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THEMATIC PAPER: APPRENTICESHIP

Vocational teachers with industry experience: Transforming expertise into effective teaching

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ABSTRACT

This study investigates how industry-experienced teachers transform their expertise into effective vocational education and training (VET) teaching in China. Using qualitative methods, including preliminary interviews and a three-month field study with classroom observations and in-depth interviews of 12 teachers in mechanical and automotive engineering, it finds that production-background teachers more readily transfer practical expertise, while research and development (R&D) teachers face challenges. Expert teachers effectively frame tacit knowledge through abnormal scenarios—a key mode of expertise transformation—aiding student learning. Production-experienced teachers also motivate students better due to their understanding of workers' mindsets. The research suggests that VET schools prioritize hiring production-line professionals for their directly applicable expertise.

Key words: industry-experienced teachers, knowledge transfer, expertise transformation

INTRODUCTION

Vocational education and training (VET) in China has undergone significant reforms in recent years, recognizing the critical role of industry experience in shaping high-quality vocational education. The *National Vocational Education Reform Implementation Plan* mandates that from 2019, vocational schools and applied undergraduate colleges must recruit specialist teachers with at least three years of enterprise experience and a higher vocational education degree. Since 2020, new graduates are no longer eligible for these positions (State Council of the People's Republic of China, 2019). China is not alone in valuing VET teachers with industry experience. A few countries have started developing specific teacher training programs to upskill individuals with industry experience and design programs to facilitate their transition into the VET teaching profession (Axmann *et al.*, 2015).

Numerous studies have emphasized the importance of industry experience for VET teachers. Shrestha (2016) suggests that the VET training must be done by qualified experts with relevant work experience and practice must be done on equipment that used by industry. In Australia, the emphasis is on ensuring teachers maintain their industry currency but not on the pedagogy of teaching for that industry (Wheelahan, 2010).

While industry expertise is crucial for VET teachers, however, they also need strong pedagogic knowledge, both of which require continuous development (Wheelahan & Moodie, 2010). And Smith (2015) demonstrates that receiving pedagogical studies at university would provide many benefits to VET teachers. Given the critical importance of industry experience and pedagogic knowledge, it is essential to study the transformation of expertise into teaching. Research on knowledge transfer would give us some insights.

Teachers share a common subject content knowledge

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base but demonstrate a personalized pedagogical content knowledge repertoire, suggesting that their pedagogical content knowledge is personally constructed (Chen & Ennis, 1995). It is also reasonable to believe that teachers' personal industry experience impacts the results of constructing pedagogical content knowledge.

As for vocational education, vocational knowledge is mostly developed through practice (Hordern, 2014), and it is performative (Mulcahy, 2011) as it is developed through practice, with others and only existent in the here and now, which can't be captured through the formal curriculum artefacts. Eraut (2003) differentiates knowledge in school and workplace settings, outlines five stages of knowledge transfer from school to workplace, and emphasizes the importance of recipient willingness and facilitation efforts in knowledge transfer. Broad (2016) discusses ways to capture and transfer tacit knowledge to teaching, notably by using inscription devices to record situated insider vocational knowledge and share it to students. And inscription devices of resources, artefacts and discussions act as boundary objects that enable translation though the process of folding.

These studies involve knowledge transfer in vocational education, but there is still a lack of generalization and conclusion on how the knowledge of industry experts is transferred to teaching. This leads to the research question of this article: How do teachers with industry experience transform their expertise to teaching in VET schools?

METHODS AND RESEARCH DESIGN

This study employs a qualitative research design, utilizing fieldwork as the primary research method. The research is divided into two key phases: a preliminary interview-based investigation and an extended field study.

The first phase consisted of preliminary interviews with three vocational school teachers, all of whom had extensive experience as ship captains. These interviews provided insights into how industry professionals perceive their transition into teaching.

The second phase involved a three-month field study at a vocational school, focusing on mechanical and automotive engineering. I participated in long-term classroom observations across 12 teachers, all of whom had extensive industry experience. Among these teachers, six had teaching experience of 0-3 years, and six had more than three years of teaching experience, three of whom were officially recognized by the school as "outstanding educators", with their profiles listed on the school's outstanding educators honor roll for exceptional teaching performance.

In addition to classroom observation, in-depth interviews were conducted with all 12 teachers to explore how their industry experience influences their teaching.

To analyze the collected data, thematic analysis was employed to identify patterns, instructional strategies, and challenges in transforming industry expertise into teaching practices.

RESULTS

Constraints on the transformation of industry expertise into teaching

Fieldwork revealed that some teachers do not perceive their industry experience as beneficial to teaching. For instance, a teacher with ten years of research and development (R&D) experience in an automobile manufacturing company now teaches hydraulic transmission systems. His lessons focus heavily on theoretical principles, such as the internal structure of a relief valve, which often leaves students disengaged. In an interview, he stated, "I learned by understanding the principles before applying them". His prior work involved optimizing truck leaf springs, a highly specialized task that is unrelated to his current teaching content. As a result, he follows his own learning approach in teaching, prioritizing theory over practice.

This case reflects a common pattern observed in the surveyed school. Several experienced educators noted that teachers from R&D backgrounds often struggle in vocational teaching compared to those from production backgrounds, as their expertise tends to be highly specialized and less directly aligned with students' employment needs.

This study recognizes that China's manufacturing industry largely follows a Taylorist management model, characterized by a clear separation between planning (*e.g.*, R&D) and execution (*e.g.*, production). This separation has led to a high degree of specialization, resulting in distinctly different types of industry expertise. To better understand these types of expertise, this study utilizes Winch's (2010) distinction between subject expertise and practical expertise. Based on task analysis interviews, findings indicate that teachers from R&D backgrounds typically possess deeper subject expertise, focusing on exploration and innovation. However, their knowledge tends to be highly theoretical and less applicable to hands-on training. In contrast, teachers from production backgrounds emphasize practical expertise, directly aligning with the employment

tasks students will encounter. Thus, the nature of a teacher's industry experience constrains the transformation of expertise into teaching practices.

Transformation of industry expertise into teaching strategies

Classroom observations of the outstanding educators revealed that their teaching uniquely guides students to focus on abnormal work scenarios. For example, when repairing a car battery, they ask students to consider the worst possible consequences, and when teaching about different types of starter motor failures, they ask students to first consider which circuit is least likely to be faulty. "In all our ordinary judgments of the qualities of things, we can recognize and describe deviations from a norm very much more clearly than we can describe the norm itself" (Schön, 1987). Thus, how does the focus on abnormal states in teaching reflect the teacher's handling of knowledge?

I further asked one outstanding educator whether certain valuable work experiences, though important, are difficult to convey to students, and how they could be effectively taught. He replied that there are, such as diagnosing faults from engine noises, which requires extensive experience and intuition, making it difficult to convey. However, the teacher pointed out that students can be taught which engine noises definitively rule out certain faults, as these are the easiest to diagnose. More complex diagnoses, however, require students to develop their own experience over time.

Analyzing the teachers' industry experience reveals a significant amount of difficult-to-articulate tacit knowledge (Polanyi, 1997), which constitutes their expertise. Although tacit knowledge may be difficult to define, expert teachers can frame it by identifying its boundaries, which often involve abnormal work states such as unexpected events and extreme cases. This approach helps reveal the gateway to tacit knowledge, allowing students to understand the thresholds between normal work conditions and exceptional situations and to recognize which aspects require accumulation through personal work experience. Teachers with production backgrounds, in particular, provide a case bank for constructing these tacit knowledge boundaries, which helps to transform their practical expertise into relevant teaching content.

Additionally, the study reveals that experienced teachers often excel at motivating students, and this motivation is rooted in a deeper understanding of the characteristics of VET students. Teachers with production-sector experience have an in-depth awareness of the workers' mindset, enabling them to connect more effectively with VET students. This deeper insight into students' perspectives enables these teachers to better motivate students and foster a stronger drive for learning.

CONCLUSION

This study finds that teachers with production experience can more easily transfer practical expertise to teaching, as their knowledge is directly relevant to VET. Expert teachers transform their expertise into teaching by using abnormal work states to frame tacit knowledge, revealing the gateway to tacit knowledge for students and guiding them to understand which aspects require self-accumulation. Teachers with production experience also motivate students more effectively, as they have a deeper understanding of the workers' mindset and interests.

This study highlights a key issue in recruiting VET teachers in China. While schools hire teachers with enterprise backgrounds, they often prioritize highly educated postgraduates, leading to the recruitment of R&D personnel whose expertise is difficult to transfer into teaching. It is recommended that schools place greater emphasis on hiring personnel from production lines, as their practical expertise is more easily applicable to teaching.

DECLARATIONS

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Author contributions

Xue PF: Conceptualization, Methodology, Resources, Investigation, Formal analysis, Writing—Original draft, Writing—Review and Editing. The author has read and approved the final version of the manuscript.

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Ethical approval

Not require.

Informed consent

The author declares that he have obtained appropriate informed consent from the participants for participation in this study. The participants were informed that the interview data were only used for research purposes, and their information would be anonymized when presenting the research result. Moreover, they are also allowed to stop the recording at any moment during the

interview, and they can refuse to respond to any question asked during the review.

Conflict of interest

The author has no conflicts of interest to declare.

Use of large language models, AI and machine learning tools

During the preparation of this work the author used ChatGPT-3.5 for language polishing. After using this tool, the author reviewed and edited the content as needed and takes full responsibility for the content of the published article.

Data availability statement

Data used to support the findings of this study are available from the corresponding author upon request.

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