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Unlocking the potential of student teachers: a practical approach to promote competence development through competence standards

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ABSTRACT

Educational science competences are considered one of the most important topics in teacher training. They also play an important role in various areas of effective teaching. Even though professional competences of student teachers have already been widely discussed based on several theoretical models, no study to date examines the promotion of student teachers' competence development in practice. As part of this framework, we established a competence grid for student teachers to assess and support individualizing students' learning paths. The grid is meant to stimulate self-reflection, which should help individuals raise awareness for their learning progress and make performance levels visible. Initial empirical results from a survey with first and second semester students ($n = 309$) demonstrated practical applicability and reliability ($\alpha = .82$) of the assessment grid, which allows to design further steps towards professionalisation.

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Introduction

Instructors have a significant influence on students through the quality of their teaching, feedback, and performance assessments. For this reason, universities and their professors need to focus on training prospective teachers by supporting student teachers regarding their competence development and professionalisation, so that they are able to educate responsible and competent learners at school (Baumert & Kunter, 2011; Blömeke et al., 2016; Lipowsky, 2006). Thus, science, but also decision-makers in education often discuss the scope of teachers' competences for professionalism and success in their careers (e.g. Baumert & Kunter, 2006; KMK, 2004/2022; Lipowsky, 2006). The areas to which these competences should relate have been theoretically derived several times (see chapter on standards for teacher competences and theoretical models). The core idea of the present paper is to combine existing models and theories of competence formation into an empirical framework, with the aim of making the concept of competence more specific and differentiating it through various categories.

This research paper does not focus on empirical evidence regarding the importance of competence development for teacher education, but rather on practicable implementation, so students and teachers are able to integrate competence ratings into their everyday life and learning. In order to provide practical applicability for student teachers and trained instructors, we developed a workable competence

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grid for self-assessment. Hence, (prospective) teachers can use the grid to evaluate their lessons and develop a professional teaching personality.

Theoretical background

The concept of competence for teachers

Research on teacher education is based on the assumption that competences can be taught and therefore, learned (e.g. Klieme et al., 2007; Weinert, 2001). They are made up of connections between knowledge and skills and hence represent abilities as well as requirements for action. For (prospective) teachers, this means interweaving acquired professional knowledge with their own beliefs and experiences, thus creating practical relevance in the form of action competence for their teaching (Blömeke et al., 2016; Busse & Bosse, 2020). It is therefore not only didactic and subject-specific knowledge that is crucial for instructors' lessons. Above all, it is imperative that teachers have pedagogic skills and understand the importance of their own professional experience and beliefs. This goes along with constant reflection on one's own teaching practice (Lipowsky, 2006).

For this reason, the acquisition of competencies and reflection on one's own level of competence during teacher training studies, preparatory service, and also beyond that during ongoing teaching work is of relevance in order to work professionally and in a student-oriented manner. Many competence standards have already been developed in this regard, and we are going to present some German models in the following chapter.

Standards for teacher competences and theoretical models

Standards for teacher education have been defined by the Standing Conference of German Ministers of Education and Cultural Affairs as a result of supra-regional education policy (KMK, 2004/2022). The specifications created outline teaching professionalism and areas of competences concerning the two phases of teacher training, namely university teacher studies and preparatory service. These areas were designated as teaching, educating, assessing, and innovating, and further subdivided into content-related and didactic-methodological core skills. In this context, various theoretical framework models were defined to enable an overall content comparability.

A well-known example of teacher professionalisation is the competence model, according to Baumert and Kunter (2011), which merges existing concepts into one theoretical framework. Four components of the teacher profession are covered here, broken down into professional knowledge, beliefs and values, motivational orientation, and self-regulation. The authors subdivide these elements into further sub-areas in order to make their content more concrete.

Concerning professional knowledge, they mention expertise (e.g. knowledge of typical mistakes made by pupils, knowledge of the current state of research), didactical knowledge (e.g. giving subject-related instructions, curricular coordination of content), and educational-psychological knowledge (e.g. classroom management, teaching methods, diagnostics, counselling, aspects of heterogeneity). This area's content can be assigned to the KMK competence categories of teaching, assessing, and innovating. Beliefs and values are part of a professional skill set as well, and with the aid of these, teachers act according to their own professional ethics. They set subjective teaching objectives, apply preferred theories about learning and teaching (e.g. a constructivist or receptive understanding of learning), and practice diversity as well as identity formation. These examples can be found in the competence area of education regarding the KMK standards. Motivational orientation consists of self-efficacy (e.g. believing in one's own teaching efficacy), along with enthusiasm for the school subjects and teaching them. Self-regulation refers to both work management (e.g. professional ambitions), and job resilience.

More recent studies confirm the relevance of teachers' core competences in relation to good teaching as well (Busse, 2021; Busse & Bosse, 2020; Orschulik, 2020). Busse, for example, names depth of reflection as a core competence and this skill benefits student teachers by enabling them to better assess learning outcomes as well as processing feedback in a meaningful way (Ohl et al., 2022). In addition, (prospective) instructors should categorise their skills in a current learning status and link them to new knowledge

(Klusmeyer & Bosse, 2022). Established knowledge about scientific work on the part of teachers also plays an important role in this context (Klusmeyer & Bosse, 2022): Students are not only enabled to read academic texts in a structured way, but also to write them and correctly apply relevant citation and bibliography rules. Furthermore, according to Busse (2021), they must be able to differentiate between everyday knowledge and factual knowledge and critically reflect on them. As stated by Minna et al. (2022), core competences include personal competences as well, which require an active role in one's own learning process and are therefore self-regulatory, such as the ability to work in a team or independently acquire new learning strategies. In the age of digitalisation, teacher skills must also include media competences, as digital media play an increasingly important role in lesson-planning processes and teaching (Honegger, 2022).

The core competences of teachers are therefore made up of both personal and teaching-specific skills. These findings are supported by the multidimensionally adapted process model of teaching (MAP) by Metsäpelto et al. (2022). The model examines teacher effectiveness in the interplay of competences at an individual and teaching-specific level. The better the competences in both areas, the more students can learn from the lessons, which means that the teacher's effectiveness increases in this case (Metsäpelto et al., 2022). The contribution of the MAP model is to provide a coherent framework that represents different levels of teacher skills and emphasises the importance of both individual and teaching competences. However, it is often the case that students do not recognize a direct connection between these standards and theories and their educational training. In order for future teachers to experience competence development, they require self-reflection as a tool.

Academic self-reflection as a tool for competence development

Self-reflection is necessary for the purposeful development of a person's competences and knowledge, whereby a general distinction can be made between everyday reflection and academic reflection (Moon, 2004). Academic reflection is more systematic, as the purpose and goal of the reflection process should be made clear at the beginning so that the actual and intended state can be compared after reflection (Chetcuti et al., 2011; Moon, 2004).

This systematic process of reflection seems particularly important for prospective teachers since they have built up beliefs about school and teaching through their time as pupils themselves, which now need to be questioned. Academic self-reflection is a suitable tool for stepping out of the learner's perspective in order to gain a more objective view of teaching. Regular self-reflection thus develops, trains, and habituates general professional competences that prospective teachers aim for (Chetcuti et al., 2011). In addition, reflecting on their own competences enables the establishment of a feedback culture when students specifically ask for feedback and give peer feedback to develop further.

Overall, academic self-reflection based on the MAP model increases teacher and classroom effectiveness, since both individual and teaching competences can be promoted in a targeted manner by constantly visualising one's own growth in competence. Thus, academic self-reflection must be utilized as a tool to experience competence development.

Competence development through experience and practice

Competence-oriented teacher training leads to positive professional development (Lenski et al., 2015). Hence, teacher trainees should be encouraged at an early stage to continuously rate and adapt their skills. Through practical reflection, students can be motivated to better assess their competences, develop a routine, and examine their progress. By testing new methods and approaches, they create learning environments that meet their needs as learners. A framework provides students with a basis for developing their competences in a targeted manner, and regular assessments train and habituate their reflective skill, as stated by Chetcuti et al. (2011). Constant reflection on competences can therefore be learned and enables future instructors to form a professional teaching philosophy. Apart from that, student teachers see high benefits from self-reflection regarding personal growth (Chetcuti, 2007).

As shown above, competence development is crucial in teacher training programmes. For this development, it is essential to make evolutions of relevant competences recognisable throughout the students' learning path. This can be instructed through stimuli for self-assessment and reflection as well as through feedback loops in and outside of university classes, but also in internships or in school-related part-time jobs that students pursue. The different possibilities enable them to individualise their own learning path by setting different priorities.

Research question

Reflection on teachers' competence development is less well-researched, although it plays an important role in dealing with challenges and opportunities in the classroom (Metsäpelto et al., 2022). For example, the learning success of students depends significantly on individual competences of their instructors and thus influences the effectiveness of teaching (Metsäpelto et al., 2022). In addition, the implementation of knowledge from educational sciences is considered one of the most important competences for an effective teaching practice (Watson et al., 2023).

The question that arises for teacher education is therefore: How can competence development and self-reflection of student teachers be promoted in practice?

Method

Material development

As shown so far, the KMK standards and presented theories form an important basis for developing a framework and conducting empirical tests on it. Based on this, we designed a competence grid in order to assess and promote the core competences of (prospective) teachers. For practical use, we added self-assessment options to the grid.

The framework (see [Figure 1](#)) maps eight areas of competence in the form of a grid for self-assessment of one's skills. The areas of competence are based on the KMK standards for teacher training in educational sciences (2004/2022), containing teaching, educating, assessing, and innovating. We decided on these categories because the job of a teacher consists of diverse tasks besides giving lessons, e.g. supporting inclusion and diversity or helping to develop the school's programme. Based on the theoretical derivations, the grid was expanded to include competence areas of scientific work and depth of reflection (Klasmeyer & Bosse, 2022), media skills (Honegger, 2022), and self-regulation (Minna et al., 2022). Each of these categories initially summarises all the competences associated with it. For differentiated self-assessment, all competences in a domain are listed separately as two to four subcategories per competence area, with a total of 21 items. With the aim of an examination of whether students could work with such a framework, we carried out a questionnaire study. For this, some subareas were further subdivided into a total of 36 items, with four to eight items per domain. Based on the results of the student-centred approach in higher education (Minna et al., 2022), five rubrics were created for grading students' self-assessment of their competence development:

1. I haven't heard of it in my studies, so far.
2. I have already heard of it, but I didn't take a closer look, yet.
3. I have already understood it theoretically, but I haven't adapted it to my practical work, yet.
4. I have understood it and adapted it on a regular basis.
5. Thanks to my reflective strength, I can well-directedly access and adapt it.

Through repeated and regular self-assessment of their own competences throughout the course of their studies, students are to gain the highest possible level of professional knowledge and thus more ability to act for their future teaching. Hence, the competence grid serves as a tool for the development of a competent teacher. Student teachers are given an overview of the overall competence they should have achieved at the end of their degree programme, and can individually track their learning path

Competence areas	Definition	Rubrics				
<i>Teaching</i>	One of a teacher's core competences is the ability to plan group oriented school lessons by considering different stages of development, promoting active learning processes for all students, and motivating them to integrate new information.					
1	I evaluate my current performance level in a way that I am able to...	1	2	3	4	5
1.1	... plan my school lessons group oriented.					
1.2	... consider different stages of development.					
1.3	... promote active learning processes for all students.					
1.4	... motivate students to integrate new information.					
<i>Educating</i>	Competent teachers are able to work with the heterogeneity in their class and can differentiate their school lessons in a way that supports inclusion and diversity in order to encourage positive interactions between students.					
2	I evaluate my current performance level in a way that I am able to...	1	2	3	4	5
2.1	... detect heterogeneity in my classes.					
2.2	... plan differentiated school lessons.					
2.3	... assess and support inclusion and diversity in my classes.					
<i>Assessing</i>	Competent teachers are able to diagnose their students' learning needs, adapt their school lessons to these needs, and support their students' learning processes with differentiated learning strategies.					
3	I evaluate my current performance level in a way that I am able to...	1	2	3	4	5
3.1	... diagnose my students' learning needs and support them.					
3.2	... adapt my school lessons by supporting students with individual learning strategies.					
<i>Innovating</i>	Competent teachers give thought-provoking impulses for the development of school programs; they improve their knowledge of methods and subject matter by studying scientific literature.					
4	I evaluate my current performance level in a way that I am able to...	1	2	3	4	5
4.1	... give thought-provoking impulses for the development of my school's programme.					
4.2	... integrate methods and subject matter from my studies and specialist literature.					
<i>Scientific work</i>	Competent teachers are able to correctly scientifically and linguistically formulate texts, directly and indirectly cite scientific information and use a consistent bibliographic format.					
5	I evaluate my current performance level in a way that I am able to...	1	2	3	4	5
5.1	... write scientific texts and correctly use the given rules for citation and bibliography.					
5.2	... distinguish between everyday knowledge and scientific knowledge, and reflect on it in a critical way.					
<i>Depth of reflection</i>	One of a teacher's core competencies is reflecting on their work and organizing feedback correctly in order to use for their teacher personality.					
6	I evaluate my current performance level in a way that I am able to...	1	2	3	4	5
6.1	... work with feedback in a productive way and organize it for my further learning and teaching success.					
6.2	... reflect on my current learning performance in an introspective way and connect it with new knowledge bases.					
<i>Media skills</i>	Competent teachers structure their materials in a way that they are able to fall back on desired subject matter and methods at any time.					
7	I evaluate my current performance level in a way that I am able to...	1	2	3	4	5
7.1	... appropriately categorize my digital feedback portfolio so that I can well-directedly fall back on subject matter and methods for my teaching.					
7.2	... appropriately use digital media adapted to the learning group and justify my choice of media.					
<i>Self-regulation</i>	The following skills refer to the classes of each semester and to what you could learn altogether.					
8	The classes helped me to develop my teacher personality further and link new to already learned information from former classes.	1	2	3	4	5
9	I picked up different learning strategies, that will help me in my studies and future teaching career in a purposeful way.	1	2	3	4	5
10	I demonstrate that I am communicative by actively addressing fellow students and my teachers and ask for feedback, if needed.	1	2	3	4	5
11	During group work I demonstrate my team spirit, take responsibility and actively contribute to it.	1	2	3	4	5

Figure 1. Competence grid.

through self-reflection. They are guided to think about how far they have come, how they arrived in this place, and where they will proceed next.

The grid is intended to serve as a basis for practising reflective competence as well as expanding individual and teaching-specific competences, as, by repeatedly completing it, students are given the opportunity to assess their own knowledge and skills against the background of a standard, recognise learning needs and make development progress visible at critical time points.

Sample

In the course of the questionnaire study, student teachers from the first and second semesters of the bachelor's programme ($N = 506$) were presented with the competence grid. Adjustments of the data set resulted in a sample of $n = 309$ ($n = 100$ for the first semester, $n = 209$ for the second semester). Most of the participants categorised themselves as female (61%) in a three-level system (m/f/non-binary). At the time of the survey, many of the students had already completed an internship or were working at a school (51% school internships, 31% part-time school jobs).

The reliability of the competence grid altogether showed an excellent fit ($\alpha = 0.82$). The reliability of the subscales varied between acceptable and excellent (see Table 1). Innovating represents the only subscale, which was considered acceptable ($\alpha = 0.67$). Teaching ($\alpha = 0.72$), educating ($\alpha = 0.71$), depth of reflection ($\alpha = 0.79$), and media skills ($\alpha = 0.79$) indicated a good fit and formed the biggest category with four subscales. Assessing, scientific work, and self-regulation all showed an excellent value ($\alpha = 0.81$).

Results

Statistical analysis – descriptive statistics

First-semester students rated their ability lower on average in all competence areas except self-regulation than second-semester students (see Tables 2 and 3). Overall, all mean values of first-semester

Table 1. Cronbach's alpha of the competence grid.

	α
Competence grid	0.82
Teaching (4 items)	0.72
Educating (4 items)	0.71
Assessing (4 items)	0.81
Innovating (3 items)	0.67
Scientific Work (5 items)	0.81
Depth of Reflection (4 items)	0.79
Media Skills (4 items)	0.79
Self-regulation (8 items)	0.81

Note. $n = 309$. 36 items in total.

Table 2. Self-assessment of first semester student teachers.

Areas of competence	n	M	SD	Min	Max
Teaching	99	3.12	0.74	1.50	4.67
Educating	100	3.17	0.81	1.33	5.00
Assessing	100	3.06	0.85	1.25	5.00
Innovating	100	3.05	0.96	1.00	5.00
Scientific Work	100	2.99	0.88	1.40	5.00
Depth of Reflection	100	3.65	0.74	1.25	5.00
Media Skills	98	3.06	0.85	1.00	5.00
Self-regulation	93	3.82	0.70	1.13	5.00

Note. $n = 100$.

Table 3. Self-assessment of second semester student teachers.

Areas of competence	n	M	SD	Min	Max
Teaching	208	3.43	0.69	1.25	5.00
Educating	207	3.56	0.72	1.50	5.00
Assessing	209	3.36	0.73	1.25	5.00
Innovating	207	3.43	0.74	2.00	5.00
Scientific Work	209	3.35	0.83	1.40	5.00
Depth of Reflection	209	3.94	0.60	2.00	5.00
Media Skills	205	3.35	0.86	1.00	5.00
Self-regulation	203	3.80	0.62	2.00	5.00

Note. $n = 209$.

students can be found around the centre of the Likert scale, with values showing a wide range of assessments from 1 to 5 in each category. Innovating and media skills presented the widest ranges (1.00–5.00), and teaching the lowest one (1.50–4.67). Nevertheless, the minimum and maximum assessments showed that first-semester students evaluated their skills very heterogeneously. On average, they rated themselves highest in the self-regulation category ($M = 3.82$, $SD = 0.7$), and lowest with regard to academic work ($M = 2.99$, $SD = 0.88$).

Assessment values of second-semester students were, on average, between 3 and 4 and, therefore, moderately higher than those of first-semester students. Here, too, there was a wide range from 1 to 5 for categories of teaching, educating, assessing, scientific work, and media skills. The values of innovating and depth of reflection were between 2 and 5. While the category media skills had the widest range (1.00–5.00), innovating and self-regulation both showed the lowest range (2.00–5.00). Regarding mean values, second-semester students rated themselves best in reflection ($M = 3.94$, $SD = 0.6$), and worst in the areas of media skills ($M = 3.35$, $SD = 0.86$) and scientific work ($M = 3.35$, $SD = 0.83$). Overall, this shows a slight progression in the self-assessment of skills from the first to second semester.

Discussion

Initial findings

The question posed was how competence development and self-reflection of student teachers can be promoted in practice. For this purpose, a framework was created and transferred into a questionnaire to test if students can work with and understand the derived competences. The questionnaire study showed that both first and second-semester student teachers assessed their competences very

heterogeneously. Still, all mean values can be found around the centre of the scale for first-semester students, and second-semester students rated their abilities moderately higher. This could indicate a progression in assessments in the course of their studies. However, it was not the aim of the present study to test this statistically since content-related hypotheses go beyond this first examination and need to rely on a grid, which is practically usable for students.

Given the results and especially the mean values of their assessment, the competence grid showed itself useful as a tool in practice. Already first-semester students are able to rate themselves in all categories, which shows that the phrasing is clear enough. However, students might understand some of the terms and concepts included in the items better when they proceed further in their studies. The reliability of the instrument supports the suitability of the grid for practice since it has an excellent internal consistency.

Limitations

The present work also shows some limitations. Due to an exclusive focus on theoretical derivations, it is not taken into account if the framework is influenced by important practical aspects and real conditions. We neither considered the context variables of the students with regard to competence development. The attempt to convert theoretical approaches into measurable variables must be examined further. A small sample within a German university was used to survey the areas of competence. In the future, a larger sample should be used to support the aforementioned theses.

Despite limitations, the competence grid proves to be a suitable tool that should be used in the future to provide a standardized instrument for competence assessment. Due to high reliability values, however, it cannot be ruled out that some items are redundant, which is why a validation study is planned as a next step in order to test the instrument's sensitivity to change.

Conclusion and future perspectives

The present work dealt with already known theoretical models (Baumert & Kunter, 2011; KMK, 2004/2022) and set itself the task of integrating these into a workable grid. We expanded the categories with findings of other authors as well, which we additionally considered as important in order to do justice to the activities and skills of teachers (Honegger, 2022; Klusmeyer & Bosse, 2022; Minna et al., 2022; Metsäpelto et al., 2022; Watson et al., 2023). The competence grid offers students a practical tool for self-assessment and provides a frame of reference by showing their individual developments when used regularly, for example, at the beginning and end of each semester. Based on Minna et al. (2022), five rubrics were introduced so that students at different levels can relate to the competences.

Thanks to a compact presentation, the progression within the rubrics, and the differentiated breakdown of the competence areas into individual sub-competences, the grid can be used across semesters to demonstrate changes. It can be enriched with stimuli for reflection by peers or lecturers. The grid is usable from the first semester onwards, as the rubrics enable a differentiated assessment of one's own competences. The competences have been selected in such a way that a progression should be recognisable already from the first to second semester so that developments and learning needs can already be shown at the beginning of the work with the grid.

The first objective, namely to create an assessment instrument for student teachers, which they are able to use in practice, has been achieved with this first approach. The grid makes student teachers aware of the growth of their competences during their studies. It supports them in reflecting on their individual level of those competences that are relevant in teacher training programme as well as in their following professional life as a teacher. Future research can investigate whether the instrument fulfils the purpose of providing impetus for students even with regular self-evaluation.

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Author contributions

Both authors took equally part in the process and writing of this paper and share the authorship.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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