

Broadening Career Horizons through Job Shadowing: A Qualitative Thematic Study of Croatian Pre-Service Teachers in Gifted, Inclusive, Upper-Secondary, and Vocational Education Settings

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ABSTRACT

This qualitative thematic study examined how 44 Croatian pre-service teachers perceived career awareness and professional identity development following job shadowing, who had completed four structured job shadowing experiences in diverse educational settings: An upper secondary school, a STEM-focused vocational school, a center for gifted students, and a center for students with disabilities. Data were collected using a 17-item Checklist Open Form and a Structured Learning Diary consisting of six open-ended items. Thematic analysis revealed a strong presence of professional identity development, followed by engagement and satisfaction, across all educational contexts. Participants' reflections highlighted career commitment and engagement with the teaching profession following the job-shadowing experiences. Reflection on inclusive and differentiated practices was present in all four contexts but varied considerably in prominence and was most pronounced in the setting involving students with disabilities. Awareness of digital technology integration as a component of teaching practice was limited. Practical recommendations were put forward for integrating structured job shadowing into teacher education curricula, with implications for European programs, where structured exposure of pre-service teachers to inclusive practices and meaningful integration of technology in teaching to enhance more effective professional development among them.

KEY WORDS: Career perceptions, gifted education, inclusive education, job shadowing, pre-service teacher education, professional identity, vocational education

INTRODUCTION

Teacher education across Europe has increasingly moved toward competence-based and practice-oriented approaches that emphasize reflective practice, collaboration, and responsiveness to diverse learners as core professional outcomes (Caena, 2014; OECD, 2019). Bridging the gap between theory and practice remains one of the persistent challenges in teacher education worldwide. Preparing future teachers therefore requires more than the transmission of academic knowledge; it also involves creating structured opportunities for individual observation, interpretation, and reflection on educational practice in authentic professional settings. A substantial body of research has highlighted the difficulty of translating theoretical knowledge into professional action, as well as the challenge of designing field experiences that meaningfully support the development of professional competence and teacher identity (Darling-Hammond, 2006; Flores and Day, 2006; Korthagen, 2017).

In Croatia, the research context of the present study, teachers are expected to work with diverse student populations across primary, lower and upper secondary, and vocational education,

in line with broader European priorities related to teacher quality, inclusion, and diversity (Vizek Vidovic and Domovic, 2013). Despite these expectations, pre-service teacher education programs often remain strongly oriented toward general subject knowledge, pedagogical theory, and relatively limited periods of school practice, which may leave graduates insufficiently prepared for general or a specialized, inclusive, and diverse realities of contemporary educational systems. This challenge also points to the importance of broadening pre-service teachers' understanding of possible professional roles and career pathways beyond traditional classroom settings. Experiences that expose future teachers to a range of educational environments may strengthen not only their practical understanding of teaching but also their awareness of the demands, opportunities, and identities associated with different professional contexts.

One promising, yet still underutilized, approach in this respect is job shadowing. As a form of experiential workplace learning, job shadowing enables students to observe professionals in authentic settings, explore career possibilities, and gain insight into workplace expectations and practices (Burke

et al., 2009). Within teacher education, such experiences may provide valuable opportunities for connecting theory with practice, developing own reflective understanding, and shaping professional identity across diverse educational contexts. The present study explores how pre-service teachers reflect on career awareness and professional identity following job shadowing across four distinct Croatian educational settings: General primary/upper secondary education, vocational STEM education, and gifted and inclusive education. It is guided by the following research question: How do pre-service teachers describe their career awareness and professional identity after job shadowing in different educational settings?

By focusing on these settings, the study contributes to the growing European discourse on experiential and context-sensitive teacher education and aligns with the aims of initiatives such as the acaSTEMy Erasmus+ Teacher Academy, which promote mobility, transversal competences, and preparation for inclusive and sustainable education.

LITERATURE REVIEW

Job shadowing constitutes a flexible and valuable form of workplace learning. Workplace learning is generally understood as the achievement of planned learning outcomes through direct involvement in authentic job roles, enriched by complementary academic activities such as reading, research, and discussion (Burke et al., 2009). Within this framework, job shadowing is typically defined as an observational learning approach in which a trainee (the “shadowee”) follows and observes an experienced professional in a real work environment without directly performing job-related tasks (Nicolini and Korica, 2024). Unlike internships or teaching practicums, which usually involve fulfilling predefined tasks and active performance, job shadowing provides access to professional practice through own observation, interpretation, and reflection rather than direct participation. In teacher education, this form of immersion is particularly valuable because it allows pre-service teachers to encounter the complexity, ambiguity, and context-dependent nature of teaching in authentic educational settings. By observing in-service teachers’ professional duties and everyday work, students can relate to their own achieved competence acquired at university to the realities of professional practice and develop a more differentiated understanding of teaching roles, responsibilities, and challenges. In this sense, job shadowing not only supports the connection between theory and practice but also may provide opportunities for reflective understanding and exploration of professional identity (Nicolini and Korica, 2024).

The pedagogical value of job shadowing can be explained through experiential learning theory (Kolb, 2014). A single shadowing experience may mirror the full experiential learning cycle (observation of professional practice provides a concrete experience; interaction, questioning, and discussion enable reflective observation; post-experience analysis

supports abstract conceptualization; and later application of acquired insights contributes to active experimentation in future professional contexts). This makes job shadowing especially relevant in initial teacher education, where students benefit from opportunities to consider practicing their own interpretation before taking on full professional responsibility.

Empirical studies have shown that job shadowing can provide substantial benefits for pre-service teachers. It helps students gain realistic insight into the teaching profession, better understand the diversity and complexity of teachers’ work, and critically reflect on competences developed within university programs (Cavas and Mercan, 2025; Lee and Poon, 2014; Margeviča-Grinberga and Kalēja, 2024). It may also support more informed career decision-making, help resolve professional dilemmas, and reduce uncertainty associated with entering the profession (Makovec, 2021). In addition, job shadowing appears to promote learning across cognitive, practical, relational, and emotional domains, thereby contributing to the development of professional identity and self-understanding (Hanuscin et al., 2021). Recent findings further suggest that shadowing experiences can broaden STEM pre-service teachers’ awareness of professional opportunities and reshape their understanding of teaching careers beyond traditional classroom environments (Cavas and Mercan, 2025). Compared with simulations, role-playing, or brief field visits, job shadowing offers a more sustained and individualized encounter with professional practice. Although such activities may have pedagogical value, they cannot fully reproduce the authenticity and complexity of real educational workplaces. Job shadowing therefore occupies a distinctive place within field-based learning, as it allows students to observe professional activity closely without the immediate pressure of task performance.

In the Croatian context of pre-service teacher education, job shadowing may be particularly important. Teacher education programs remain predominantly oriented toward general pedagogical preparation, with limited systematic exposure to specialized environments such as gifted education, inclusive education for students with disabilities, or vocational STEM settings. As a result, some graduates may enter the profession with limited understanding of the diversity of teaching roles and institutional contexts in which they may work. Although job shadowing in Croatia has primarily been promoted through Erasmus+ mobility initiatives for in-service teachers and school staff (AMPEU, 2021), systematic research on its role within initial teacher education remains scarce. Existing studies have also focused mainly on general school settings, while evidence from specialized educational contexts is still limited.

The present study addresses this gap by examining job shadowing across four distinct Croatian educational environments: A primary/upper secondary school, a STEM-oriented vocational high school, a center for gifted students, and a center for students with disabilities. In doing so, it contributes not only to general research of job-shadowing practice but

also to a better understanding of pre-service teachers' reported career awareness and reflections on professional identity following observational workplace learning across diverse teaching contexts.

METHODS

Participants

A convenience sample of 44 Croatian pre-service teachers from the University of Osijek and the University of Split participated in the study. The pre-service teachers from the University of Osijek were Master's level students training for a career as mathematics teachers (or a combination with another STEM subject). Conversely, the pre-service teachers from the University of Split were Master's level students in their final semester, preparing for a career in primary school teaching (class-teaching), which included STEM instruction. Each participant attended only one job-shadowing event, and assignment to these events was randomized. Participation was voluntary, and all participants provided informed consent.

Overview of the Four Job Shadowing Events

Four job-shadowing events were organized to expose participants to different career contexts in education, with a focus on STEM-related instruction in them. Each event job-shadowing activities followed the same structure: (1) Pre-event preparation (e.g. information about job shadowing, the host institution, and reflection collection procedure); (2) The job-shadowing sessions at the educational events generally lasted up to 3 h. During these sessions, pre-service teachers were tasked with observing professionals, focusing on their interaction with students, career requirements, core duties, required skills, technology integration, work environments, and professional challenges, while also forming personal reflections on their observations and (3) post-event activities (e.g., including recording observations and completing assessment checklists, summary of experience).

- Event 1: Center for Gifted Students (Split) (ST1): Participants ($n = 13$) observed specialized instruction for gifted learners, including differentiated curricula, project-based learning, and enrichment activities
- Event 2: Center for Students with Disabilities (Osijek) (OS3): Participants ($n = 10$) shadowed inclusive practices, support services, and individualized education plans for students with disabilities
- Event 3: Upper Secondary School (ST2): Participants ($n = 13$) shadowed general, standard, and regular classroom teaching at different levels. Observed duties included, among others, lesson planning, class teaching, assessment, and classroom management
- Event 4: VET High School (STEM focus, Osijek) (OS4): Shadowing of in total 8 participants emphasized teaching in the math subject, industry linkages, and STEM integration through practical projects in the context of vocational education.

Instruments and Data Collection

Two structured protocols developed within the Erasmus+ acaSTEMy Teacher Academy were used for the overall purpose of organizing and recording pre-service teacher reflections related to each event job-shadowing activities: The Checklist Open Form and the Structured Learning Diary. The Checklist Open Form consisted of 17 items divided into three sections: (a) Information about the observed career and organization, (b) personal reflections of the pre-service teacher, and (c) general opinions. For analysis, data from sections (b) and (c) were used. The Structured Learning Diary contained six open-ended reflections focused on structured observations of the shadowed career, professional tasks, required competences, professional challenges, and personal insights. Pre-service teacher reflections were recorded during or immediately after each visit and summarized shortly thereafter. Recoded pre-service teacher reflections in each of the protocols were inter-related and bounded, and for the purpose of focused analysis, responses to two open-ended questions in the learning diary were used in thematic analysis.

Data Analysis

This study employed a qualitative thematic analysis with a quantitative descriptive component to examine pre-service teachers' reflections following job shadowing experiences across four educational contexts (ST1, ST2, OS3, OS4). The primary analysis involved qualitative thematic analysis of the learning diaries, following Braun and Clarke's (2006) phase approach. Data consisted of written responses to two structured reflective questions: (1) Whether the visit influenced participants' perceptions of the teaching profession, and (2) what they found particularly important or interesting during the visit. The unit of analysis was the individual pre-service teacher written response.

Themes were derived inductively based on the anticipated aspects of the job shadowing activity and refined through iterative coding by the research team to ensure reliability. They were structured into five thematic categories: (1) broadened career paths, (2) awareness of inclusive and differentiated practices, (3) awareness of technology integration and innovation, (4) professional identity development, and (5) engagement and satisfaction. Each response could be assigned multiple thematic codes. Following coding, the frequency of each theme within each educational context was calculated and expressed as a share/proportion. These shares were then interpreted using four categorical ranges of representation (low, moderate, high, very high) to enable cross-context comparison, while preserving the qualitative depth of responses in such a study without intentions for quantitative comparison or quantitative-based interferences.

RESULTS

Broadened Understanding of Teaching and Career Paths

Pre-service teacher's reflections indicated a shift from a relatively narrow view of teaching as classroom instruction

toward a broader understanding of the profession. Teaching was described not only in terms of lesson delivery but also through responsibilities related to planning, communication with students and parents, administrative work, classroom management, differentiation, and continuing professional development. Several entries suggested that participants became more aware of the less visible dimensions of teachers' work and of the extent to which teaching involved multiple pedagogical, organizational, and relational tasks. As one participant noted, a teacher was *"not only the one who delivers lessons but much more."* Another participant similarly emphasized that *"a lot of work stands behind a single lesson,"* pointing to the hidden preparation and responsibility involved in teaching.

This theme also included a more differentiated understanding of the demands of teaching practice. Participants referred to issues such as motivating students, adapting instruction to different levels of prior knowledge, maintaining discipline, and establishing constructive relationships with learners. These reflections suggested that teaching was increasingly perceived as extending beyond subject content transmission to include broader developmental and relational dimensions. This was reflected in statements such as *"it is not all about grades; the most important thing is knowledge and the development of the student as a person."*

In addition, some participants expanded their understanding of possible professional trajectories within education. Exposure to different institutional settings appeared to make visible roles and practices beyond conventional classroom teaching, including work in specialized environments, individualized educational support, and workshop-based or non-formal educational activities. For example, some participants referred to *"work with children with difficulties and an individualized approach to each child,"* while others highlighted *"educational workshops for children"* as a meaningful form of educational work.

Inclusive and differentiated practices

A second recurrent theme concerned participants' recognition of the importance of adapting teaching to students' individual characteristics and needs. Across the diary entries, participants referred to learners of differing abilities, including gifted students and students with disabilities, indicating increased awareness of the heterogeneity of educational settings. Rather than remaining at the level of general endorsement, some reflections identified specific features of differentiated practice, such as adjusting instructional approaches, responding to students' reactions, and interpreting diverse behavioral and learning patterns. One participant explicitly referred to the need for a *"differentiated approach in teaching,"* while another observed that *"each student requires an individualized approach."*

Participants also referred to interpersonal dimensions of teaching that were closely associated with inclusive practice. Support, patience, empathy, and communication

were frequently mentioned as important components of effective work with learners. These reflections suggested that participants were not interpreting inclusion solely as instructional adaptation but also as relational responsiveness. This was particularly visible in statements emphasizing the need to *"understand children with difficulties"* and to respond with patience and support. At the same time, diary entries indicated that inclusive and differentiated teaching was understood as professionally demanding. Participants associated such practice with the need for additional professional competences, pedagogical knowledge, and flexibility in planning, and ongoing professional learning. The theme therefore points to an emerging understanding of differentiation as a complex professional competence rather than a discrete teaching technique.

Technology integration and innovation

Technology integration and innovation emerged as a distinct theme, although its prominence differed substantially across contexts. In the pre-service teacher reflections, technology was described as part of instructional practice rather than as an external supplement to teaching. These observations were generally linked to specific pedagogical functions. Participants noted that digital tools could facilitate the representation of abstract concepts, support student engagement, and enable more active participation in lessons. As one participant observed, students *"follow the material more easily because they can see it through concrete examples and not only listen to explanations."* Another participant explicitly referred to the use of *"GeoGebra, Nearpod, and Mentimeter"* as tools that supported teaching and learning.

References to innovation extended beyond digital tools themselves. Participants also described innovation in terms of varied teaching methods, combinations of classroom activities, and flexible lesson design. In some entries, traditional frontal teaching was implicitly contrasted with approaches perceived as more interactive and adaptable. For instance, one participant noted that contemporary teaching involved *"more different activities to maintain students' attention."* Several reflections additionally indicated that effective use of technology presupposes continued teacher learning, suggesting awareness that innovation was linked to professional development rather than merely to access to tools.

Professional identity development

The entries also pointed to processes of professional identity development. A recurring pattern was the articulation of increased certainty regarding career choice and stronger identification with the teaching profession. Participants often described the experience as clarifying or confirming their interest in teaching, suggesting that job shadowing functioned as a context in which professional aspirations were tested against observed practice. For example, one participant wrote that the experience *"confirmed my choice and made me even more certain that this is the profession I see myself in,"* while

another stated that it “*increased my desire for this profession.*” At the same time, participants’ reflections did not indicate only affirmation, but also more differentiated self-assessment. Several entries referred to existing personal resources, such as communication skills, patience, or subject knowledge, while also acknowledging areas requiring further development. One participant stated that they had “*good communication skills, patience, and the necessary knowledge,*” but also recognized that these abilities would continue to develop through experience. Another participant noted having the “*basic skills needed for the job,*” while also identifying classroom discipline and administrative work as areas for further growth.

A further aspect of this theme was participants’ tendency to position themselves in relation to future practice. Some entries included references to methods they would adopt, approaches they would modify, or strategies they would use in their own teaching. This suggested that job shadowing did not function solely as observation, but also as a source for anticipatory professional reflection.

Engagement and satisfaction

The fifth theme concerned participants’ evaluations of the job shadowing experience itself. Reflections were predominantly positive and indicated that participants generally regarded the experience as meaningful, relevant, and informative. Statements describing activities as useful or worthwhile appeared across settings, while explicit expressions of dissatisfaction were limited. This pattern was reflected in comments such as “*everything was useful*” and “*there was nothing particularly useless.*” This theme also included affective responses to the experience. Some participants described the observations as motivating or encouraging, particularly in relation to their future professional engagement. Others suggested that the experience provided forms of insight that they considered difficult to obtain through university-based theoretical instruction alone. In several entries, participants simply stated that the experience was “*interesting,*” “*useful,*” or that “*nothing was boring,*” indicating sustained engagement across different observed contexts.

Thematic Representation across Contexts

In the Center for Gifted Students (ST1), the most salient themes were inclusive and differentiated practices and professional identity development. Participants frequently referred to the need to respond to individual learner characteristics, including the educational needs of gifted students, and to the importance

of adapting instruction accordingly. Reflections also suggested that this context was associated with clearer professional self-positioning in participants’ reflections.

Engagement and satisfaction were strongly represented, while broadened understanding of teaching and career paths appeared at a moderate level. Technology integration and innovation did not appear in the reflections from this setting. In the Upper Secondary School (ST2), professional identity development and engagement and satisfaction were the most prominent themes. Participants often framed the experience as confirmatory in relation to their future career intentions. Other themes were less developed in comparison. Inclusive and differentiated practices appeared mainly through general references to student-centered teaching, while broadened understanding of teaching and career paths was less pronounced. Technology integration and innovation did not appear in the reflections from this setting. In the Center for Students with Disabilities (OS3), inclusive and differentiated practices constituted the dominant theme. Participants consistently referred to individualization, empathy, and the need to understand students with disabilities in relation to both learning and behavior. Professional identity development and engagement and satisfaction were also highly visible, although often articulated through reflections on responsibility and professional demands. Broadened understanding of teaching and career paths was present at a moderate to high level, particularly in relation to the emotional and relational aspects of educational work. Technology integration and innovation did not appear in the reflections from this setting.

The STEM-focused VET High School (OS4) displayed the broadest thematic distribution. In this setting, broadened understanding of teaching and career paths was especially prominent, with participants describing teaching as a profession involving multiple visible and non-visible forms of work. Professional identity development and engagement and satisfaction were also strongly represented, while inclusive and differentiated practices appeared at a moderate level. Compared with the other contexts, technology integration and innovation appeared more frequently, with participants explicitly referring to digital tools and their instructional functions.

A summary of the frequencies of each theme within each educational context and expressed as proportions/shares of pre-service teacher’s reflections is presented in Table 1, using

Table 1: Thematic representation across educational contexts

Theme	ST1 (n=13) (%)	ST2 (n=13) (%)	OS3 (n=10) (%)	OS4 (n=8) (%)
Broadened career paths	◐ 5 (38.5)	◐ 2 (15.4)	◐ 4 (40.0)	● 6 (75.0)
Inclusive practices	● 9 (69.2)	◐ 7 (53.8)	●● 10 (100)	◐ 4 (50.0)
Technology integration	◐ 0 (0.0)	◐ 0 (0.0)	◐ 0 (0.0)	◐ 3 (37.5)
Professional identity development	● 11 (84.6)	●● 12 (92.3)	● 8 (80.0)	● 6 (75.0)
Engagement and satisfaction	● 10 (76.9)	●● 12 (92.3)	● 7 (70.0)	● 7 (87.5)

◐: Low (≤30%), ◐: Moderate (31–60%), ●: High (61–90%), ●●: Very high (≥91%)

four categorical ranges (low, moderate, high, and very high) to enable general cross-context comparison.

DISCUSSION

Two themes were prominent across responses from all four settings: Professional identity development (75.0–92.3%) and engagement and satisfaction (70.0–92.3%). However, the other three themes had large variation in context: Broadened understanding of teaching and career paths (15.4% [ST2]–75.0% [OS4]), inclusive and differentiated practices (50.0% [OS4]–100% [OS3]), and technology integration which was not mentioned in the reflections in three of the four contexts, only appearing in the STEM vocational school (37.5%). This pattern suggested a difference worth noting explicitly: Job shadowing seemed to fairly reliably reinforce participants' sense of themselves as future teachers' professional identity-related reflections were consistently present across settings, while the dimensions of teaching that participants described depended greatly on the context in which they were placed.

In the discussion below, the five themes are not treated as parallel outcomes, but rather the four settings are treated as offering different affordances for professional noticing.

Contexts as Different Possibilities for Observation

The context of OS3 emphasized individualization and responsiveness more than any other setting; all participants in this setting spoke of adapting practice to the individual student, often in terms of empathy, patience, and interpretation of behavior and learning (e.g., “each student needs an individualized approach”). Differentiation was also emphasized in ST1, where it appeared oriented toward enrichment and extension rather than support, suggesting that indicating that “differentiation” was not encountered as a single generic principle but in two distinct pedagogical forms. The context of ST2 had the highest levels of reflections related to identity and affective reflections, but the lowest expansion of career conceptions and no reflections on technology. OS4 had the broadest range of topics, the highest proportion of reflections characterizing teaching as work outside of teaching, and the only reflections in the dataset that specifically addressed digital resources and their teaching functions. One possible interpretation of this pattern was that the settings differed in how closely they aligned with participants' prior educational backgrounds and experiences. ST2 represented the most conventional school setting in the study and might have offered participants fewer unfamiliar features to reconsider in relation to their prior educational experiences. It confirmed existing commitments and seemed to offer little to encourage participants to revise their conceptions of what teaching involved. In contrast, reflections from the specialized and vocational settings more often included observations that broadened participants' descriptions of teaching and professional practice.

This interpretation agrees with Kolb's (2014) account of experiential learning, in which concrete experience becomes

educationally productive through reflective observation and conceptualization, and with Lave and Wenger's (1991) emphasis on learning through engagement with situated practice: Exposure to less familiar communities of practice makes a wider range of professional activities available for observation. The present findings point to potentially complementary functions of familiarity and novelty: Familiar settings may reinforce professional commitment, whereas less familiar settings may broaden what participants notice about teaching and the range of roles it entails.

Professional Identity as a Strong Outcome in Context

The consistency of identity-related reflection across settings is consistent with research that identifies early field experience as formative for teacher identity (Beauchamp and Thomas, 2009; Flores and Day, 2006) and with evidence that student observation is specifically associated with changes in career perceptions (Cavas and Mercan, 2025; Hanuscin et al., 2021). Two aspects of these reflections deserve comment. First, identity that the work is not confined to affirmation: In addition to statements of increased confidence, participants need to make more subtle self-assessments, citing existing resources (communication, patience, subject knowledge) and areas for development (classroom discipline, administrative work), and positioning themselves in relation to practices that they can adopt or adapt. Second, precisely because identity-related reflection occur at a high level everywhere, it may represent the lowest-threshold response to observing practice. Namely, recognition and self-comparison do not require a specialized interpretive framework, but noticing differentiation or noticing the pedagogical function of a digital tool probably does. In another words, the finding is both encouraging and cautionary: Without structured reflective reinforcement, job shadowing risks becoming motivational reinforcement rather than conceptual development.

The Absence of Technology-related Reflection

Technology was not just under-represented in the reflections in ST1, ST2, and OS3, but absent altogether, only appearing when digital resources were explicitly embedded in instructional tasks (OS4) where participants named specific applications and linked them to pedagogical functions such as representing abstract concepts and sustaining participation. One possible explanation was not that technology was necessarily absent from these settings, but that its pedagogical function was not sufficiently visible or salient to participants to enter their reflections. This aligned with synthesis which showed that technology competence was developed in contexts where digital practice was explicitly modeled and discussed, rather than simply available (Tondeur et al., 2012), and suggested that the mere presence of a technology in the observed environment was not enough for pre-service teachers to perceive technology as an object of professional attention.

Contribution to the Preparation of Future STEM Teachers

Of the four settings, only one was STEM-specific, but all represent four different points of view from which future STEM teachers could observe their future profession. The

findings of the study relate to STEM teacher education in three ways. First, what these STEM-oriented participants observed was mostly not subject-based teaching. Their reflections focused on differentiation, responsiveness, workload, and invisible dimensions of the teacher role, that were, elements of professional practice that were least served by subject-based courses. Therefore, monitoring might be most useful in preparing STEM teachers; job shadowing might serve as a useful complement to disciplinary preparation in STEM teacher education. Second, the lack of technology-related reflection suggested that technological-pedagogical competence was unlikely to develop through exposure alone and that STEM-specific placements require mentors who explain why a particular tool was used for a particular mathematical or scientific idea. Third, the vocational STEM context was the only context where participants explicitly discussed teaching in relation to applied problems, industry connections and professional responsibilities outside the classroom. This was especially important for pre-service STEM teachers, who were expected to make school science and mathematics meaningful by connecting the topics to careers and real-world applications. These connections were indicated as an explicit priority in European STEM education policy and in the acaSTEMy Teacher Academy framework within which this study was conducted. This aspect of professional work was revealed only through vocational placements. However, placements in specialized inclusive and gifted settings exposed participants to the diversity of learners for whom STEM teaching needed to be designed, which highlighted another important dimension of teacher preparation: Supporting equitable participation in STEM.

Obtained results suggest that job shadowing can be a useful link between theory learned in class and practice in the profession, but that learning is not independent of the context of observation. Indeed, practice that reflects the student's current professional context is more likely to strengthen existing professional commitment than to broaden the student's perspective on the profession. The findings suggest that job shadowing can provide a link between theory learned in class and observed professional practice, while the content of participants' reflections vary according to the context of observation. In the present study, reflections from the more conventional school setting are more strongly associated with career confirmation, whereas reflections from specialized and vocational settings more often addressed differentiated practice, broader professional responsibilities, and technology. For this reason, it may be beneficial to provide pre-service STEM teachers with placements in different settings, such as specialized and vocational schools, and to combine these experiences with structured reflection. This can help future STEM teachers develop a broader understanding of professional practice, including inclusive teaching and the meaningful use of technology.

IMPLICATIONS AND RECOMMENDATIONS

The findings of this study offer several implications for the design and implementation of pre-service teacher education regarding

to job shadowing experiences. First, the strong presence of a professional identity development perspective in all educational contexts, followed by engagement and satisfaction, suggests how job shadowing experiences reinforce career commitment, and teacher education programs need to integrate such experiences early and systematically within formal curricula. Such curricular innovations may provide students with opportunities to reflect on their career choice and develop a more grounded understanding of the profession, evidenced by the present study and by prior research (Beauchamp and Thomas, 2009; Flores and Day, 2006).

Second, the prominence of inclusive and differentiated practices highlights the importance of placing pre-service teachers in diverse educational settings, including those involving students with special educational needs or gifted students. Structured exposure to differentiated educational environments appears to foster empathy, awareness, and pedagogical responsiveness. Programs need to ensure that job shadowing placements are purposely designed to include varied learner populations, rather than relying solely on mainstream classroom settings, typical in regular schools.

Third, the limited presence of technology integration across most contexts indicates a need for more intentional modeling of digital pedagogies in practice settings. As evidenced in vocational schools (OS4), where digital tools are explicitly observed, pre-service teachers are more likely to recognize and value technology when it is meaningfully integrated into teaching. Teacher education programs needed to collaborate with partner schools to ensure that mentors demonstrate purposeful and pedagogically grounded uses of technology, and not only to provide experiences about the educational capability of technological solutions without context. Fourth, the differences in reflections observed between visited educational contexts in the study, suggest that not all job shadowing experiences yield the same learning outcomes. The differences in participants' reflections across the visited educational contexts suggest that the aspects of teaching that become salient may vary by setting. This underscores the need for structured reflection activities, such as guided journals, discussions, or seminars, to support deeper processing of observed experiences. Without such scaffolding, learning may remain at a motivational or satisfaction level, rather than an analytical level.

Finally, the findings pointed to the importance of mentor quality and role modeling. Participants' reflections frequently referred to observed teaching practices, communication styles, and classroom management, although mentoring was not examined as a separate analytical theme in the present study. Teacher education programs should therefore provide guidance and training for in-service mentor teachers to ensure that job shadowing experiences were pedagogically meaningful and aligned with program goals.

LIMITATIONS

Several limitations of this study need to be acknowledged. First, the analysis is based on self-reported written reflections,

which may be influenced by social desirability or limited depth of expression. While the structured format allow for comparability across contexts, it may have constrained the richness of responses. Second, the study relies on a relatively small and context-specific sample, with different participants in each educational setting. As such, the findings cannot be generalized beyond similar contexts but rather provide exploratory insights into patterns of learning across job shadowing experiences. Third, the uneven quality and length of responses (including minimally elaborated answers) may have affected the accuracy of thematic representation. Some themes, particularly technology integration, may be to some degree underrepresented due to lack of explicit mention rather than absence of awareness. Finally, the study does not include longitudinal data and therefore cannot assess the persistence of observed effects on professional identity or pedagogical understanding over time. Future research need to examine how job shadowing experiences influence pre-service teachers' development across longer periods and in combination with other forms of field experience.

CONCLUSION

The study suggests that structured job shadowing is an experiential component of pre-service teacher education with the potential to provide opportunities for pre-service teachers to move from a relatively narrow view of teaching as classroom instruction delivery toward a broader understanding of the profession. In addition, the present study indicates that participants' reflections varies according to the diversity and characteristics of the observed contexts, rather than showing a uniform pattern across settings. Exposure to specialized educational settings foster a deeper understanding of inclusive practices, differentiated instruction, and teacher's professional challenges. Taken together, the findings highlight the value of exposing pre-service teachers to diverse educational contexts, particularly for making different dimensions of teaching visible, including inclusive practice, professional responsibilities, and the use of technology in STEM-oriented settings.

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