

Comparing Alternative and Traditional Certification Pathways for Physics Teachers: What Sets Them Apart?

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Abstract. Teacher quality significantly impacts student learning outcomes in physics. While traditional teacher education programs emphasize the development of professional competencies, alternative pathways, like the “Quereinstieg” in Austria and Germany, are increasingly common due to teacher shortages. Surprisingly, existing research suggests comparable teaching quality between traditionally and alternatively qualified teachers. However, methodological limitations challenge the validity of these findings. Addressing this gap, our study examines differences in professional knowledge and action-related skills between teacher candidates, traditionally and alternatively qualified teachers in Austria, focusing on physics. We especially anticipate differences in explaining and reflection skills of traditionally and alternatively qualified teachers.

Introduction

Research has shown that teachers are an important factor when it comes to student learning [1]. Thereby, student performance depends on the quality of instruction they receive in physics lessons. High quality teaching in turn is dependent on teachers’ action-related skills such as explaining skills, which then again depends on the professional competences a teacher has [2]. Teacher candidates should acquire these competencies and action-related skills through teacher education programs.

However, due to teacher shortages in many countries [3], a growing number of individuals are entering the teaching profession without a traditional certification program [4] such as an academic teacher education programme. In Austria and Germany, a pathway of alternative qualification is the so-called “Quereinstieg” or “Seiteneinstieg”. These pathways are designed for graduates who completed a masters’ degree in a field other than teaching but did not receive a formal teacher education that qualifies them to teach two school subjects (as required in both Austria and Germany) [5]. Here, candidates receive on-the-job pedagogical training while working as teachers [6], potentially missing out on relevant professional competencies offered in academic teacher education. However, it remains an open question whether this disparity makes a significant difference and, if so, where these differences lie.

Looking at previous research, from a theoretical point of view, it is surprising that studies have mostly shown that there is almost no difference in teaching quality between traditionally and alternatively qualified teachers [5, 7–9]. However, when taking a deeper look, all of these studies rely on external ratings of teaching quality (their own, principal, students, experts) instead of proximal measures, questioning the validity of these studies.

In this study, we try to address this issue by comparing the professional knowledge (content knowledge and pedagogical content knowledge) as well as explaining [2] and reflection skills [10] of traditionally and alternatively qualified teachers in Austria.

The present study

In our study, we are thus addressing the following research questions:

1. What differences regarding professional knowledge (content knowledge and pedagogical content knowledge) and action-related skills (explaining and reflecting) are there between a) teacher candidates, b) traditionally qualified teachers in physics, c) traditionally certified teachers in another science subject and d) alternatively qualified teachers?
2. What is the relationship between professional knowledge and action-related skills for alternatively qualified teachers?

For our study, we are using previously developed and validated test-instruments that measure professional knowledge and performance. In order to detect medium to small effects, for the final sample size, we aim for N = 250 participants.

Results and Conclusion

At the poster, we will present the study design, test instruments used and preliminary results with as many participants we can gather until the conference. We expect there to be difference, especially when it comes to pedagogical content knowledge, between traditionally and alternatively qualified teachers. However, research question 2 can be seen as exploratory as there is no research to date addressing this question.

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