Online-Journals.org

iJET International Journal of Emerging Technologies in Learning

iJET | eISSN: 1863-0383 | Vol. 19 No. 1 (2024) | OPEN ACCESS

https://doi.org/10.3991/ijet.v19i01.38897

PAPER

Enhancing Teachers' Professional Identity in a Reflective Learning MOOC

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ABSTRACT

Social interaction in online teacher training can be challenging. Accordingly, we aim to explore how a massive open online course (MOOC) for teacher training affects the professional identity (PI) and development of teachers. This course was developed based on the reflective learning framework (RLF) and utilises modelling as a teaching method. For that, we enrolled in a mixed-method research study. Data were collected from 54 teachers and three discussion boards. Next, it was analysed through content analysis using grounded theory, the application of the narrative reflection assessment rubric (NARRA), and statistical tests. As a result, we observed a significant increase in teachers' evaluations regarding reflective thinking (from 24% to 67%) and sociocultural learning (from 13% to 39%) after completing the course. Pearson's r coefficient showed a positive relationship between the fourth NARRA element, transformation, and its predecessors. This indicates that each element plays a role in a continuous development process. The evidence was sufficient to conclude that the training promoted teachers' PI development, except in the domain of job satisfaction.

KEYWORDS

reflective learning, professional identity (PI), vicarious learning, negative role model, massive open online course (MOOC), teacher education

1 INTRODUCTION

Professional identity (PI) is a multidomain concept widely addressed in the research agenda of teacher training [1], [2]. It encompasses teachers' professional knowledge, abilities, and dispositions regarding the domains of motivation, task perception, commitment, self-image, self-efficacy, job satisfaction [2], and reflective thinking [1]. Teacher training often focuses on providing normative knowledge about social expectations regarding teachers' characteristics and behaviour. On the contrary, the reflective learning framework (RLF) argues that teachers' beliefs, prior knowledge, and experiences should be considered as essential components of their professional development [3]. According to RLF, teachers must be seen as individuals

Rodrigues-Silva, J., Alsina, Á. (2024). Enhancing Teachers' Professional Identity in a Reflective Learning MOOC. *International Journal of Emerging Technologies in Learning (iJET)*, 19(1), pp. 23–38. https://doi.org/10.3991/ijet.v19i01.38897

Article submitted 2023-02-15. Revision uploaded 2023-10-27. Final acceptance 2023-11-08.

with the ability to make decisions about their actions [4]. Following this, instead of receiving, teachers engage in reflective cycles on the interplay between practice and theory to construct their PI [5].

Empirical studies provide evidence that reflective thinking improves teaching quality [6]. However, the existing literature on RLF primarily focuses on in-person environments due to its strong reliance on face-to-face communication [5]. This is particularly evident in the stages of sharing beliefs, prior knowledge, and personal experiences [7]. In this regard, transitioning RLF to online settings encounters challenges [8], such as achieving robust social interaction and incorporating practical activities. Despite the challenges, previous experiences indicate concrete possibilities for online RLF teacher training [7]. In this vein, researchers have made pedagogical recommendations for remote teaching in the context of the COVID-19 pandemic [5], [9]. These recommendations include the curricular integration of information and communication technologies (ICT) [10] and the incorporation of pedagogical instruments such as online portfolios [11].

Considering the above, we designed a teacher training programme following the RLF in a massive open online course (MOOC) format. Remarkably, this course embraced modelling as a teaching method scaffolded by vicarious learning (VL) [5]—a theory that states learning may occur from observing models' behaviours [12]. Given that, the course incorporates the negative role model of a perfect bad teacher (PBT), an archetype that embodies teachers' unwilling behaviours, including resistance to training, disrespect towards students, and lack of productivity [13].

This course encourages teachers to reflect on the concept of PI in contrast to the identity of a fictional character. As reported elsewhere [14], teachers share their prior beliefs and experiences, comparing their good and bad teachers in this course. Such an atmosphere makes this course unique because, although this VL is omnipresent in all human interactions, modelling is rarely made explicit and reported as a teaching method in teacher education [15].

Furthermore, RLF argues that teacher training should include practical activities to encourage teachers to reflect on the integration of practice and theory [3]. Accordingly, teachers designed and executed a class session aligned with a specific theoretical framework for direct instruction. After this, they participated in peer assessment, as recommended in the literature for online teacher training programmes [16]. Eventually, they wrote a reflective narrative about their development.

Briefly, the understanding of RLF and VL in online environments is not well established [7], particularly in relation to modelling that is supported by negative role models [17]. Hence, we wonder how training programmess may impact teachers' professional identity and reflective thinking. Hence, considering this inquiry and the gap in the literature, our aim is to explore how a teacher training MOOC embedded in RLF and VL affects the development of teachers' professional identity and reflective thinking.

2 THEORETICAL FRAMEWORK

This research addresses three theoretical constructs: PI, RLF, and VL. Therefore, we will elucidate each construct, highlighting their relationship and potential in a teacher training massive open online course.

2.1 Professional identity

Professional identity is not a permanent or fixed personal attribute but rather a complex and dynamic relational phenomenon. It is an ongoing process of interpreting and re-interpreting experiences [18].

Hanna et al. [2] suggest applying the PI construct in teacher education programmes. Their review of quantitative studies identified six main domains of PI. These domains include: motivation, which refers to engagement and willingness to become a teacher or join the profession; task perception, which encompasses beliefs about what constitutes good teaching; commitment, which relates to dedication to becoming or being a teacher; self-image, which involves how teachers perceive themselves and how they believe others perceive them; self-efficacy, which is the belief in teachers' ability to organise and perform their daily activities [12]; and job satisfaction, which encompasses feelings about the profession, school, or other educational institutions. Moreover, reflective thinking may be interpreted as a domain of PI [1]. Steenekamp et al. [19, p. 04] analysed reflection notes and found that this activity has a reconstructive power to assist teachers' PI development in three different ways: 'becoming future caring professionals, becoming motivated and inspirational teachers, and becoming agents of change.'

2.2 Reflective learning framework

On the one hand, RLF states that teacher training should not aim at learning from practice (trial and error) and then expecting to build theoretical knowledge later. On the other hand, RLF posits that teacher development should not aim to learn from theory with the intention of practicing it later [3]. As a third avenue, RLF proposes that teachers' professional development is driven forward through iterative reflective cycles—action, looking back on the action, awareness of essential aspects, creating alternative methods of action, and trial (ALACT) [20]—that integrate practice and theory [5].

Moreover, RLF is a neo-Vygostian approach [21] in which teachers' subjectivity—beliefs, prior knowledge, and experiences—are shared and considered during their formation [3]. Furthermore, beyond subjectivity, this framework addresses the subject-ness of teachers. As Biesta [22] explains, this concept means recognising teachers as individuals with agency and holding them accountable for their personal and professional choices.

Reflective learning framework identifies three main stages [23]. First, in deconstruction, teachers become aware (often through cognitive conflicts) of their prior experiences, values, and beliefs. Second, in co-construction, teachers' implicit knowledge is expressed through social interaction between peers and the teacher trainer, and it is articulated with the theory. Third, in reconstruction, teachers interact with themselves as subjects in their professional practice.

In sum, RFL aims to assist teachers in converting implicit knowledge into theory-based knowledge and in developing their PI [2]. In this context, instruments such as the narrative reflection rubric assessment (NARRA) have been validated as appropriate tools for evaluating reflective narratives based on elements of teacher development: focus of reflection, prior conceptions, inquiring, and transformation.

2.3 Vicarious learning

Bandura et al. [12] observed that children imitate aggressive behaviour after watching videos of adults exhibiting such behaviours. Those authors conceptualised imitative learning as VL [12], which means that observers learn behaviour patterns without performing actions or receiving direct reinforcement [15].

In this sense, models are individuals whose behaviour is observed [12]. They are identified as having positive or negative roles based on their goals of promoting or preventing. Positive role models lead observers towards desirable behaviours and outcomes, promoting goals. On the contrary, negative role models exhibit uncooperative behaviour and face the consequences of it, which hinders them from achieving their goals [17].

People might be driven by different promotion or prevention goals in VL [24]. Some individuals recall more information about pursuing success, while others focus on avoiding failure [17], [24].

As Sanderse [15] remarks, not every teacher models virtuous behaviour. Inevitably, teachers are exposed to both positive and negative role models. It can be derived from their previous experiences as students or their interactions with peers. Considering those experiences, addressing modelling as a teaching method [25], [26] might provide fruitful triggers for reflections about behaviours that should be performed (or avoided) in educational settings [26].

2.4 Combining the three constructs into a MOOC

As RLF states, teachers' prior experiences should be considered in their professional development [3]. First, teachers are naturally exposed to both positive and negative role models in relation to those experiences. In this regard, Lankveld et al. [18], for example, observed that experienced teachers act as role models who influence their colleagues' PI development. Second, when teachers share their beliefs, prior opinions, and experiences in an RLF course, they serve as role models for each other [19]. Interestingly, Lockwood et al. [17] noted that intentional reflective thinking helps in learning from negative role models. In this case, individuals who are initially influenced by positive role models can also be influenced by negative role models through reflection.

Regarding modelling, Mayes [27] suggests introducing videos of dialogues between tutors and students in MOOC formation. According to this author, the following participants can learn as much from those dialogues as the original students. Therefore, as models that can symbolize VL [28], modelling can be considered a teaching method for online teacher training [29]. In this same vein, previous experiences point to the potential of RLF in online environments [5], [9].

3 METHOD

We chose to adopt a mixed-methods approach because it combines both quantitative and qualitative methods. This complementation allows for a nuanced and comprehensive understanding of the object of study [30], specifically the effects of a MOOC course in this case.

As previously stated, the research explores a teacher training programme designed in a MOOC format with a workload of 90 hours. This course was offered in Brazil by the Federal Institute of Education, Science, and Technology of Minas Gerais (IFMG). First, it was released on the institution's website, targeting both pre-service and in-service teachers. No enrollment fee or any other charges were applied. Teachers could enrol in the course from December 2020 to April 2021.

At the end of this period, we conducted a cross-sectional research design, which involved collecting data within a single time frame [31]. We clarify that the data came from three discussion boards that capture different stages of the course (as explained later).

3.1 Participants

Three hundred sixty-six teachers completed the course. Next, we applied the eligibility criteria to establish the research sample. First, we excluded 99 teachers who did not volunteer to participate in the research. Similarly, we excluded 46 teachers who did not pass the course because they submitted incomplete assignments.

This filtering resulted in 221 participants. Following that, we examined the length of their texts posted on discussion board 3 (final reflections). We adopted the inclusion criterion of selecting participants whose text extended to at least 600 characters (including spaces). This criterion is intended to select significant participants, or, in other words, 'actual learners' in MOOCs [32, p. 45]. Eventually, we arrived at a sample size of 54 participants.

Those 54 pre-service and in-service teachers came from various fields and educational backgrounds. Additionally, it is worth noting that they come from 21 out of the 27 Brazilian states, as well as the federal district. This indicates that they are geographically well-distributed across the country. Furthermore, we would like to highlight that the sample has a balanced gender ratio, with 52% female and 48% male. No one reported any special educational needs.

Henceforth, we will refer to them interchangeably as teachers. For citation purposes, we anonymised their participation by coding them as P01, P02, ..., and P54. As the teachers used their native language (Portuguese), we translated their texts into English.

3.2 Data collection

Data was collected from the course's discussion boards, which were retrieved from the modular object-oriented dynamic learning environment (Moodle) platform. Each discussion board corresponds to a different phase of the course.

In Phase I, teachers expressed their expectations for the course and shared their prior conceptions and experiences about teaching. In Phase II, teachers designed and executed a class session based on Ribeiro's [33] framework of direct instruction. Additionally, teachers conducted self- and peer assessments in this activity using an authentic rubric from a Brazilian university's teacher selection process [34]. In Phase III, they wrote reflective narratives about their professional development. Table 1 summarises the study phases, data collection instruments, samples, analysis procedures, and tools used in the research.

Table 1. Course phases and research procedures

Course Phase	Data Source	Data Analysis	Analysis Tool
Phase I – Expectations towards the course.	Discussion board 1	Induced categories: multiple comparisons	Atlas-ti
Phase II – Designing and executing a class	Discussion board 2	NARRA [35] and descriptive statistics	Atlas-ti, Excel, SPSS
Phase III – Final reflections on their professional development	Discussion board 3	Categories are deducted from Professional Identity domains [2] and induced from data [36]. One-sample proportion hypothesis test between discussion boards 1 and 3	Atlas-ti, SPSS

3.3 Data analysis

First, we upload data into the Atlas-Ti software. Concerning Phase I, we analysed discussion board 1 using multiple comparisons based on grounded theory [36]. Initial readings facilitate familiarisation and assist in scanning the main features of the text. In subsequent readings, we drafted and refined the induced categories. This process iterates and finishes when saturation is reached.

In Phase II, we analysed discussion board 2 using the NARRA [35]. Accordingly, we applied each NARRA indicator, which consists of ordinal indicators graded from 1 (minimum) to 4 (maximum evaluation). The indicators in this instrument are organised into four elements: 1) focus of reflection; 2) prior conceptions and beliefs; 3) inquiring; 4) transformation. Accordingly, we created four corresponding scale variables by aggregating the indicators. Then, we calculated Pearson's r to quantify the relationships between those four elements.

After this, the indicators were separately addressed as ordinal variables. The frequencies were plotted in Excel and interpreted as repeated measures of the same variable (NARRA element) under different conditions. The element "prior conceptions and beliefs" has three indicators representing three conditions: about oneself, the context, and the discipline. Accordingly, we conducted the nonparametric Wilcoxon Signed Ranks test (for two conditions) or the Friedman test (for three conditions) to assess within-subject differences between the indicators and conditions. We utilised the statistical package for the social sciences (SPSS) software and employed a significance level of $\alpha = 5\%$ as the threshold for hypothesis testing throughout the research.

Finally, in Phase III, we analysed discussion board 3, applying Hanna et al.'s [2] six PI domains: self-efficacy, self-image, commitment, motivation, perception of the task, and job satisfaction. Additionally, we allowed inductive categories to emerge from the data. As we were able to match the categories that emerged from discussion boards 1 and 3, we conducted a one-sample proportion hypothesis test to compare the frequencies from the beginning to the end of the formation.

4 RESULTS

First, we present the results of Phase I, which correspond to the content analysis of discussion board 1. In Table 2, we present the five categories that were identified as teachers' motivations or expectations towards the course. As can be seen, we have included representative responses for each category.

Table 2. Teachers' expectations or motivations about the RFF course

Motivation/ Expectation (%)	Representative Response
Cognitive goal – updating and expanding knowledge (59%)	'I hope to learn a lot and expand my knowledge within this course. I always try to improve myself to perform good teaching' (P39).
	'I hope to learn and share knowledge. At the end of this course, I would like to be a perfect good teacher' (P41).
Competency goal – Improving teaching practice (52%)	'I believe this course can bring me new perspectives and methods for my teaching practice' (P13).
	'I believe this course will portray interesting and innovative perspectives to teaching, especially related to professional self-assessment' (P37).
Reflective thinking (24%)	'I opted to enrol on this course [...] to reflect about my practices, then change them whenever necessary' (P48).
	'[...] I expect to carry out a reflective assessment of my work, thus improving my knowledge in education' (P53).
Negative role model (22%)	'A *priori*, I consider that being a Perfect Bad Teacher has a huge charge of subjectivity. I am curious to know the course's approach' (P17).
	'I confess the course theme – Perfect Bad Teacher – caught my attention, aroused my curiosity' (P03).
Sociocultural learning (13%)	'Sharing experiences will certainly make us understand that there is not a unique formula for being excellent teachers. Knowing a variety of experiences will make us see things differently and think about different solutions' (P30).
	'I signed up for this course to be in touch with experiences from my colleagues' (P31).

We notice that it is reasonable for teachers to expect to acquire new knowledge and develop skills in any teacher training programme. More than half of their responses had such motivations. Additionally, teachers addressed reflective thinking (24%), negative role models (22%), and sociocultural learning (13%). These three categories will be compared later through an analysis of teachers' final reflections.

Next, we present the results from Phase II. This section corresponds to reflections reported on discussion board 2 regarding the design and execution of a direct instruction class session. Data was analysed using the NARRA [35], [37]. The results have been organised based on the instrument's four elements: focus of reflection, prior conceptions, inquiring, and transformation.

First, a Pearson r coefficient was calculated on scale variables (aggregation of indicators) to verify the relationship between the fourth element, transformation, and each of its predecessors. Results indicated significant positive relationships between transformation and the focus of reflection ($r = .661$, $p = .001$); transformation and prior conceptions and beliefs ($r = .448$, $p = .001$); and transformation and inquiring ($r = .608$, $p = .001$). The strengths of those correlations are interpreted as weak, moderate, and strong, respectively. This finding provides evidence that professional development encompasses a process that involves all of those aspects.

Henceforth, we will conduct specific analyses of the indicators for each NARRA element. The first element is the focus of reflection. It has two indicators: "identifies and describes the focus of reflection in a contextualised manner" and "makes judgements about the focus of reflection." In Figure 1, we present the frequency distribution. Both indicators had a median evaluation equal to 2, which, according to the NARRA, means that teachers identified and described a focus of reflection and then made a judgement about it. A Wilcoxon signed rank test reported no significant difference between those two indicators ($Z = –0.34$; $p = .973$). It is important to note that this value is below the desired 4. In other words, most descriptions and judgements of a focus of reflection could have more depth.

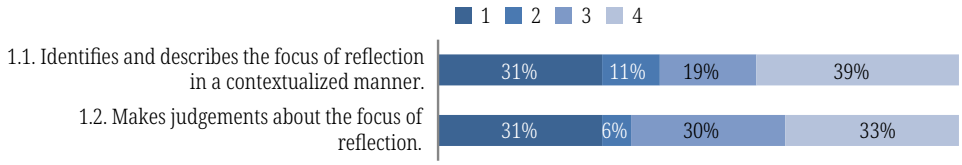

Fig. 1. Situation, activity, or experience that triggers reflection

Some teachers conducted practical activities despite the COVID-19 pandemic, as indicated by the following statement: "The experience was impressive, but I was initially a little confused because the class was held online due to the pandemic" (P06). Furthermore, due to the pandemic, the class was conducted via a video call. A few students and three colleagues took part (P31). Other teachers justified issues related to enrolling in the activity and chose a different focus for reflection. For example, "I didn't perform the activity because I couldn't find anyone to evaluate it." So, I will consider taking in a high school class in 2019 (P04).

NARRA's second element is prior conceptions and beliefs. In Figure 2, we present the frequency distribution of three indicators. Results show how teachers specify their preconceptions and beliefs about themselves and the discipline or profession. These conditions presented medians of two. However, the indicator specifying preconceptions and beliefs about context had a median value of 1. A Friedman test determined that difference was significant ($\chi^2_{(2)} = 18.39$, $p = 0.001$).

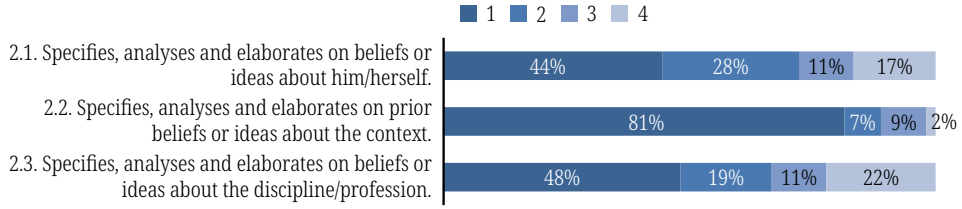

Fig. 2. Prior conceptions and beliefs: awareness of own previous beliefs, knowledge, and experiences

NARRA's third element observes whether teachers inquire about the conditions: the focus of reflection, the context, and the professional action. The indicators presented medians of 1.5, 1, and 1, respectively. A Friedman test showed that these values are significantly different ($\chi^2_{(2)} = 21.14$, $p = .001$). As shown in Figure 3, we highlight that 91% did not inquire about the context.

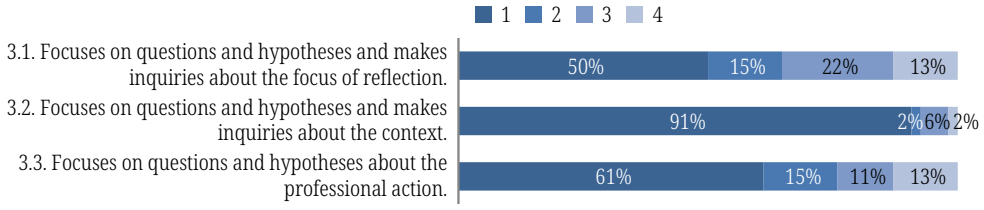

Fig. 3. Inquiring: investigating possible actions of teachers on questions and hypotheses

Qualitatively, we can observe how teachers inquired about designing a direct instruction class. For instance, one teacher stated, "Regarding my teaching approach, I primarily emphasised accumulating content knowledge rather than delving deeply into one topic." And during this class, I realised that this wasn't necessary (P42). Similarly, this inquiry is evidenced in the fragment: "After planning my class, as required, I conducted a self-assessment, taking into account factors such

as preparation and organisation. For me, everything seemed to align well with the rubric, but based on the grades from my colleagues, I need to improve" (P21).

NARRA's fourth element is transformation, and its indicators relate to initiating a new ALACT reflective cycle [38]. The first indicator corresponds to setting new learning goals, and the second indicator corresponds to setting new action plans. As seen in Figure 4, the majority of teachers (72%) did not establish any learning goals to support their professional development. In contrast, 52% did not set action plans for a new reflection cycle. A Wilcoxon signed rank test shows a significant difference between the two indicators (Wilcoxon Z = –3.360; p = .001).

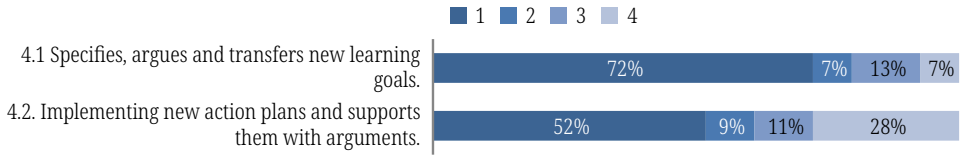

Fig. 4. Transformation: Set concrete learning objectives and future action plans and approaches to start a new reflective cycle

Findings indicate that teachers were more willing to implement action plans than to establish learning goals. Interestingly, 28% of the teachers' narratives were evaluated with the highest grade for implementing new action plans. For example, "I intend to consider all of my colleagues' suggestions." I will focus on class organisation. They also suggested that I speak slower for better understanding (P21). Only 7% achieved the highest grade for setting new learning goals. For instance, this teacher said, "I will use the rubric (from the teacher selection process) to reflect on my classes." "I feel that this makes us more secure and facilitates meaningful learning for our students" (P44).

From now on, we present Phase III of the research. This section focuses on the final reflections of teachers regarding the course. First, it was analysed, considering the six PI domains as pre-set categories.

As shown in Table 3, the PI domains of motivation (33%), task perception (26%), and commitment (26%), are evident in the relationship between teachers and their profession. For example, a participant wrote, "As teachers, we should be motivated and aware of the impact we can have on our students" (P27) or "Being teachers includes considering that we teach ways of living, of thinking about a better world, of building a viable and more respectful reality" (P43).

Table 3. Final reflections about their experience in the course and professional development (categories deducted from PI domains)

Professional Identity Domain (%)	Representative Response
Motivation (33%)	'[…] motivation and the capacity for transformation. The course was an injection of encouragement, especially in the context of the pandemic' (P31).
	'As teachers, we should constantly be motivated, aware of the impact we have on our students' (P27).
Task perception (26%)	'Teachers should never stop being students. The reflective process should be continuous. It contributes to developing more intense and functional teaching' (P10).
	'Autonomy in the teacher builds competencies, applying a distinct, more human, conscious, and participative teaching method' (P01).
Commitment (26%)	'I hope to apply the knowledge acquired on the course into my practice, using self-assessments' (P24).
	'Being teachers includes considering that we teach ways of living, of thinking about a better world, of building a viable and more respectful reality' (P43).

(Continued)

Table 3. Final reflections about their experience in the course and professional development (categories deducted from PI domains) *(Continued)*

Professional Identity Domain (%)	Representative Response
Self-image (17%)	'I saw myself as a teacher, a researcher who reflects on my praxis' (P16).
	'I needed to reflect on my performance, which at this moment seemed to be inefficient. Sometimes we feel we are incompetent regarding external discourses that say teachers are unproductive and incapable' (P44).
Self-efficacy (15%)	'I had many insights with the reflective approach of being a Perfect Bad Teacher. The course helped me to be more dynamic when teaching' (P22).
	'The course showed me a lens that allowed me to see differently. I developed a better and prepared look' (P12).
Job satisfaction (6%)	'The course allowed me to reinforce my certainty that choosing to be an educator is not a profession only, but a mission. And I feel great pleasure to be part of it' (P42).
	'The reflective learning course awakened my love for education and teaching' (P12).

The categories of self-image (17%) and self-efficacy (15%) had similar frequencies. These domains are more related to introspection: reflections on how teachers perceive themselves and their abilities. We highlight that job satisfaction (6%) resulted in a much lower incidence than the other domains. We will now continue presenting the analysis of this section by introducing categories that have been derived from the data. Results are shown in Table 4.

Table 4. Final reflections about their experience in the course and professional development (categories induced from data)

Category (%)	Representative Response
Reflective thinking* (67%)	'The course led me to reflect on my teaching practice and posture as a teacher and educator' (P20).
	'As a teacher, the course allowed me to reflect on my pedagogical practices and behaviours, the way of teaching, learning, and evaluating' (P09).
Course quality (44%)	'The portfolio facilitates reasoning so we can learn in an active and transversal way. And the course has an authentic and respectful ambience' (P29).
	'I like the method used in the course and the theoretical scaffolding. I saved all courseware for future studies' (P44).
Sociocultural learning* (39%)	'It was interesting reading responses and comments of my colleagues. I observed the diversity of their teaching realities' (P23).
	'Interacting and sharing experiences of our practices with our colleagues makes us reformulate our way of working in the classroom, and also how we consider a variety of students' (P24).
Negative role model* (32%)	'The course title surprised me at the first moment. But during the course, I could realise the purpose was to show us how not to be such a bad teacher' (P15).
	'I started this course wondering what a PBT would be like. I reflected on my vision of good and bad teachers, then I contrasted it with opinions from my colleagues. I observed that we have some opinions in common' (P54).
Cognitive conflict (9%)	'There were moments of reflection, questioning and discomfort. Discomfort, because seeing oneself in the figure of a Perfect Bad Teacher is difficult. But it is necessary to get rid of old practices that do not add any value to our students. Deconstructing and then reconstructing is a painful process' (P02).
	'As soon as I saw some of the PBT's behaviours, it made me want to not be like him. I recognised a little of the PBT in myself, but the reflections help me be aware of these aspects and now I can act differently to avoid repeating such practices' (P40).

Note: *Categories previously identified as teachers' expectations or motivations about the RFF course (see Table 1).

Reflective thinking was the most frequent category, present in 67% of the teachers' final reflections. Teachers emphasised that the course resulted in reflective thinking and professional development. For example, one teacher wrote, "The course led me to reflect on my teaching practice and posture as a teacher and educator" (P20), while another stated, "As a teacher, the course allowed me to reflect on my pedagogical practices and behaviours; rethink the way of teaching, learning, and evaluating" (P09).

A proportion test was conducted to compare matching categories from discussion boards 1 and 3. These measures essentially represent a pre-post design because the texts are taken from the beginning and end of the course. The percentage of reflective thinking increased significantly from 24% to 67% ($Z = 6.72$; $p < 0.01$).

Similarly, the frequency of sociocultural learning categories increased from 13% to 39%. A proportion test indicates that this difference is statistically significant ($Z = 3.91$; $p < 0.01$). Teachers affirmed that the course enabled them to learn by exchanging ideas and experiences with their colleagues. They reported an acknowledgement of multiple realities and forms of working.

The frequency of the negative role model category varies from 22% to 32% during the course. However, a proportion test fails to reject the hypothesis that these proportions are equal ($Z = 1.57$; $p = 0.06$). This result indicates that the test does not provide enough evidence to support the conclusion that the variation is statistically significant. However, there is evidence of a qualitative change. This category initially appeared out of curiosity about the PBT character. By contrast, in the end, the negative role model is addressed as a preventive measure. "For instance, as can be read in the statement, 'The course's title surprised me at first.' But during the course, I realised that the purpose was to show us how not to be a bad teacher" (P15).

Less frequently, 9% of the teachers reported experiencing cognitive conflicts. For example, a teacher indicated that reflecting caused him sentimental discomfort: "There were moments of deep reflection, questioning, and discomfort." "Discomfort arises from seeing oneself in the role of the perfect bad teacher" (P02). Such declarations show initial resistance, followed by a positive regard for reflective thinking.

5 DISCUSSION

This research aimed to explore how a teacher training MOOC embedded in RLF and VL affects teachers' professional identity and the development of reflective thinking. For that, we first elucidated that this course portrays the Perfect Bad Teacher (PBT) as a negative role model, considering that the character would depict teachers' undesirable behaviours [13].

This character is a crucial starting point for discussions about teachers' behaviour. Without delivering or imposing preconceived normative knowledge, teachers reflect on their beliefs, prior knowledge, and personal experiences. Importantly, they were regarded as individuals who make decisions based on their PI, including the freedom to question the underlying values that define the perception of the PBT as a bad teacher.

As a result of this study, we observed that approximately half of the participants expected to expand their knowledge or improve their teaching practice. Garza et al. [8] found similar results, with 43% of the participants believing that they could acquire enriched learning through teacher-training massive open online courses.

Following this, teachers were asked to integrate theory and practice by designing and executing a class session using a framework for planning direct instruction [33]. Regarding this proposal, NARRA found that one-third of them did not identify any focus of reflection or make judgements about it. In this case, the lack of focus on the activity suggests that some teachers may not have actively participated in it.

Heartwarmingly, approximately half of the teachers expressed, to varying degrees, their beliefs or ideas about themselves and the discipline or profession. However, few did it, considering the context (21%). Similarly, approximately half of the teachers formulated hypotheses and made inquiries about the focus of reflection and professional action. Nevertheless, few did it, considering the context (9%). The course focuses on the teacher figure. Accordingly, the intention is to prevent participants from shirking their responsibility for themselves while taking into account broader contextual features. Previous studies show that teachers sometimes avoid introspection by "blaming" others [21].

Next, we calculated the Pearson r coefficient, which indicated a significant positive relationship between the fourth NARRA element, transformation, and the three preceding elements: focus of reflection, prior conceptions and beliefs, and inquiring. This finding is essential because it suggests that each element plays a role in a continuous professional development process. Especially with regards to transformation, almost half of the participants reported implementing new action plans to improve their teaching. Significantly less frequently, only a quarter of the teachers specified new learning goals to theoretically scaffold those actions.

It was possible to identify the following PI domains in teachers' final reflections: motivation, task perception, commitment, self-image, and self-efficacy. Job satisfaction, on the other hand, had a low incidence (6%). We acknowledge that PI domains have a holistic and complex relationship [2] and that job satisfaction is likely to be influenced by external factors. Zakariya et al. [39] studied teachers from 38 countries. Their results showed that Brazil ranks 22nd in terms of teachers' job satisfaction. Some studies indicate that certain Brazilian teachers exhibit symptoms associated with burnout syndrome. For instance, they report dissatisfaction with working conditions, social prestige, and salary [40].

The category of reflective thinking showed a statistically significant increase from the beginning (24%) to the end of the course (67%). It is important to note that reflective thinking is considered the seventh PI domain of personal intelligence [1]. Similar studies have reported an increased awareness of reflective thinking in RFL courses [1], [41]. Following the same trend, sociocultural learning showed a statistically significant increase from 13% to 39%. Teachers emphasised that they learned from the opinions and experiences of others. Other studies observed similar results [5], [7], [29]. Murugesan et al. [32] reported a high evaluation of social interaction in massive open online courses.

The percentage of individuals categorised as negative role models ranges from 22% to 32%. Even though this variance was not statistically significant, there is a noticeable qualitative change in teachers' responses. Their statements moved from simple curiosity about the PBT to reflections on teachers' unwillingness to behave, which helped them to rethink their behaviours and professional identity.

Some teachers (9%) reported experiencing cognitive conflicts. The literature in RLF reports that cognitive conflicts are expected due to resistance to introspection [21] and awareness of discrepancies between their discourse and practice. McGarr and McCormack [42] define cognitive conflict as an event that causes disequilibrium. They state that the level of cognitive conflict decreases when teachers perceive the importance of reflective thinking [43].

We suggest that future research on courses with analogue features (VL, RLF, and MOOC format) should encourage reflections on broader contexts, such as the school, community, and government. Notably, we emphasise the importance of exploring professional development as it relates to job satisfaction. Researchers could provide instruments, such as the NARRA, to assist teachers in organising and enriching their reflective narratives.

Studies report that MOOCs are likely to have low completion rates [8], [44], [32]. Indeed, some teachers might not undergo a professional transformation through the course. However, since MOOCs are massive (as the acronym suggests), many teachers have benefited after all [45]. Remarkably, this format helped to enhance heterogeneity in teacher training by connecting individuals from diverse backgrounds and contexts [46]. Especially in the field of RLF, contact with diverse opinions, beliefs, and experiences is indispensable for teacher development. Additionally, considering the sample characteristics, MOOCs allowed for the democratisation of access to education. Teachers came from different and distant Brazilian states, most of whom would not have taken the course otherwise.

6 CONCLUSION

Results allowed us to draw critical conclusions about online teacher training based on the RLF, as follows:

1. Vicarious learning helps teachers raise awareness about their identity. Teachers reflect on their beliefs, opinions, and experiences by contrasting themselves with negative role models, teachers from their memories, and their peers.
2. Negative role models facilitate the (re)construction of professional identities rather than simply acquiring normative knowledge. Not without cognitive conflicts, teachers are called to reflect, decide, and engage in what would be considered appropriate professional conduct.
3. Online teacher training can overcome the challenge of effective social interaction. Beyond the advantage of democratizing access to education, appropriate spaces, such as discussion boards, make MOOCs as a suitable format for sociocultural learning. This enriches the diversity of participants' opinions and contexts.
4. Teacher training MOOCs must incorporate practical activities since RLF intertwines theory and practice. This way, teachers are compelled to engage in a continuous process of identifying a focal point for reflection, reevaluating their preexisting notions, conducting inquiries, and ultimately, undergoing transformation by establishing new cycles of reflection.
5. Teachers focused on self-reflection, their actions, and their profession. Few participants elaborated on their beliefs or made inquiries about the context. Similarly, they overlooked job satisfaction, a PI domain that is more closely related to broader contextual settings.
6. Teachers reported more frequently implementing new action plans to improve their teaching and then specified new learning goals to support those actions theoretically.

Those findings represent essential advancements towards comprehending online RLF teacher training, and they also highlight future challenges in promoting iterative reflective cycles that integrate practice and theory.

7 REFERENCES

[1] M. M. J. Engelbertink *et al.*, "The reflection level and the construction of professional identity of university students," *Reflective Pract.*, vol. 22, no. 1, pp. 73–85, 2020. https://doi.org/10.1080/14623943.2020.1835632

[2] F. Hanna, R. Oostdam, S. E. Severiens, and B. J. H. Zijlstra, "Domains of teacher identity: A review of quantitative measurement instruments," *Educ. Res. Rev.*, vol. 27, pp. 15–27, 2019. https://doi.org/10.1016/j.edurev.2019.01.003

[3] K. Melief, A. Tigechelaar, and F. Korthagen, "Aprender de la práctica," in *Creando mi profesión: Una propuesta para el desarrollo profesional del profesorado*, 1st ed., O. Esteve, K. Melief, and Á. Alsina, Eds., Barcelona: Octaedro, 2010, pp. 19–38.

[4] G. Biesta, M. Priestley, and S. Robinson, "The role of beliefs in teacher agency," *Teach. Teach.*, vol. 21, no. 6, pp. 624–640, 2015. https://doi.org/10.1080/13540602.2015.1044325

[5] O. Esteve and À. Alsina, "Más allá del PowerPoint: Promoviendo el aprendizaje activo en la formación de maestros no presencial," *Papeles Trab. sobre Cult. Educ. y Desarro. Hum.*, vol. 16, no. 3, pp. 1–14, 2020.

[6] W. Xiaoya, "The reflective teaching practice of teachers based on optimal teaching quality," *Int. J. Emerg. Technol. Learn.*, vol. 17, no. 15, pp. 156–170, 2022. https://doi.org/10.3991/ijet.v17i15.33757

[7] O. Kozar, J. F. Lum, and P. Benson, "Self-efficacy and vicarious learning in doctoral studies at a distance," *Distance Educ.*, vol. 36, no. 3, pp. 448–454, 2015. https://doi.org/10.1080/01587919.2015.1081739

[8] L. Y. A. de la Garza, T. Sancho-Vinuesa, and M. G. G. Zermeño, "Indicators of pedagogical quality for the design of a massive open online course for teacher training," *RUSC. Univ. Knowl. Soc. J.*, vol. 12, no. 1, p. 104, 2015. https://doi.org/10.7238/rusc.v12i1.2260

[9] V. Rodés, M. Porta, L. Garófalo, and C. R. Enríquez, "Teacher education in the emergency: A MOOC-inspired teacher professional development strategy grounded in critical digital pedagogy and pedagogy of care," *J. Interact. Media Educ.*, vol. 2021, no. 1, pp. 1–14, 2021. https://doi.org/10.5334/jime.657

[10] V. Graça, P. Quadros-Flores, and A. Ramos, "The challenges of initial teacher training," *Int. J. Emerg. Technol. Learn.*, vol. 16, no. 18, pp. 85–96, 2021. https://doi.org/10.3991/ijet.v16i18.24237

[11] B. C. Serdà and A. Alsina, "El portafolio: Efectos de un proceso de implementación autorregulado," *Cult. y Educ.*, vol. 25, no. 3, pp. 323–336, 2013. https://doi.org/10.1174/113564013807749650

[12] A. Bandura, D. Ross, and S. A. Ross, "Vicarious reinforcement and imitative learning," *J. Abnorm. Soc. Psychol.*, vol. 67, no. 6, pp. 601–607, 1963. https://doi.org/10.1037/h0045550

[13] R. P. Biani and S. Lorenzato, "Malba Tahan + Matemática = Malbatemática," *ETD – Educ. Temática Digit.*, vol. 19, no. 3, p. 822, 2017. https://doi.org/10.20396/etd.v19i3.8647052

[14] A. Carvalho da Silva and J. Rodrigues-Silva, "Sobre o bom e o mau professor," *Formação Docente – Rev. Bras. Pesqui. sobre Formação Profr.*, vol. 14, no. 31, pp. 155–170, 2022. https://doi.org/10.31639/rbpfp.v14i31.645

[15] W. Sanderse, "The meaning of role modelling in moral and character education," *J. Moral Educ.*, vol. 42, no. 1, pp. 28–42, 2013. https://doi.org/10.1080/03057240.2012.690727

[16] K. J. Topping, "Digital peer assessment in school teacher education and development: A systematic review," *Res. Pap. Educ.*, vol. 38, no. 3, pp. 472–498, 2021. https://doi.org/10.1080/02671522.2021.1961301

[17] P. Lockwood, C. H. Jordan, and Z. Kunda, "Motivation by positive or negative role models: Regulatory focus determines who will best inspire us," *J. Pers. Soc. Psychol.*, vol. 83, no. 4, pp. 854–864, 2002. https://doi.org/10.1037/0022-3514.83.4.854

[18] T. van Lankveld, J. Schoonenboom, M. Volman, G. Croiset, and J. Beishuizen, "Developing a teacher identity in the university context: A systematic review of the literature," *High. Educ. Res. Dev.*, vol. 36, no. 2, pp. 325–342, 2017. https://doi.org/10.1080/07294360.2016.1208154

[19] K. Steenekamp, M. van der Merwe, and A. S. Mehmedova, "Enabling the development of student teacher professional identity through vicarious learning during an educational excursion," *South African J. Educ.*, vol. 38, no. 1, pp. 1–8, 2018. https://doi.org/10.15700/saje.v38n1a1407

[20] F. A. J. Korthagen, "Linking practice and theory: The pedagogy of realistic teacher education," in *Annual Meeting of the American Educational Research Association*, vol. 28, no. 4, 2001, pp. 4–17. [Accessed: Jan. 13, 2022].

[21] J. Rodrigues-Silva and Á. Alsina, "Formação docente no modelo realista-reflexivo," *Rev. Educ. em Questão*, vol. 59, no. 60, pp. 1–28, 2021. https://doi.org/10.21680/1981-1802.2021v59n60ID24757

[22] G. Biesta, "Risking ourselves in education: Qualification, socialization, and subjectification revisited," *Educ. Theory*, vol. 70, no. 1, pp. 89–104, 2020. https://doi.org/10.1111/edth.12411

[23] A. Alsina, "Hacia una formación transformadora de futuros maestros de maemáticas: avances de investigación desde el modelo Realista-Reflexivo," *Unipluriversidad*, vol. 19, no. 2, pp. 60–79, 2019. https://doi.org/10.17533/udea.unipluri.19.2.05

[24] N. Wilde and A. Hsu, "The influence of general self-efficacy on the interpretation of vicarious experience information within online learning," *Int. J. Educ. Technol. High. Educ.*, vol. 16, no. 1, 2019. https://doi.org/10.1186/s41239-019-0158-x

[25] R. Coppell, "Revisiting the concept of the anti-role-model for social learning theory in UK education," *Res. Ideas Outcomes*, vol. 6, 2020. https://doi.org/10.3897/rio.6.e60683

[26] R. Nagle, "Learning through modeling in the classroom," *Teach. Coll. Rec.*, vol. 77, no. 4, pp. 631–638, 1976. https://doi.org/10.1177/016146817607700406

[27] J. T. Mayes, "Still to learn from vicarious learning," *E-Learning Digit. Media*, vol. 12, no. 3–4, pp. 361–371, 2015. https://doi.org/10.1177/2042753015571839

[28] M. F. Schober and H. H. Clark, "Understanding by addressees and overhearers," *Cogn. Psychol.*, vol. 21, no. 2, pp. 211–232, 1989. https://doi.org/10.1016/0010-0285(89)90008-X

[29] S. Korucu-Kış, "Preparing student teachers for real classrooms through virtual vicarious experiences of critical incidents during remote practicum: A meaningful-experiential learning perspective," *Educ. Inf. Technol.*, vol. 26, no. 6, pp. 6949–6971, 2021. https://doi.org/10.1007/s10639-021-10555-7

[30] J. W. Creswell and V. L. Plano Clark, "Key concepts that inform mixed methods designs," in *Designing and Conducting Mixed Methods Research*, 2017, pp. 51–99.

[31] T. R. Lawson, A. C. Faul, and A. N. Verbist, *Research and Statistics for Social Workers*. Taylor and Francis Inc., 2019. https://doi.org/10.4324/9781315640495

[32] R. Murugesan, A. Nobes, and J. Wild, "A MOOC approach for training researchers in developing countries," *Open Prax.*, vol. 9, no. 1, p. 45, 2017. https://doi.org/10.5944/openpraxis.9.1.476

[33] C. Ribeiro, "A aula magistral ou simplesmente aula expositiva," *Máthesis (Viseu)*, vol. 16, no. 16, pp. 189–202, 2007. https://doi.org/10.34632/mathesis.2007.5102

[34] IFMG, "concurso público de provas e títulos para o provimento dos cargos da carreira do magistério do ensino básico, técnico e tecnológico," *Edital de normas gerais No. 105/2016*, 2018. www.ifmg.edu.br [Accessed: Oct. 03, 2021].

[35] Á. Alsina, S. Ayllón, and J. Colomer, "Validating the narrative reflection assessment rubric (NARRA) for reflective narratives in higher education," *Assess. Eval. High. Educ.*, vol. 44, no. 1, pp. 155–168, 2018. https://doi.org/10.1080/02602938.2018.1486391

[36] A. Strauss and J. Corbin, "Grounded theory methodology: An overview," in *Handbook of Qualitative Research.*, Thousand Oaks, CA, US: Sage Publications, Inc, 1994, pp. 273–285.

[37] Á. Alsina *et al.*, "Improving and evaluating reflective narratives: A rubric for higher education students," *Teach. Teach. Educ.*, vol. 63, pp. 148–158, 2017. https://doi.org/10.1016/j.tate.2016.12.015

[38] F. A. J. Korthagen, "La práctica, la teoría y la persona en la formación del profesorado," *Rev. Interuniv. Form. del Profr.*, vol. 24, no. 2, pp. 83–101, 2010.

[39] Y. F. Zakariya, K. Bjørkestøl, and H. K. Nilsen, "Teacher job satisfaction across 38 countries and economies: An alignment optimization approach to a cross-cultural mean comparison," *Int. J. Educ. Res.*, vol. 101, p. 101573, 2020. https://doi.org/10.1016/j.ijer.2020.101573

[40] J. Rodrigues-Silva, "Síndrome de burnout em professores brasileiros," *Poíesis Pedagógica*, vol. 18, pp. 143–159, 2020. https://doi.org/10.5216/rppoi.v18.65418

[41] Á. Alsina, R. Batllori, M. Falgàs, and I. Vidal, "Marcas de autorregulación para la construcción del perfil docente durante la formación inicial de maestros," *Rev. Complut. Educ.*, vol. 30, no. 1, pp. 55–74, 2018. https://doi.org/10.5209/RCED.55466

[42] O. McGarr and O. McCormack, "Counterfactual mutation of critical classroom incidents: Implications for reflective practice in initial teacher education," *Eur. J. Teach. Educ.*, vol. 39, no. 1, pp. 36–52, 2016. https://doi.org/10.1080/02619768.2015.1066329

[43] D. F. O. Onah and J. E. Sinclair, "Assessing self-regulation of learning dimensions in a stand-alone MOOC platform," *Int. J. Eng. Ped.*, vol. 7, no. 2, pp. 4–21, 2017. https://doi.org/10.3991/ijep.v7i2.6511

[44] E. M. Smaili, M. Daoudi, I. Oumaira, S. Azzouzi, and M. E. H. Charaf, "Towards an adaptive learning model using optimal learning paths to prevent MOOC dropout," *Int. J. Eng. Ped.*, vol. 13, no. 7, pp. 128–144, 2023. https://doi.org/10.3991/ijep.v13i7.40075

[45] C. Zhuo and X. Dong, "An applicable way of teaching quality evaluation based on MOOC platform," *Int. J. Emerg. Technol. Learn.*, vol. 12, no. 3, pp. 57–67, 2017. https://doi.org/10.3991/ijet.v12i03.6421

[46] D. Gamage, I. Perera, and S. Fernando, "MOOCs lack interactivity and collaborativeness: Evaluating MOOC platforms," *Int. J. Eng. Ped.*, vol. 10, no. 2, pp. 94–111, 2020. https://doi.org/10.3991/ijep.v10i2.11886

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