

# Comparison of the Teacher Identity Perception of Novice Science Teachers Through a Mixed-Methods Approach

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*Despite research on teacher identity contributes to understanding teacher learning and development, studies carried out with novice teachers (with less of five years of professional experience) are still rare due to the difficulties of finding participants at this stage. Consequently, this study aims to know how novice science teachers perceive their teacher identity through a mixed-methods approach. Hence, we have compared the data collected from an open-question survey and a Likert-type questionnaire adapted from literature to seek for matching results, evidencing in this way the consistency of these novice teachers' perception about their teacher identity. Results show how pre-service teaching training provided novice teachers with a notion of their teacher identity, establishing the differences and similarities with other educational stages, and highlighting the factors, such as the Master's Degree, placement period or teacher motivation, that have an influence in constructing their teaching identity*

**Keywords:** Professional development, teacher identity, novice teachers

## **Introduction**

Teacher identity is a critical element of the educational landscape, profoundly influencing the methods and strategies educators adopt in the classroom. Considered a multifaceted construct deeply embedded in an individual's experiences, values, and beliefs, this identity shapes teachers' pedagogical choices, steering them towards particular teaching and learning approaches. For instance, teachers who perceive themselves as innovators or facilitators often gravitate towards student-centred methodologies, emphasizing active learning, inquiry, and collaboration, fostering a more interactive and engaging learning environment, as Hanna et al. (2019) highlighted. Consequently, these teachers tend to create dynamic classrooms where student participation is highly encouraged. Conversely, teachers adhering to traditional educational models, focusing on knowledge transmission, may lean towards more directive, less constructivist methods, potentially restraining student interaction (Vermunt et al., 2017).

Teacher identity development is a dynamic process continuously shaped by

personal experiences and evolving educational paradigms (Avraamidou, 2014). This process often intertwines a teacher's previous experiences as a student with their professional teaching identity. Indeed, a teacher's educational background plays a significant role in shaping their perceptions of effective teaching. For example, positive experiences with collaborative learning during their formative years may encourage teachers to implement similar classroom strategies (Carlone & Johnson, 2007).

Furthermore, a teacher's commitment to values such as equity and inclusion significantly influences their educational approach. Teachers motivated by these values are more likely to design and implement strategies that cater to diverse learning needs, creating inclusive and participatory classroom environments. This approach aligns with the findings of Hong et al. (2016), who emphasize the importance of inclusive teaching practices in addressing the varied requirements of students. Thus, understanding the intricacies of teacher identity is crucial in comprehending their pedagogical choices and the resulting classroom dynamics.

Hong et al. (2016) also emphasise the critical role of TPI in understanding and enhancing teachers' career development, pointing out that TPI's significance extends beyond technical aspects like teaching quality or motivation; it also plays a vital role in teachers' emotional well-being. Recognising the dynamic nature of TPI, especially pronounced during the early stages of a teaching career, they argue for the necessity of support and assistance from superiors, colleagues, and close social networks to aid novice teachers in forming their professional identity.

Stenberg and Maaranen (2021) further highlight the challenges faced by novice teachers. The complex and multifaceted nature of teaching marks this initial period. It requires them to develop pedagogical skills and navigate numerous new situations, ranging from classroom management to external responsibilities like parent meetings, continuous professional development, and administrative tasks. Transitioning from training to real-world teaching and managing these varied situations, often discussed in training but different in practice, can lead to doubts and difficulties.

Creating environments where new educators can reflect and discuss their experiences is crucial for developing TPI (McLean & Price, 2019). Such spaces can help address the challenges and uncertainties faced by novice teachers, potentially reducing the risk of them leaving the profession, a significant concern, particularly in STEM areas. Hence, awareness of the need to construct TPI assists teachers in finding a sense of personal meaning and serves as a tool for enhancing their teaching practice. This construction of TPI not only aids in personal and professional development but also contributes to the overall quality of education provided (Pillen et al., 2013).

## Theoretical Framework

Despite there are multiple factors influencing the construction of the Teacher Professional Identity (TPI), we could mainly divide them into two significant dimensions: the personal and the contextual dimensions (Serrano et al., 2016), which include aspects like the general view of education, the commitment or motivation for teaching, the educational stage or the successful teaching relations with students, among others (Pontes et al., 2013). In developing the TPI, the Master's Degree in Teaching and the first years of service play an essential role (Trevallion, 2018). During these periods, the students and novice teachers start to configure their professional identity through reflection based on their personal work experiences, a process that will continue constantly evolving and influencing their personality and teaching practice (Martín-Gutierrez et al., 2014). Although the literature in this field points out how novice teachers tend to teach the same way they were taught, this tendency can be modulated, based on their own experiences, if there is an appropriate construction of TPI during the novice teacher period (McLean & Price, 2019).

In a comprehensive overview of the diverse approaches and methodologies employed in studying TPI, Avraamidou (2014) describes how methodologies range from those that emphasize technical skills and subject knowledge to more holistic approaches that intertwine these aspects with the teacher's personal and social context. Avraamidou's review reveals a notable inclination within empirical research towards qualitative methods over quantitative ones, though mixed-methods approaches also appear. This tendency highlights the complexity of TPI research, suggesting that a multifaceted approach is often necessary to capture the nuanced interplay between a teacher's professional competencies and their broader personal and social environments.

Considering qualitative methodologies for studying TPI, a significant emphasis is placed on personal histories, utilizing narrative inquiry, ethnography, and dialectical approaches. These methods often involve a range of interview styles, spotlighting the participant's reflections and experiences. Additionally, they include a broad spectrum of subject-generated materials, where reflective practice is typically central, alongside various classroom observation forms. Conversely, quantitative approaches in TPI research employ a variety of tools and instruments, such as surveys, questionnaires, and tests. These tools vary in openness and are designed to assess the TPI perspectives of the participants quantitatively. Such methods offer a structured framework for measuring specific aspects of TPI, providing a complementary perspective to the more narrative-focused qualitative approaches.

Beijaard et al. (2004) identified a similar trend to Avraamidou (2014), noting a predominant use of qualitative methodologies in TPI research. These approaches

often involve diverse methods and procedures, underscoring the richness and complexity of qualitative inquiry in this area.

Hong & Cross Francis (2020) offer a particularly insightful perspective, highlighting the challenges researchers face in categorizing themselves as purely qualitative or quantitative. Their reluctance to adhere strictly to one methodology is grounded in their use of both inductive and abductive processes. In their approach, empirical data, seen as socially constructed actions or interactions, are analyzed inductively to establish categories and identify patterns leading to conclusions. Simultaneously, they employ abductive reasoning to deepen the exploration of relationships between empirical data and existing literature.

We concur with Hong & Cross Francis's perspective, especially their view that TPI is not a static construct but a dynamic reality constantly shaped by teachers through their interactions with various environments, ranging from the classroom and students to broader social contexts like family, school systems, and legislative frameworks. In this context, quantitative and qualitative methods have their place, particularly when articulating the meaning of a complex construct like TPI.

Recognising the multifaceted nature of TPI, which encompasses both its conceptualization and the myriad factors influencing its development, recent studies in the field, such as those by Kavrayici (2020) and Zhao & Zhang (2017), advocate for using mixed methods. This approach enriches the research and enhances the validity of the findings by integrating the strengths of both qualitative and quantitative methodologies (Creswell, 2009).

### **Aims and Research Questions**

Considering the established relevance of gaining awareness about the TPI, this study seeks to offer a picture of its perception developed by novice science teachers through a mixed-methods approach comparing qualitative and quantitative data. By doing so, we aimed to respond to the following research question: How do the novice science teachers' perceptions of their teacher identity shape and match when comparing the results obtained from an open-question and a Likert-type questionnaire?

In this broader research project, we adopted Creswell's (2009) "connected in mixed methods" approach as part of our methodology. This approach aims to determine whether participants' responses align across different research methods, thereby serving as a validation mechanism for our data collected through diverse means. By comparing responses elicited through varied methodologies, we aim to verify the consistency and reliability of our findings. This process is crucial in determining whether to proceed as planned with the main study or to revise and refine our research instruments, guiding us in verifying the appropriateness

of our research direction.

Our ultimate goal is to contribute to the professional development of teachers during a particularly complex phase of their professional and personal lives. By providing a platform for reflection and awareness, we aim to facilitate the development of TPI. This aspect of the study is geared towards encouraging teachers to engage in introspection and recognize the evolution of their professional identities, an exercise crucial for their growth and development as educators.

## **Methodology**

### **Participants**

Data were gathered from five novice teachers (with less than 5 five years of professional experience), former students of the Master's Degree in Teaching at the University of Málaga, in the speciality of Physics and Chemistry during 2020 and 2021. Each of the participants held a bachelor's or a master's degree in either science or engineering. Specifically, two held degrees in Environmental Sciences, while the others majored in Physics, Chemistry, and Biochemistry. Among them, two had also earned additional master's degrees, one of whom had completed a PhD. These two participants were the only ones with professional experience outside the teaching sector. The demographic composition of the group included four males and one female, with ages ranging from 26 to 35 years.

This convenience sample, chosen for its heterogeneity related to educational paths and career choices, as well as teaching experience and professional background, enabled us to offer a unique perspective for the comprehensive understanding of teacher identity perceptions among novice teachers.

### **Data Collection And Analysis**

As research instruments, we adapted an open-ended survey (Serrano et al., 2016) and a Likert-type questionnaire (Pérez et al., 2019), seeking the correlation between the TPI ideas illustrated by the participants in the survey and the scores obtained in the Likert-type questionnaire, offering an x-ray of the novice teachers' perceptions on the TPI. The open-ended and Likert-type questionnaires underwent external validation by a panel of experts, ensuring content validity. Additionally, statistical procedures were applied for the Likert-type questionnaire to assess scale reliability and construct validity, ensuring that the instrument effectively measured the intended constructs of TPI. Both instruments were completed virtually by the participants.

The open-ended survey (Serrano et al., 2016) consisted of five questions (Table 1) to elicit participants' perspectives on various aspects of TPI. These questions

explored participants' understanding of TPI and its characteristics, the evolution of teacher identity across different educational stages, the initiation of its development, whether teachers' identity formation during university education parallels that of other professionals, and the key factors contributing to its development during training periods.

**Table 1. Open-ended questions in the survey (Serrano et al., 2016).**

Section	Understanding TPI
Q1	What do you think the term “teaching professional identity” means, or what would be the main characteristics of said identity?
Section	TPI in teachers of diverse educational levels
Q2	Is the professional identity of a primary school teacher, a secondary school teacher or a university teacher the same?
Q3	Do you think that future secondary school teachers develop a professional identity equivalent to that created by doctors, architects, lawyers, engineers, journalists, or any other profession that requires university training during their university careers?
Section	Factor influencing TPI
Q4	At what stage of their training or professional life do you think a secondary school teacher begins to develop a process of identification with the teaching profession?
Q5	Indicate which aspects you think can contribute most to developing teaching professionalism during the initial training process for secondary school teachers.

The Likert-type questionnaire (Pérez et al., 2019) consisted of 31 items, encompassing distinct dimensions that align closely with the themes explored in the open-ended survey.

Modifications to its adaptation to novice teachers were kept to a minimum to retain the integrity and quality of the original validated instruments, which basically consisted of translating the closed-ended questions into Spanish.

For the quantitative data, we performed a descriptive analysis with the software RStudio (version 1.3.1093), estimating the percentual distributions, means and standard deviation. For the qualitative data, using ATLAS.ti software (v. 22.2.5.0), we analyzed the responses of the survey. After we completed the first independent analysis, we negotiated the final codification, resulting in a total of 69 codes for the responses of the survey. We then took the same codes that emerged in the qualitative analysis as a reference for the Likert-type items, with a correlation of 21 codes for 23 Likert-type items. By doing so, we overlay the two analyses, matching the number of mentions of the codes in the survey and the scores obtained in the related Likert-type items.

## Findings

Table 2 shows the result of codification and relationship among the open-questions and the Likert-type items, together with the mean score obtained for each category.

**Table 2. Codification and relations open-questions-Likert-type items.**

Section	Codes emerged from open-ended survey	N	Likert-type items related*	Score means per item	Score means per section
Understanding TPI (Q1)					4.4
	Adaptation to changes	2	5	4.0	
	Teacher attitudes	1	4,12	4.5	
	Communication skills	1	6	4.2	
	Content knowledge	2	3,9,13	4.4	
	General teacher training	2	3	4.2	
	Heterogeneity of the teaching contexts	3	5	4.0	
		2	3,9	4.2	
	Pedagogical knowledge	1	15	4.4	
	Reflection	3	1	4.6	
	Skills	1	1	4.6	
	Teaching competencies	1	2	4.8	
	Teacher identity/Identification as a teacher	2	7,10,14	4.6	
	To show interest for the students				
TPI in teachers of diverse educational levels (Q2-Q3)					4.3
	Differentiated identity by stage	6	16	4.4	
	Formative process	3	21,27	4.0	
	Pedagogical practice	5	18,20,21	4.3	
	Students' necessities	3	17,20	4.5	
Factor influencing TPI (Q4-Q5)					4.4
	Master's Degree	7	27	3.8	
	Placement period	3	23	4.2	
	Teacher's motivation	2	31	4.8	
	Teachers referents	2	30	4.6	
	Student learning	1	29	4.4	

N: Number of mentions

\*Out of the 31 items, the analysis only includes those with equivalent code mention in the open-ended survey

Concerning the understanding of the TPI, participants brought to light aspects like the "skills" (understood as non-specified general abilities) and "heterogeneity of the teaching contexts", followed by others like "adaptation to changes", "general teacher training", "content knowledge", "pedagogical knowledge" and

“to show interest for the students”, among others with less representation. The mean score for this section reaches 4.4 with the highest score for the items with the codes “teacher identity/identification as a teacher”, “skills” and “teacher competencies”, and “to show interest for the students”. One of the most common codes is “skills”, which also correlates with a high score, happening the same situation with the code “to show interest for students”.

Regarding the perception of TPI in teachers of diverse educational levels, participants showed a broad consensus that, for different educational levels, exist a differentiated teacher identity and a different pedagogical practice is necessary, as stated by the appearing codes. The mean score for this section is 4.3, with the highest marks associated with “students’ necessities” and “differentiated identity by stage”. Connecting to differences or similarities with TPI and other professional identities, we establish a correlation based on the code “formative process”, appearing with three mentions in open questions and being scored with a mean of 4.0 points in the quantitative analysis. Thus, the surveyed novice teacher related the TPI with specific training, which differs from what other professions need.

The most mentioned code in the open questions related to factors influencing TPI, points to the “Master’s Degree” and the “placement period” as main milestones, followed by the “teacher motivation”, and the “teachers’ referents” as the primary factors influencing the construction of TPI. The mean score for this section is 4.4, with only one item scoring under 4, referring to a broader psycho-pedagogical training during the Master. Hence, although this code did not emerge in the qualitative analysis, and participants scored the item lower, they did consider the importance of participating in this kind of formative process to be a teacher, reinforcing the idea that the Master is seen as an essential and well-proportioned factor in the development of the TPI. For other mentioned factors, results again show how participants raised importance to similar aspects in both questionnaires. The best score is related to the importance of teacher “teacher motivation”.

## **Discussion and Conclusions**

Our findings show the consistency of the participants’ perceptions when using two different approaches. In our study, it comes to light how pre-service teaching training provided novice teachers with a notion of the TPI meaning, establishing the differences and similarities with other educational stages and highlighting the factors that influence the building of their TPI. Consequently, pre-service teaching might be considered a starting point to develop the TPI and the awareness of its importance, promoting, at the same time, the self-reflection about this concept, its implications and the proper teaching practice.

By integrating data from different sources, we have created a comprehensive

dataset combining items and codes from qualitative and quantitative components, along with their corresponding scores and frequency of mentions. This amalgamation enhances our understanding of the data by providing a holistic view of each item. Including average scores for each category facilitates an immediate understanding of the level of consensus or divergence among participants regarding each item. This, in turn, enables a more straightforward and transparent comparison within respective sections of the study.

Simultaneously, this data integration allows for a more nuanced assessment of the relevance of each theme in our analysis. By observing the frequency of mentions in the qualitative analysis and their corresponding scores in the quantitative part, we gain insight into the overall significance of specific topics related to TPI as perceived by the study participants. This approach not only enriches our understanding of each item's importance but also sheds light on the broader implications of these topics within the context of TPI research.

These results have encouraged us to continue improving the initial training program in the way we have been performing it, proving the good results obtained in the teaching identity regard.

## **Educational Implications**

In this research, we aim to underscore the significance of TPI and the necessity of comprehensive training for prospective teachers in this area. Moreover, we emphasize the importance of cultivating awareness of TPI among pre-service teachers. This awareness is crucial in facilitating the development of reflective practices in novice teachers navigating many influences and transformations in their TPI. Such reflection is instrumental in helping them progress towards an identity that resonates with their values and enhances their teaching practice.

Through the questions presented in our research instruments, we seek to uncover the elements that are essential in shaping the TPI of novice teachers. This understanding will enable us to design future training programs for pre-service teachers with greater precision, tailoring them to address the specific needs and challenges faced during their initial teaching years and providing insightful guidance to these new educators, helping them navigate and shape their TPI effectively during the formative stages of their careers.

## **Acknowledgement**

This work is part of the R+D+i Project “Development and monitoring of pre-service and novice science teachers’ teaching identity. Study of the influence of the inquiry processes, emotional and gender profiles” reference PID2022-140001OA-I00, funded by MCIN/AEI/10.13039/501100011033/FEDER, UE and the FSE+, and the research project B1-2020-23 funded by the University

of Malaga. Dr García-Ruiz thanks the RYC2020 program, financed by the State Research Agency and the European Social Fund (reference: RYC2020- 029033-I/AEI/10.13039/501100011033). Mr Luque-Jiménez thanks to the reference project RYC2020-029033-I for the research contract received (CI-22-120), co-financed by the State Research Agency and the European Social Fund.

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