualifications. We also searched for: Information regarding their preferences for a credential's format, its contents and the

nature of the issuing institution (for example, whether they prefer a MC to be issued by a university, a training institution or a company). Finally, we also searched for evidence on whether learners were willing to pay extra for a SLE that provides a credential.

Table 5. Publications that study learners' preferences by subcategory of preferences

Preferences	F.A.	N.F.A.	I.A.
Online, face-to-face, blended	2	19	27
Synchronous, asynchronous	0	31	17
Duration and dedication	2	38	8
Full time, part time	3	38	7
Relation with other courses / Stackability	1	33	14
With or without official credential	3	17	28
Willingness to pay	2	33	13
Total percentage	**4%**	**34%**	**62%**

Given the large share of papers with no information on specific learners' preferences, results in the following section are presented as a percentage of the papers for which information was either formally or indirectly assessed.

3.3.2. Preferences for online, face-to-face or blended format

As mentioned above, most of the reviewed studies refer to preferences and opinions regarding a particular MC, of which 94% were provided online. Our results (Figure 17) indicate that the large majority (93%) of the studies for which inferences can be made indicate that learners tend to be satisfied with micro-credentials that take place in an online environment.
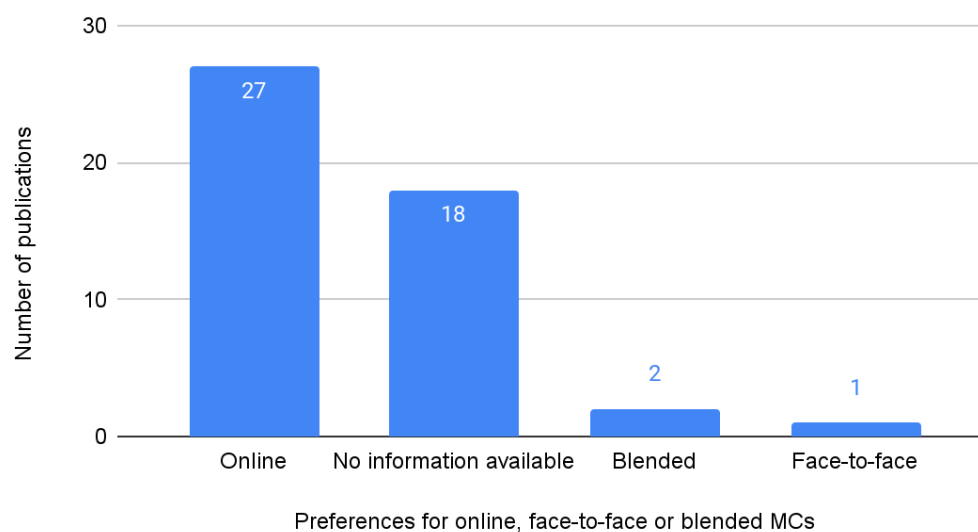

Figure 17. Publications by preference for online, face-to-face or blended MCs

Some examples of the stated reasons for learners to be satisfied with online MC are:

- Students can **access course content anytime** and from **any device** (Kumar, 2019);
- Online and multiform learning **suits** students' needs (Aittola and Ursin, 2019);
- Students **can save time** attending online courses (Vezne, 2020);
- Students can get to **learn from professors across the country** (Ambadkar, 2020).

3.3.3. Preferences for synchronous or asynchronous MCs

Only 6% of the papers with available information indicate learners´ satisfaction for the synchronous modality of MCs, which means having to be connected at a specific time and day, while a larger number of studies show their satisfaction with asynchronous MCs (53%), which means they can connect at the time that is most convenient for them (Figure 18).
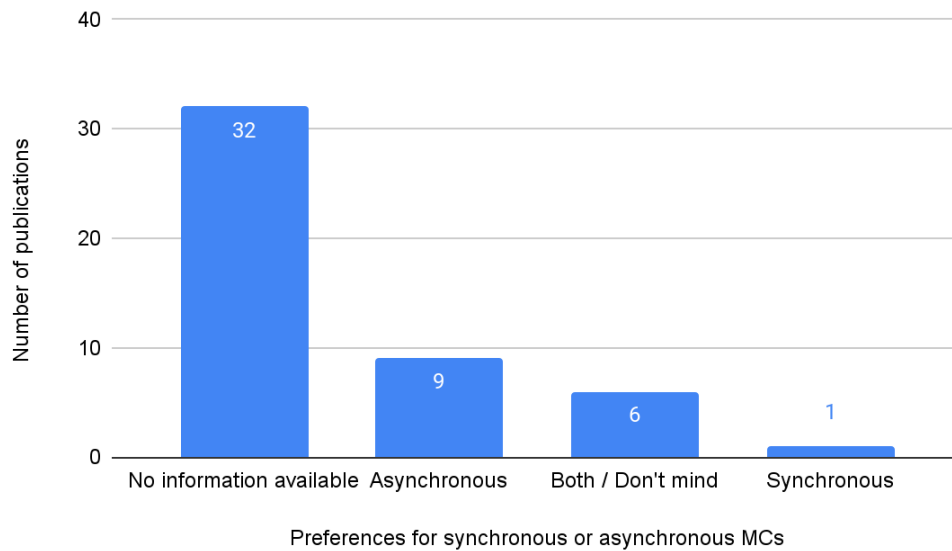
Figure 18. Publications by preference over synchronous or asynchronous MCs.

Some examples of learners' reasons for enrolling in asynchronous MCs are as follows:

- Participants stated that their motivation to attend more MOOCs is **the freedom that they experience** as a consequence of its flexibility (Vezne, 2020);
- Students liked that asynchronous participation **is voluntary** (Coleman, 2018);
- Participants (agree or totally agree) that the asynchronous format **suits their schedule** and that it helps reconcile work and family life (Ruiz-Palmero et al., 2020);
- Online students said they **chose independent study for convenience** instead of the inconvenient scheduling of college courses (Hellerstein et al., 2020);
- Student opinion: "The best thing about this type of course is its convenience, **as it has no fixed schedule, and it is quite flexible"** (Ruiz-Palmero et al., 2020);
- Because learning with MOOCs is self-paced, learners **can set their learning schedule at their most convenient time** (Hellerstein et al., 2020).

However, **the freedom associated with MOOCs, and in general to asynchronous online education, can be inappropriate** for people with low intrinsic motivation and result in high drop-out rates (Kundu and Bej, 2020).

3.3.4. Preferred daily dedication and duration of MCs

The issue of the preferred daily dedication and duration of MCs appeared in only 21 % of the papers (Figure 19), of which, only half collected information regarding preferences for a particular specified duration (regarding weeks or months of the learning experience) or dedication (regarding the hours they dedicate to the experience during the day or week).
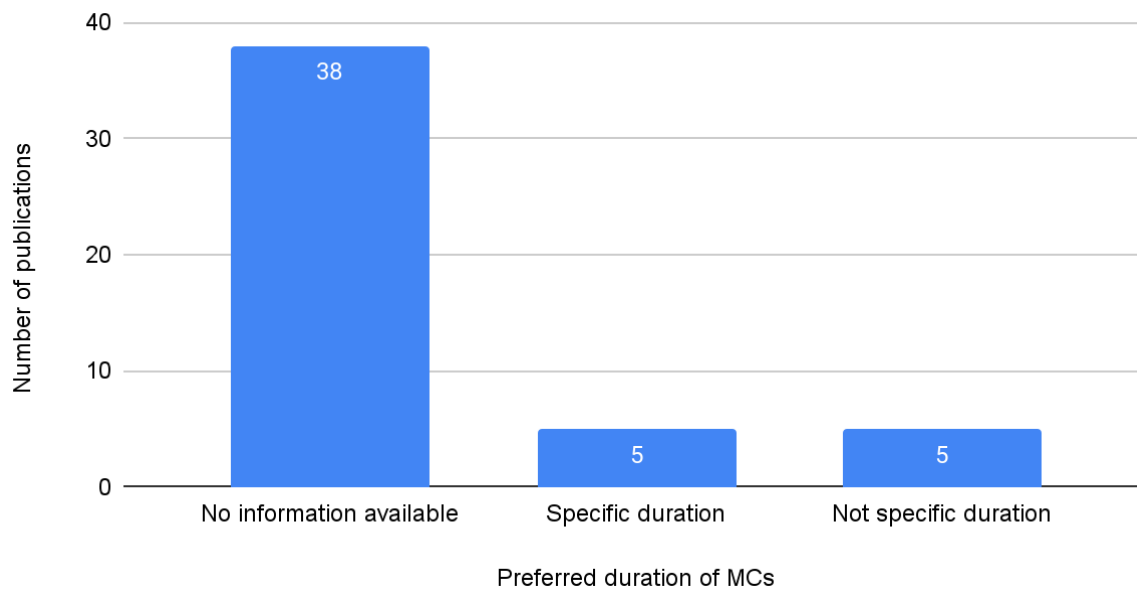
Figure 19. Publications by preference duration of MCs.

Below are listed some of the identified preferences (it mainly refers to MOOCs format):

- [Regarding hours per day of a MOOC] 33.74 % of learners plan to devote no more than one hour a day to complete MOOC learning; **53.71 % of learners plan to devote 1 to 2 hours**; 11.65 % of learners are willing to spend 2 to 5 hours to learn MOOC; only a tiny minority (0.90 %) of learners are willing to spend more than 5 hours learning MOOC (Guo, Wu and Zheng, 2019).

- [Regarding hours per week of MOOC dedication] **56.25% of respondents preferred to devote 2 to 4 hours per week to studying for MOOCs**; 20% of respondents preferred up to 5 to 8 hours per week of study time; and 11.25% respondents did not have any time constraint for study time (Ambadkar, 2020).
- [Regarding the total duration of a MOOC] Preferred duration of MOOCs: 1 to 4 weeks (24,2% of respondents), **5 to 8 weeks (52,2% of respondents)**, 9 to 12 weeks (17,7% of respondents), 13 weeks and above (5,9% of respondents) (Deng, Benckendorff and Gannaway, 2020).

3.3.6. Preferred full-time or part-time modalities of MCs

Another type of information related to students' preferred MC format refers to students' preference for full-time or part-time participation in the MCs (Figure 20). The studies that directly or indirectly assessed this aspect indicate that students are satisfied with part-time modalities (70%).
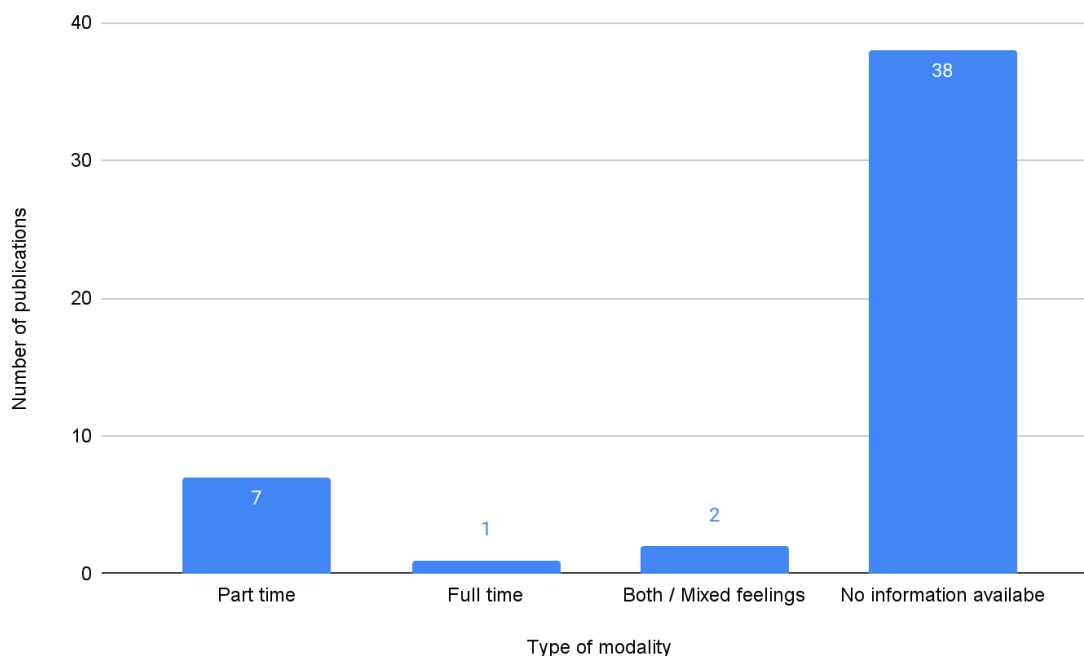
Figure 20. Publications by preferred full or part-time modalities of MCs.

Some specific opinions regarding preferences for part-time modalities of MCs are that learners highlight the convenience of following the course **online and during or outside working hours** (Aittola and Ursin, 2019; Ruiz-Palmero et al., 2020).

3.3.7. Preferred type of relation of MCs regarding other courses
Another type of information analyzed corresponds to students´ views on the relation of MCs with other types of qualifications (that is MCs as complements, as part of, or substitutes of traditional macro-qualifications, Figure 21). Most papers that provide information on this topic highlight learners´ satisfaction with MCs that complement their traditional training (i.e., their bachelor's or master's degree) (40%), followed by those that highlight learners' satisfaction with MCs that are part of their traditional training (27%).
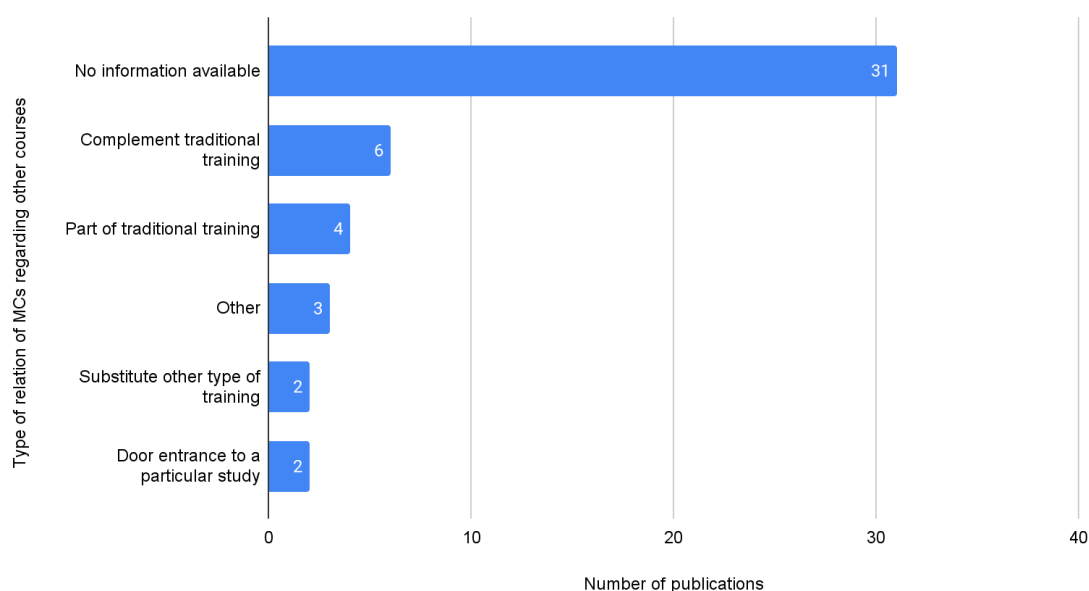
Figure 21. Publication by preferred role/function of MCs regarding other types of learning

Next table illustrates students' opinions about MC´s relationship with other courses.

Table 6. Examples of types of relation between MCs and other courses

Learners perceive that better fit by…	Considerations / Examples
Complementing traditional training	Almost 84% of participants enrolled in a MOOC with the expectation that the experience would enable them to extend their previous education (Fernandez-Diaz, Rodriguez-Hoyos, Belver and Calvo, 2020).
Being part of traditional learning	46.25% of respondents studied a particular set of MOOCs in order to opt for credits that can be validated in a university subject (Ambadkar, 2020).
Substituting other type of learning	99% of respondents responded that the lack of formal accreditation in their universities was a hindrance to taking the MOOC (Kumar, 2019).
Being an entrance door to formal study	Participants commented on how the time-bound nature MOOCs helped them to prepare for the more demanding traditional academic environment (Kubincova, Dale and Kerr, 2018).

3.3.8. Preferences regarding obtaining credentials for a SLE

The considerations and importance students place on receiving credentials when finishing SLEs have also been recorded (Figure 22). In this regard, papers with available information indicate that students see obtaining credentials for a SLE as important (77%). In 7% of the papers obtaining credentials is deemed not crucial but valued in some way, while 17% don't mind obtaining an official credential or not after the completion of the SLE.

Figure 22. Publications by learners' considerations on obtaining credentials for a SLE.

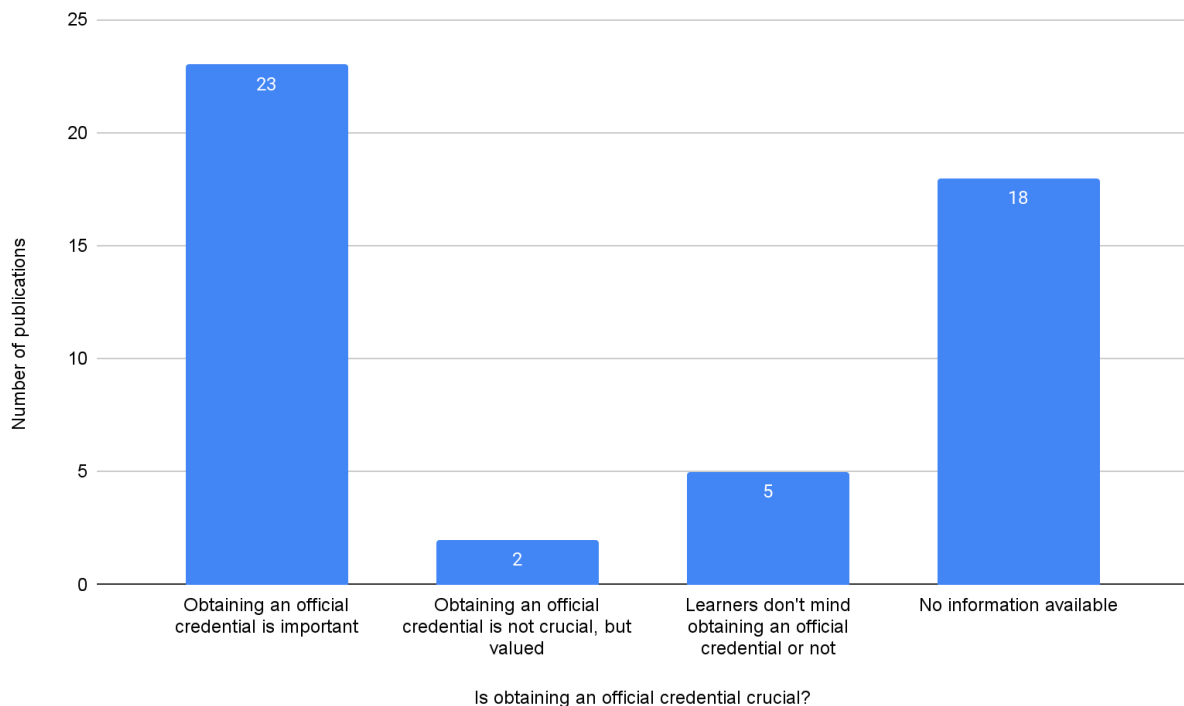The following table shows more highlighted examples of the considerations of students for obtaining credentials after undertaking some form of SLEs.

Table 7 Examples of learners´ perceived benefits for obtaining credentials when taking SLEs.

Learners perceive that…	Considerations and examples
Obtaining an official credential is valued	- Badges awarded by the students make **skills not explicitly mentioned in the curriculum visible** along with their level of development, and this increases job opportunities (Maina et al., 2022). - 10% of teacher candidates stated that their motivation to enroll in MOOCs is **to get a certificate** (Vezne, 2020). - Many MOOC participants took the course to receive a valuable and recognized certificate as an **evidence for their learning** achievement in the nanotechnology field (Watted and Barak, 2018). - Most interviewees downloaded the free certificate of completion and **added it to their CV**s (Bertolini and Goglio, 2021). - Students appreciated the **possibility of getting recognition** for things they are already involved in and seemed willing to invest additional effort to receive a badge for things they are involved in (Coleman, 2018).
Obtaining an official credential is not crucial	- Participants described their intrinsic motivation: **"It's not all about the framed certificates; it's more about the journey"** (Brunton et al., 2018). - Most course participants saw receiving a certificate only as an **additional motivational factor** (Sablina et al., 2018). - Those interviewed had mixed feelings about the motivation generated by the badges offered during the course: "**I know badges motivate some people. They like to have their recognition public. It's not for me.** My goal was really to look for new techniques." (Torcivia et al., 2020). - In some cases, certification from online courses was perceived as less valuable in the labour market: "t**raditional education certificates are still more likely to guarantee to obtain the job**" (Castaño-Muñoz, Colucci and Smidt, 2018).

3.3.9. Willingness to pay for MCs

Finally, we identified whether, in the selected articles, students exhibited a willingness to pay for obtaining a credential as a further indication of the value they place in a credential beyond the value of the skills learned in a SLE (Figure 23). Most of the studies with available information show that, when possible, students are happy to avoid paying for MCs (85%).

Figure 23. Publications according to willingness to pay for MCss

Some reasons of students´ considerations for free types of MCs are:

- The highest agreement with reasons for choosing an online course was 'financial savings' because students wished to **avoid the additional cost of a college course** (Hellerstein, et al., 2020).
- MOOC **reduces the cost of education** for learners (Sanni, Ajiboye and Hamzat, 2021).
- Students like the MOOCs they completed because they **provided free, accessible, and flexible** alternative learning opportunities (Mabuan and Ebron, 2018).

4. Discussion

This systematic literature review has generated multiple results about the learners' perspectives on MCs. The main findings are presented below and clustered in accordance with the RQs investigated in this study.

4.1. RQ 1: What are the characteristics of research on learners' perspectives on MCs?

The literature review revealed a constant scientific production between 2018 and April 2022. In this sense, the 48 articles analyzed expanded research on the topic of MCs (micro-credentials), such as those of Taylor and Hung (2022) and Lee (2021) by focusing on learners' point of view and taking into account their motivations and preferences. The distribution of publications across countries shows a common interest in MCs across continents in line with the upward global interest indicated by Leong, Sung, Au and Blanchard (2020, p.93). This interest is aligned with the recent initiatives from many countries collected in the article by Brown et al. (2021, p.245). From the authors' keywords and the words used to refer to MCs, MOOCs are, by far, the term most related with MCs, in line with the great popularization of MOOCs in the last decade, especially since 2018 (Zhu, Sari and Lee, 2020, p.1692). MOOCs are also the most studied type of micro-credential. This has greatly influenced the results obtained in this review. The sample of learners, mainly university students and MOOC participants, was narrowed by the inclusion criteria set by the literature search, reflecting higher education institutions' major role in providing MCs.

In terms of the methodology pursued by the studies, quantitative research is the most common, and questionnaires are the most widely used research tool for collecting data on learners' opinions. Data has been collected mainly during or after the SLE and refers to this particular experience. Therefore, there is little information on students' expectations before starting a MC, which makes it difficult to verify if their expectations were met. In qualitative research, interviews and focus groups are the most used research techniques. This variety of research techniques and tools has resulted in a variety of research approaches, from 'micro' studies, for example, the case studies from Ponce and Yitzen (2021), to massive MOOC questionnaires, for example, the study of Luik et al. (2019).

4.2. RQ 2: Which are the different learners' drivers for pursuing MCs?

Building on the 19 drives and attractors for micro-credentials described by Brown and Mhichil (2021), the results of the literature review has uncovered many types of learners with different motivations, of which three stand out. First, the reason most often mentioned in the reviewed studies for learners to engage in MCs is to be more efficient in their work. The second is that learners pursue MCs to have access to relevant and updated content, and the third is that learners are attracted to MCs to satiate their personal curiosity for new knowledge. It is noteworthy that MCs are perceived as a tool to advance in the current job or in one's career, and not so much as a tool to find a job for those who are unemployed or seeking another job. Equally significant is the fact that pursuing MCs for the sheer pleasure of learning new things appears as an important driver, as the debate around MCs often focuses on their instrumental value to achieve employment related needs, as for the drivers and attractors for MCs collected by the aforementioned authors.

In addition to these main motivations, MCs are also seen as providing learning flexibility and being a good complement to other types of training. In this sense, in line with the review of these authors (p.19), MCs are seen as useful when being a part of blended education or complementing "traditional" education. This 'complementation' allows students to delve into knowledge that is taught in formal courses or get in touch with useful content that is not fully covered in their formal studies and that helps them to advance professionally. Finally, it is also notable that getting a certificate attesting to the acquisition of certain knowledge and skills is discussed, as an important motivator, in a relatively lower number of publications.

Concerning the advantages of MCs, the possibility of learning anytime, anywhere, at one's own pace appears as the benefit of MC that is often highlighted in the reviewed publications. In addition, a second stated advantage of MCs is that they are useful for complementing other traditional courses, in line with Resei et al. (2019) which stated that "micro-credentials are widely seen as a potential complementation of the existing higher education system and as a follow-up tool after the early academic stages (bachelor or master), rather than replacing them" (p.4). The literature review also points to issues related to lack of motivation and low interaction with teachers and students as one of the most mentioned learners' perceived disadvantages of MCs.

4.3. RQ 3: What are the learners´ preferences towards MCs?

Because most studies analyzed in this literature review assess learners´ preferences on one particular MC, they are not well suited to assess learners' preferences over different modalities of micro-credentials or their potential characteristics. It is, therefore, not surprising that few studies directly tackled this research question. The scant available evidence points to learners´ satisfaction with online, asynchronous and part-time MCs. Similarly, despite credentials being a key element of the micro-credential movement, few papers discuss learners´ views on this crucial matter. From the existing evidence, we gather that learners value credentials as proof of learning that can be presented to companies or employers, a key aspect of the whole employability process highlighted by Oliver (2019, p.17)

and Gauthier (2020). These credentials can be a "tangible" proof that learners have the knowledge and skills that are required for a specific job or position, complementing their CV or their digital portfolio, as exemplified in Maina, Guàrdia, Mancini and Martinez (2022). But on the other hand, while most prefer earning credentials when undertaking a SLE, many question if and how these credentials will be useful later when looking for a job or seeking a promotion. Learners point to a lack of a common frame between companies, employers and even universities about the value of these micro-credentials and ultimately their applicability. This is a critical aspect to be solved, as pointed by Oliver (2019, 14). These results are in line with Resei et al. (2019) who stated that "chaotic terminologies, low standardization and limited stackability and transferability are key barriers that need to be overcome to make micro-credentials more valuable and recognized" (p.4).

5. Conclusions

This systematic review analyzed and summarized five years of research into learners' perspectives on MCs. This review identifies and describes how research has been conducted in methodological terms and the evidence obtained from the selected studies. Furthermore, it helps to identify to the current academic interest on MCs, which responds to the needs of today's citizens living in a changing society, and the interest in accreditation associated with these MCs. Even with the effort of institutions such as UNESCO (Oliver, 2022) and the European Union (Council of the European Union, 2022) this is still an evolving field with diverse views across educational institutions, employers and public policies.

5.1. Main findings

As for the most important drivers for learners engaging in MCs, our review points to satisfying work-related skill needs and satiating one´s curiosity for new knowledge as the most common ones. This systematic literature review has brought to the surface that MCs' flexibility (learn at your pace any time anywhere) is seen as a great advantage, jointly with being a good complement to other types of courses or qualifications. While the main disadvantage of MCs is identified in the lack of face-to-face contact with teachers and other learners. As far as the learners´ preferences over particular modalities and characteristics of MCs is concerned, the literature shows that learners are satisfied with online asynchronous courses of short duration that require relatively low daily or weekly engagement. They also reveal that certificates are valued to make skills visible to employers, even though there is uncertainty on how the latest will perceive and evaluate them.

5.2. Limitations of this study and suggestions for future research

It should be noted however that the conclusions drawn here are partially influenced by the type of studies available in the literature. As most studies assess learners' opinions on individual MC, it is quite difficult to disentangle learners´ motives and their perceived benefits and disadvantages from the types of MCs on which learners could express their views. With this limitation in mind, it seems safe to conclude that most learners, for which their opinions have been gathered in this study, engage in MOOC-type of MCs with the intention of learning, either to achieve work-related goals or to satiate their curiosity for new knowledge and skills.

The motive of obtaining a certificate that serves to make skills visible to third parties has been less analyzed and discussed in the literature. Therefore, their apparition as a relatively weaker motivator for MCs may be a direct consequence of it. The shortage of literature is surprising in the light of the recent drive to create a standardized approach to micro-certificates to enhance the validation and recognition of skills across institutions and countries.

The fact that most data has been collected on students participating in a particular MC (typically a MOOC) is particularly restrictive when it comes to assessing learners 'preferences over different modalities and potential characteristics of MCs. For this reason, very few studies have been able to tackle this question. Therefore, we find that an in-depth analysis of the recent academic literature does not provide a satisfactory answer to the third research question posed in this review. Thus, for example, the relatively scarce information assessed suggests that students find numerous advantages in self-directed online learning experiences of relatively short duration (1-2 months) and that require between 1-2 hours of dedication per day to them. The literature, however, also points to learners missing interaction with teachers and learners during their study, a question afforded by face-to-face education, which seems to be contradictory with their preferences for online education. Similarly, despite the centrality of the credential in the most recent definitions of MCs (Council of the European Union, 2022), remain a large knowledge gap about the value students place on a credential, the type of information a credential must contain –Do learners want the credential to show instruction hours, course(s) contents, skills and competences acquired, or want them to be digital? – or on what are the students´ preferences for the issuing institutions. While the literature indicates that learners value credentials, some studies also point to students´ ambiguity about the value of credentials due to uncertainty about employers' and other learning institutions' recognition.

Several points of interest and possible future lines of study emerge from the results of this systematic literature review. In the first place, despite the popularization of micro-credentials (Lee, 2021), our findings suggest that although a considerable amount of data has been generated in recent years, they are very focused on MOOCs (Zhu, Sari and Lee, 2020). It would be important to broaden the focus on other types of MCs. Second, this literature review has focused on the perspective of students, as one of the main actors in the micro-credentialing context, but it would be necessary to complement this study with the vision of employers and those responsible for public policies (Maina et al., 2022). Understanding employers´ stance towards micro-credentials, how they value them and the types of inferences they make about their holders is of key interest for learners, higher education institutions and learners. A credential is useful only if it is widely recognized and accepted. The triangulation of these visions will lead to a complete overview of the potential of MCs to further learners´ goals. Third, going forward, it would be desirable to extend the existing evidence to gauge learners' preferences for MCs and credentials and solve some apparent contradictions in the preferences gathered. Therefore, from a methodological standpoint, it would be useful to complement the existing literature with studies that, without limiting themselves to particular MOOCs, or specific credentialing experiences, elicit the preferences of people over different learning modalities and dedications (online versus face-to-face, synchronous vs asynchronous

or full-time versus. part-time), types of credentialing, willingness to pay for them to gauge and unbundle preferences on individual characteristics of MCs to guide future MCs design. Finally, a limitation of the research has to do with the time period of the studies analyzed, which runs from 2018 to 2022. Various initiatives at the European, American or Asian level suggest a growing interest in MCs (Brown et al., 2021). A follow-up study seems useful to assess if the ambiguity in the use and application of MCs continues with these new policies or, on the contrary, MCs are recognized by employers, as demanded by Oliver (2022), or credited towards longer qualifications.

5.3. Implications for the field

This review provides several practical implications. The results can be helpful for universities to help design more learner-centric MCs that are aligned with the needs of diverse groups of students. This would help to widen their appeal and reduce dropout rates. Our findings can also inform policymakers that seek to enact policies regarding MCs, particularly in a context where the European Commission recommendation on MCs has been adopted by the European Council and countries have committed to its implementation. This research can also support a better alignment of public policies with learners´ priorities helping MCs move from potential opportunities to realities, recognizing the three main actors -students, employers and policymakers- in the use, value and application of the certifications obtained by students. It is also relevant for the development of policies that create the right skills for workers, to enhance employability and competitiveness. Lasty, this research can be helpful for companies to support designing training plans for their workers.

Within the framework of the Erasmus + project "Modularization of Continuing Education and professionalization by Micro-credentials (MCE)", in which the authors of this article participate, the findings of this systematic review will serve as the basis for a series of focus groups carried out by project partners, involving 11 European higher education institutions. Both research, which have been planned as complementary, will contribute to the further conceptualization of MCs and to transformative institutional developments in interaction with national and EU policies.

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