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STUDENT TEACHERS' REFLECTION COMPETENCE[1]

A prerequisite for knowledge integration?[2]

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ABSTRACT[4]

Referring to Weinert's concept of competence (2003), reflection competence requires cognitive abilities and skills for the analysis of pedagogical practice as well as motivation and volition. 178 students took part in a study where they were asked to analyze vignettes by applying the model STORIES (Students' Training of Reflection in Educational Settings) after self-assessing their reflection competence. Results validate the postulated model insofar as correlations between the four dimensions of the model are low. In line with former empirical results (Wyss, 2013), the study confirms the weak ability of student teachers to reflect on professional problems and especially to integrate different areas of reflection (e.g., theory with generation of alternatives). This lack of competence is surprisingly accompanied by high self-assessed reflection competence. Different interpretations are discussed. To identify relevant parameters, a follow-up study examining whether reflection competence depends on personality traits and cognitive capabilities will be carried out. Guiding objectives are to explore how the different cognitive abilities of student teachers influence their capacity for reflection and for integrating knowledge at different levels of reflection. Strategies to foster the development of reflection due to specific interventions during preservice programs are discussed. [5]

Keywords. reflection competence, knowledge integration, professionalization of student teachers[6]

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THE NEED FOR REFLECTION

Teacher education includes reflection training aimed at fostering the development of teachers as reflective practitioners, because reflection competence is a prerequisite for identifying problems and addressing them professionally in pedagogical settings. Therefore, (critical) reflection should facilitate the retrieval of theoretical knowledge that is beneficial for solving a professional problem. Although the ability to reflect on a professional situation might be a prerequisite for retrieving theoretical knowledge, it is not a sufficient means of ensuring the integration of theoretical knowledge in the subsequent pedagogical action.

Or, to put it in another way, we may know what might be a beneficial approach to a problem in theoretical terms but still decide to fall back on routines involving well-trodden paths, as they might be easier to follow, reduce the complexity of the situation, and serve rather our personal needs than to those of the students involved. One may argue that this is a matter of underlying attitudes and motivation. This cannot be denied, but still another problem may be that we must link different sources of knowledge together by restructuring the situation using theoretical knowledge as well as knowledge about the constraints (of a situation or context) and finally by considering the (anticipated) perspectives of those involved. This seems to be a rather challenging task that might depend not only on the effort we are willing to make but also on the ability to use logical conclusions, the capacity of attentional control, and perceptive accuracy. Furthermore, personality traits such as tolerance of ambiguity, dominance, or nurturance may influence this process as well.

In this article, we will first address reflection and its significance in student teacher education. We will then describe the theoretical framework for the development of the model STORIES. Finally, we will present and discuss the study.

REFLECTION IN STUDENT TEACHER EDUCATION

Dewey (1933), who approached the concept of reflection via the idea of "reflective thinking," is acknowledged as the originator of this concept. He focuses on reflection as an active and deliberate process of thinking that involves the consideration of knowledge as well as beliefs connected with the respective cause of reflection (Calderhead, 1989; Cutler, Cook, & Young, 1989). Reflective thinking might be caused by doubts or problems but can also refer to problems or tasks that have been overcome. Perplexity and doubt are often inherent in this process and antedate solutions (Hatton & Smith, 1995).

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Referring to Dewey's work different issues were addressed:

(a) the question of the disjuncture of thought process and action, the length of reflection (short-term vs. extended)

(b) the question whether reflection is necessarily problem-centered or not

(c) the question of the ways in which reflection takes context and systemic conditions into account with regard to critical reflection (Gore & Zeichner, 1991; Hatton & Smith, 1995).

While Dewey (1933) focuses on reflection as a process of thinking, Schön (1983) emphasizes the connection between reflection and action as a precondition for the development of professional competence in pedagogical settings in terms of a "reflective practitioner." In this regard, Schön distinguishes three modes of professional action:

(a) tacit knowing-in-action: The individual acts competently in routinized ways, without relying on explicit knowledge.

(b) reflection-in-action: Competent routinized action changes when there is something surprising or unwanted. The actor starts a reflective conversation about the situation, manipulates it by conducting "on-the-spot experiments," and observes the consequences by relying not on explicit, generalizable knowledge in the form of theories but on his or her own experiences. The characteristic of this (and the first) mode is that the action is not interrupted—the actors' thinking serves to reshape what they are doing while they are doing it (Schön, 1987, p. 26).

(c) reflection-on-action: This mode is of more secondary importance for Schön and is marked by the act of interrupting and getting out of one's current action. It is a conscious thinking about the situation and implies a distanced view of one's own action and thinking. This mode enables one to identify, reorganize, und communicate existing knowledge (Altrichter, 2000; Oschatz, 2011).

Leonhard and Abels (2017) analyzed Schön's concept of the reflective practitioner to find out to what extent it represents a viable basis for an education that promotes teachers' reflection competence. They point out that the mode of reflection-on-action, unlike that of reflection-in-action, is a promising approach for initiating the enhancement of student teachers' reflection competence (ibid., 52). Leonhard und Abels (2017) therefore point out that an action flow does not allow any intervention (like on-the-spot experiments), because any necessary pause is followed by an interruption of acting or teaching, whereas on the other side accompanying cognitions cannot be considered reflection. Such cognitions might activate routines or technical knowledge but will not allow a deeper or reflected understanding of the situation.

Wyss (2013) criticizes Schön's model because of its lack of joint reflection as well as its failure to include the social environment. Both issues are important in teacher training: Joint reflection between mentors and student teachers or within peer groups fosters a broader perspective on the given situation. And it is crucial to consider the social environment if one wishes to develop alternatives that take the heterogeneity of students into account. Finally, authors like Häcker (2017) argue that reflection is not a personal task but, on the contrary, highly professional, and that institutional structures are necessary to enable joint reflection.

So far, in the context of teacher education reflection can be understood as a complex process, separate from real pedagogical practice and dissociated from action itself (in terms of reflection-on-action), which integrates theoretical and practical knowledge into the analysis of a given situation. At the same time, it is necessary to take into account the various perspectives of the participating individuals as well as the social and institutional conditions (in terms of reflection at a meta-level; Müller, 2010) to develop sensible alternative pedagogical actions as well as to foster student teachers' professionalization.

The emphasis on reflection in teacher education gives rise to the question of an adequate operationalization of reflection for assessing didactic concepts with regard to their effectiveness in promoting reflectivity in teacher education. Liston and Zeichner emphasize the difference between reflective teaching and teaching that is technically focused: "If a teacher never questions the goals and the values that guide his or her work, the context in which he or she teaches, or never examines his or her assumptions, then it is our belief that this individual is not engaged in reflective teaching. This view is based on a distinction between teaching that is reflective and teaching that is technically focused" (Zeichner & Liston, 1996, p. 1).

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The authors (1985) referring to van Manen's three levels of reflection (1977) developed a four-stage conceptual framework to analyze and categorize practical reasoning during supervisory conferences and evaluating their educational program for student teachers (Zeichner & Liston, 1985).

Van Manen (1977) distinguishes between three levels for choosing alternative courses of action that rely on different criteria. The first level blocks out institutional contexts, focusing instead on efficiency and the effective application of educational knowledge. The second level takes the underlying assumptions and predispositions of practical affairs into account and evaluates the consequences of action. The actor therefore considers different alternatives. Finally, the third level focuses on moral and ethical criteria and considers the teaching itself as well as the context. Zeichner and Liston (1985) referring to this model, develop the RTI (Reflective Teaching Index). The RTI postulates four stages of discourse rather than van Manen's three levels. These four stages are divided into further subcategories. In analyzing the material of practical reasoning during supervisory conferences, Zeichner and Liston (1985) realized that van Manen's model was not able to distinguish between practical judgments with prudential versus moral force. This distinction refers to the work of Gauthier (1963), who argues that a practical judgment may have a moral force if its considerations are independent of the purposes, aims, or desires of the actor and if it focuses primarily on the nature of the act in question, whereas a judgment based on prudential force is bound to considerations which depend upon the intention of the actor. Nonetheless, Zeichner and Liston (1985) emphasize the importance of all four stages in teacher education:

(a) Factual Discourse describes the actual teaching situation or lesson, identifies information that is relevant, or tries to anticipate what may happen in the future.

(b) Prudential Discourse is about suggestions or advice concerning the given situation; it also evaluates the quality of discussed pedagogical action.

(c) Justificatory Discourse analyzes arguments and reasons for past, present, and future behavior. It therefore takes different alternatives into account.

(d) Critical Discourse questions underlying assumptions and assesses their value. Referring to the justificatory Discourse, it takes a critical view on the arguments presented.

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In using the RTI to analyze supervisory conferences, Liston and Zeichner determined that the fourth level is hardly ever used. This is in line with further studies (Hatton & Smith, 1995; Wyss, 2013). Hatton and Smith (1995) use a different model that distinguishes between descriptive, dialogical, and critical reflection. They argue that teacher education does not succeed in developing critical reflection and conclude that the conception of reflection itself is not practicable. Wyss (2013) uses a stimulated recall to analyze teacher reflection. After examining teacher reflections on teaching situations, Wyss (2013) draws the conclusion that theoretical knowledge is disregarded, perspectives of students are not integrated, and alternatives as well as context variables are rarely discussed, which is in contrast to the self-perceived ability to reflect. Although Tynjälä (1998) points out that written reflection is superior to oral reflection, arguing that elaborated reflection requires an integration and reorganization of information, there is still no guarantee that written reflection improves reflection and leads to a deeper level (Maclellan, 2008). Even the use of prompts may wear off and involves the risk of formal reflection without deeper personal involvement, as Häcker points out (Häcker, 2017).

There have indeed been a certain number of attempts to measure the competence to reflect. The problems these attempts have to face are that the different levels are not sufficiently distinct from one another and that it is primarily the lower levels that are used. The latter problem is explained by a lack of time (Wyss, 2013) or a lack of an institutionalized space for reflection (Häcker, 2017). In an analysis of 40 publications on models of reflection, Poldner and colleagues (2014) conclude that models of reflection frequently refer to the reflection types of Schön (1983) or the reflection levels of Mezirow (1991) or van Manen (1977). The quality of reflection is usually assessed on a continuum from "nonreflective" to "critically reflective" or from "technical reflection" to "critical reflection" (Aeppli & Lötscher, 2016). Hierarchical structures of reflection have been used by various authors. Nevertheless, hierarchical structures often have been an object of criticism, as already mentioned above (Hatton & Smith, 1995; Leijen, Valtna, Leijen, & Pedaste, 2012; Valli, 1997). Therefore, Zeichner (1994) suggests that one should not assume different levels but rather different dimensions of reflection with their own quality and value.

Like other models, the RTI differentiates more between depth of reflection than between different subjects of reflection. These distinctions are doubtlessly relevant and helpful for taking up the thoughts and arguments of students and stimulating their logical reasoning and reflection on their underlying assumptions. But our argument is that one may still fail to acknowledge the underlying problem in analyzing a teaching situation even if one follows a predetermined structure through all levels, because the problem space itself is too constricted, causing one to miss relevant information, ignore the perspectives of others, or simply shut out systemic limits. Therefore, our intention is to create a framework that postulates different dimensions of reflection that are mutually dependent but in such a way that they still can be distinguished and trained separately from one another in teacher education. In addition, we assume that addressing different aspects of the situation separately may foster understanding of the value of each individual dimension. Thus, the model may facilitate the integration of different sources of knowledge. The quality of reflection should therefore be exhibited in two different ways: first, in the quality of analysis of the different dimensions, and second, in the ability to integrate the knowledge gained from the reflection.

STORIES – A THEORETICAL FRAMEWORK[7]

What makes a good teacher? What is a well-taught lesson? Teacher training students have implicit ideas and implicit knowledge about the "right" answers to these questions on the basis of educational experiences they gained from years as students themselves. These epistemological beliefs lead to implicit theories about good teaching practice which characterize the traineeship (Dewe, Ferchoff, & Radtke, 1992, p. 87). In contrast to experience-based knowledge about school and teaching, knowledge content taught by universities seems to be of secondary importance for teacher training students (von Felten 2005, p. 25). In an older study, Lortie (1975) already mentions the dominant role of practice and its influence on the socialization process of teachers. Clandinin (1995, p. 28) describes the attempt to transfer theory of good teaching into practice as "a sacred story of theory-practice." Many studies confirm that the link between theory and practice is weak or simply non-existent (Korthagen, 2001; Cole & Knowles, 1993; Veenman, 1984). Zeichner and Tabachnick (1981) point out that pedagogical concepts and educational theories acquired during student teachers' education are often "washed out" when they work at school (ibid., p. 7). However, professional action is not characterized merely by habitual responses but is instead an intelligent act regulated by implicit *and* explicit knowledge acquired during university study and on the basis of reflections (Wyss, 2013, p. 17).

Fostering the development of a reflective attitude in students and helping them to endure the confrontation with problems that are ambiguous, include antinomies, or lead to decisions that will not resolve identified dilemmas (Herzog, 1995) involves teaching them to take responsibility for themselves and to analyze situations in terms of recognizing relevant theoretical principles and reflecting on misconceptions. It is thus necessary for them to acquire professional knowledge and professional experience to deal with professional practice (Kolbe, 1997). A model of reflection that focuses on distinct processes while addressing a problem might provide support in segmenting a complex process into manageable sections.

In contrast to other reflection models (e.g., Hatton & Smith, 1995), the STORIES model (Students' Training of Reflection in Educational Settings, Figure 1) does not proceed from hierarchically structured levels of reflection. Instead, we assume that a model which addresses different issues solves the afore mentioned problem that the task of reflecting in general on a pedagogical situation may wear off and lead to formal reflection instead of elaborate thinking. Placing emphasis on different topics, such as theoretical knowledge about a situation, exploration of different perspectives, consideration of context, or the generation of alternatives, may thus

allow student teachers to elaborate each on its own and initially reduce the complexity of the goal of fostering their development. A means of attaining this is by presenting one or more dimensions in the form of sample solutions or information students can refer to when working on other dimensions. Thus, the focus on single processes of reflection and the concentration on specific topics should enhance student teachers' development and also allow them to set individual training foci. STORIES defines four dimensions marking single and distinguishable processes of reflection that are not necessarily built on one another, each involving its own quality of reflection. It draws on Müller's (2010) conceptual modeling, which takes systemic reflection into account, but refers as well to Zeichner and Liston's (1985) RTI model in that it acknowledges the need for different levels of examination during the process of reflection. The first level, described by Zeichner and Liston (1985) as Factual Discourse, is located before the reflection itself takes place. In STORIES, the description of the situation would create the material for the reflection. It could be created by others (lecturers, supervisors) or by the individual students themselves on the basis of their observations of others or their own experience.

Figure 1: The "STORIES" reflection model—Students' Training of Reflection in Educational Settings

Empirical findings indicate that written drafts show the most evidence of reflection (Hatton & Smith, 1995; Tynjälä, 1998). With STORIES, we thus work with case examples given to the students in the form of written situations or vignettes of pedagogical interactions in school taken from field observations. Student teachers have to elaborate the situations in writing. Thus, each of the four dimensions is initiated by guiding questions serving as prompts.

(a) Linking theory and practice:
This dimension focuses on the analysis of the written situation. The objective is to activate theoretical as well as empirical knowledge that could be case-related or is related such that it explains fundamental processes relevant for the pedagogical situation. In a second step, students are asked to evaluate their material and consider which theoretical approach or empirical outcome could be of essential meaning.
The guiding questions in this dimension are:
What is the central issue?
Do I know theoretical models/approaches or empirical findings to explain the situation?

What are the benefits of each of my findings for possible alternatives? Is it sufficient to understand the situation, or do I have to look for other explanations?

(b) Perception of different perspectives:
In this dimension, the perspectives of all actors (e.g., teacher, students, colleagues, parents) involved in the given situation or even in anticipated settings (like "What might the parents think/feel, if they would know about the situation?") are analyzed systematically. In the process, the actors become aware of their own prior assumptions and errors of observation and can thus anticipate and discuss different interpretations of cognitive, motivational, and emotional aspects.
Questions which initiate the reflection process are:
How is the situation experienced from different perspectives (directly involved or indirectly affected)?
What are probable reactions of the actors involved if one takes different interpretations into account?
How could the behavior of the participants change in the future due to the teacher's behavior?

(c) Development of alternatives:
In this dimension, two steps have to be distinguished. First, it aims to develop alternatives for pedagogical action while integrating the relevant theoretical and empirical findings. This step is crucial because the ability to integrate knowledge using the theoretical and empirical findings depends on the diligence the teachers invest in the process (a) and on their ability to evaluate available alternatives with respect to the different perspectives of the actors involved in the process (b).

The second step involves reflecting on the limits and possibilities of the environmental system (school/education policy and other framework conditions)—in terms of reflection on a meta level—and relating them to the alternatives mentioned above. The question whether alternatives can be realized in light of the environmental conditions implies a political dimension: Is there a need to restructure the system?

Guiding questions are:
What alternative action could the protagonist take?
Do these alternatives take the anticipated perspectives of the others involved into account?
Are there opportunities that open up new ideas or possibilities for action?

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Is it necessary to consider systemic restraints? If so, is it possible to overcome them, or is it necessary to adjust the alternative in light of the given restraints? Where could the actor get support?

(d) Reference to one's own professionalization:
In the fourth dimension, students are supposed to rethink the given situation and assess their personal prerequisites by anticipating what it would be like to be in the situation described. The aim is to get them to recognize their own strengths and become aware of development tasks simultaneously. In the course of this process, they may become aware of their limited perception of themselves and the world. At best, they achieve an extended self-view.
The initiating questions are:
What does this mean for me and my professional development?
Which individual strengths would help me cope with the given situation?
Where do I see development tasks I have to master?

We assume that the four dimensions we will now describe are related insofar as dimension (c) *the development of alternatives* should be linked with (a) *linking theory and practice* and (b) the *perception of different perspectives*. High quality alternatives should at least be closely linked to (a) and (b). This assumption still holds true in the case that (a) and (b) are given in the form of prime examples. We assume further that (a) and (b) are not connected with one another, because the ability to anticipate other perspectives is not necessarily connected with a student's theoretical knowledge.
Finally, (d) the *reference to one's own professionalization* should show the least connection to the first dimension, because theoretical knowledge is not necessarily linked to one's own reflection. On the other hand, there might be a correlation between the quality of the reflection on different dimensions and self-reflection processes, because the ability to expound problems, to reframe, and to take others' perspective into account may facilitate the access to one's own reflection, increasing the awareness of development tasks and personal challenges. The question whether such correlations can be found needs to be the subject of the following investigation.

RESEARCH DESIGN—METHODS AND SAMPLE

A total sample of 178 student teachers in the first semester of their master's program participated in this study during the 2016/2017 winter semester. Male students

accounted for 26.7% of the whole sample (n = 44), and the average age was 25 years (M = 24.95, SD = 3.47).

The surveyed students took part in a course titled "Pedagogical Diagnostics," in which they analyzed written teaching situations. In addition, all participants filled in a questionnaire to self-assess their reflection competence at the beginning of the course before starting their analyses in October 2016. Furthermore, they received a second questionnaire to evaluate their experience while working on the vignettes at the end of the winter semester in January 2017. The second questionnaire focused on the extent to which the students had to overcome difficulties in working on written drafts and whether the presentation of the dimensions of the STORIES model, including the guiding questions, facilitated their reflection processes. The following figure illustrates the research design.

Figure 2: Research design

In the following, we present the instruments, methods, and results of the student teachers' performance on reflection tasks (a). Then we present the results of the self-assessment (b) and, finally, the evaluation of their experience working with the STORIES model (c).

a) Student performance on reflection tasks

Each student teacher analyzed three written situations describing interactions in pedagogical settings by applying the STORIES reflection model. These situations are related to topics of pedagogical diagnostics. For instance, the first situation expounds the problem encountered by teachers in providing oral feedback on student performances in front of the class. In this draft, the teacher uses various benchmarks, such as comparing individuals with other classmates or referring to individual developments or curricular standards. The teacher assesses achievement in different ways and attributes problems primarily to students' behavior or personalities. Therefore, regarding the first dimension, *Linking Theory and Practice*, guiding questions should help students to identify different reference standards, attribution processes, and so forth—in brief, knowledge they acquired during the course. On the basis of the second dimension, student teachers are expected to identify, discuss, and reflect on how individual students provided with the teacher's feedback might feel and think and how this might influence their further actions. The challenge of the third dimension is to develop alternatives for teachers in providing feedback and communicating assessment (e.g., marks) of student development. Therefore, student teachers need to consider the student perspective (dimension 2) and integrate

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scientific understandings of the situation (dimension 1). In addition, the limits set by the surrounding environment have to be taken into account. This implies critical reflection of what we are used to taking as a matter of course: What are the assumptions underlying the system of providing feedback at this school? Is the teacher's behavior consistent with the guidelines of the school? Do I agree with these guidelines? And finally, what is the impact of giving marks and feedback in the way described? How are further decisions, such as determining whether students meet admissions requirements for academic studies, affected by the use of different reference standards for the assessment of school performances? And finally, when working on the fourth dimension of the STORIES model, student teachers have to ask: What would I have done in the given situation? What do I take for granted and what are my underlying assumptions? How do I want to act in a similar situation in the future? What is the most challenging task for me in consideration of my own experience and my personal development? And finally, what developmental task can I identify for myself?

The second written situation expounds the problems of school reports and the difference between written reports and reports based on grading.

The third situation describes the interaction between a teacher and a student with cognitive, motivational, behavioral, and physical symptoms of test anxiety in writing an English test.

Evaluation method

To collect data from the student teachers' written drafts and convert qualitative data step by step into quantitative data, we used a content analysis method   according to Mayring (2002). We then developed a category system on the basis of theoretical considerations (e.g., Müller 2010; Zeichner & Liston, 1996) and empirical findings (von Felten, 2005; Tiefel, 2004; Wyss 2013). This deductive approach explains why the four main categories of the category system are identical to the reflection dimensions of the STORIES model. The required definitions of the main categories accordingly correspond to the explanations of the model. Each main category describes a distinct quality of reflection.

Concerning the RTI (Zeichner & Liston, 1985), each main category is successively subdivided into further subcategories with increasing depth of reflection. Hereinafter, this will be illustrated in detail by the first main category *Linking Theory and Practice*. It includes six subcategories as well as an additional seventh subcategory, *Incorrect Use of Theoretical References*:

1) description of appropriate theoretical references without explicit naming

2) explicit naming of appropriate theories or theoretical models

3) correct matching of text passages and theoretical references

4) case-related explanation of appropriate theories or theoretical models

5) explanation and discussion of appropriate theories or theoretical models beyond the case

6) discussion and evaluation of different theoretical approaches

We extended the four levels described by Zeichner and Liston (1985) by inserting further subcategories, enabling us to also classify rudimentary approaches and differentiate between references to the given case and to fundamental issues beyond the teaching situation. Table 1 shows further identified subcategories of the other three dimensions.

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Within the category system, every subcategory is defined by prototypical text passages. Moreover, we formulated units of content analysis and coding rules for the deductive subcategories to ensure objectivity. Each unit of content analysis has bipolar coding (existing vs. non existing). This is a crucial step in quantifying the qualitative data. The data were coded more than once by the same coder, allowing evaluation of the category system and increasing reliability. After evaluating 40% (n = 70) of the student teachers' drafts, we modified the category system marginally in regard to the definitions of a few subcategories. The validity of the category system, in particular its construct validity, is ensured through orientation along the theoretical description of the STORIES model. Finally, we analyzed the collected data using SPSS with an alpha level of .05 for all statistical tests.

Results

Tables 1 and 2 show the descriptive results of all dimensions or subcategories for the first and the third analyses of the vignettes. The values are cumulative scores of the quantified content analysis (n = 107). Since the written situations refer to different pedagogical content, it is not considered appropriate to compare the means statistically. Nevertheless, the values provide information about the status quo of reflection performance.

Tab. 1: Descriptive results of subcategories—vignette 1

Regarding the first dimension, it can be determined that student teachers are better at naming appropriate theories or models explicitly ($M = 2.64$, $SD = .88$) than paraphrasing them ($M = .09$, $SD = .38$). On the other hand, the more demanding the requirements concerning analysis and reflection are, the lower the attained values are (from $M = 4.18$, $SD = 2.83$ to $M = .29$, $SD=.44$). Still, the mean for incorrect use of theoretical knowledge is also quite small ($M = .85$, $SD = .85$). The descriptive results of the second dimension are quite different. On the one hand, it is easier for (at least some) student teachers to indicate ($M = 7.23$, $SD = 4.77$) and explain ($M = 4.64$, $SD = 3.47$) the emotions of the actors involved—although there is a wide range—than to anticipate ($M = 1.80$, $SD = 2.00$) and explain cognitions ($M = 1.19$, $SD = 1.53$). Moreover, they are almost entirely incapable of explaining and discussing motivational, emotional ($M = .07$, $SD = .30$), and cognitive ($M = .07$, $SD = .37$) aspects and their significance in general or in relation to their probable impact on future behavior ($M = 83$, $SD = 1.26$). Finally, the third dimension validates the results of the first dimensions: More demanding requirements are not properly addressed. On average, students are able to describe about three alternative pedagogical actions without explaining them ($M = 3.31$, $SD = 2.96$). However, it is striking that the range is again very large and fluctuates between zero and fourteen indications ($Min = 0.00$, $Max = 14.00$). Only a small number of student teachers are able to explain and justify their proposed actions, and even less of them in light of their theoretical knowledge or anticipated perspectives. The means of the fourth dimension *Reference to one's own Professionalization* are so low on the whole ($M = 1.00$, $SD = .00$ to $SD = 1.51$) that they amount to a rejection.

All in all, the results of the analysis of vignette 1 show that student teachers are more likely to just name or identify appropriate theories as well as aspects of other perspectives than to justify or explain why they chose them. Furthermore, it seems to be easier for student teachers to create alternative pedagogical action when they do not consider restrictions or chances of the environment. The fourth category seems to be a special one, because there are a lot of floor effects. Most of the participating student teachers were not able to analyze the given situations in support of their own development by applying theoretical models or references. Only a few of them were able to identify development tasks for themselves or to identify a lack of knowledge or skills regarding the analyzed situation. None of them reflected on the limitation of their own perception or made an effort to extend their perspective ($M = .00$, $SD = .00$). The results thus confirm other empirical findings (see above) indicating performance at primarily low reflection levels.

Table two shows descriptive results of the third analyses of the written drafts.

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Tab. 2: Descriptive results of subcategories—vignette 3

There are only a few striking differences between the means of the first and the third cases. The student teachers evidently found it easier in the third case to indicate cognitive aspects of involved actors (M = 3.53, SD = 5.04) than in the first case (M = 1.80, SD = 2.00), and the range is also wider. There are no apparent differences with regard to the fourth dimension, but at the end of the seminar the student teachers were more likely to describe alternative ways of acting (M = 4.97, SD = 3.82) and to explain them from further perspectives (M = 2.28, SD = 2.32).

Evaluation of the STORIES model

We performed bivariate correlations to verify the model's dimensions as largely independent (Tab. 3). In the third dimension, we differentiated between the tasks of developing alternatives and considering environmental restrictions or chances. This differentiation is based on the assumption that student teachers might be able to develop alternatives on the one hand while blocking out environmental conditions on the other. Thus, we aimed to detect potential varying patterns within the correlations between the other dimensions and those subcategories. Again, the correlation coefficients of both the first and the third analyses are displayed (Tab. 3 and Tab. 4).

Tab. 3: Results of bivariate correlation analysis (Pearson) of STORIES dimensions— vignette 1 with two-tailed third dimension

Correlation analyses of the first case show that the first two dimensions *Linking Theory and Practice* and *Perception of Different Perspectives*, are significantly correlated with one another (r = .23, p < .05, Table 3). Furthermore, the second dimension is significant correlated with both third dimensions (*Development of Alternatives*: r = .36, p < .01, and *Consideration of other Contexts*: r = .39**, p < .01). Both subcategories, *Development of Alternatives* and *Considerations of other Contexts*, also show significant correlations (r = .41**, p = .01). However, overall the correlation coefficients do not exceed r = .50.

Of course, there should be significant correlations between the dimensions if the student teachers show constant commitment, and the third dimension requires explicit reference to the first and second dimensions. Nevertheless, correlation coefficients above r = .50 would indicate that the dimensions cover similar

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content and are thus not independent of one another. With reference to Cohen (1988), this means that correlations of up to $r = .50$ are acceptable if one is to assume that the dimensions define distinguishable and independent processes of reflection.

It is striking that there are not any significant correlations with the fourth dimension. This might be due to the reported floor effects. Most of the participating student teachers were not able to analyze the given situations to the benefit of their own professional education. The resulting low variances restrict the probability of significant correlations.

Both the number of significant correlations and the height of the coefficients hardly shift with respect to the analyses of the third vignette (Table 4), with the exception of a significant correlation between theory and practice and the development of alternatives within the third written draft.

Tab. 4: Results of bivariate correlation analysis (Pearson) of STORIES dimensions— vignette 3 with two-tailed third dimension

b) Student teachers' self-assessment of reflection

The questionnaire for self-assessing reflection competence includes some items that were already empirically tested by Wyss (2013), which we modified due to our research purposes and sample.

We conducted a factor analysis and extracted six factors including three to seven items (Table 5). The internal consistency was calculated, and all factors are of at least acceptable reliability (Nunally, 1994).

Tab. 5: Results of factor analysis concerning self-assessed reflection competence

Student teachers tend to assess themselves as self-reflective and as willing to perceive other perspectives after arguing. External assessment seems to be important for them. The means for these three factors are within one standard deviation of the range of profoundly positive to neutral (self-reflection: M = 2.3, SD = .60; perspective taking: M = 2.2, SD = .50; importance of external

assessment: M = 2.5, SD = .70) Student teachers assess themselves rather highly with regard to self-reflection and empathy. They differ with regard to their experience of negative emotions after arguments, attempts to avoid conflicts, and engagement in negative thoughts after critical occurrences. Here, the means reported are within a neutral range, and the standard deviations vary between approval and rejection.

Case-specific comparison of self-assessed and measured reflection competence

Regarding self-assessed and measured reflection competence, the correlation analysis hardly shows any significant correlations, including the self-assessed perception of other perspectives and the measured ones (Table 6; r = .19, p > .05).

Tab. 6: Results of bivariate correlation analysis (Pearson) of self-assessed and measured reflection competence—vignette 1 with two-tailed third dimension

Only on *engaging in negative thoughts after conflicts* did higher scores correlate with a higher probability to generate developmental tasks (r = -.33, p < .01). Student teachers engaging in negative thoughts or feelings are more able or willing to interpret the given situation in relation to their own professionalization and to identify developmental tasks.

However, this correlation is not stable throughout the different analyses of the written draft (third vignette: r = -.11, p > .05, Tab. 7). Instead, there is only a low significant correlation between the rejection of negative emotions after conflicts and the reference to one's own professionalization (r = .23, p = <.05). Thus, student teachers who reject negative emotions after conflicts are less likely to interpret a case with reference to their own professional development.

Tab. 7: Results of bivariate correlation analysis (Pearson) of self-assessed and measured reflection competence—vignette 3 with two-tailed third dimension

c) Student teachers' evaluation of their experience working with STORIES

At the end of the winter semester, the student teachers assessed their experience with the STORIES model as well as with the prompts provided to them in the form of questions. The questionnaire consisted of self-configured items and included questions concerning the extent to which the key questions facilitated the analysis.

The following table (Tab. 8) illustrates the results of the factor analysis. In general, student teachers provide positive feedback concerning the model and the key questions, and they agree that reflection is important for their future professionalization.

Tab. 8: Results of factor analysis assessment of work on the given vignette using STORIES

Again, we carried out analyses to examine correlation patterns between the student teachers' evaluation of working with the STORIES model and their actual performance analysing and reflecting on the first (Table 9) and the third vignette (Table 10).

Tab. 9: Results of bivariate correlation analysis (Pearson) of course evaluation and measured reflection competence—vignette 1 with two-tailed third dimension

Surprisingly, there is a comparatively high positive correlation between the second dimension (*perception of different perspectives*) and the self-assessed *importance for ones' own professionalization* (r = .40, p = <01). Student teachers who assess the analyses of the given teaching situations as important for their own professional process are less likely to anticipate the perspective of actors involved at the beginning of the course (vignette 1). Similarly, student teachers who assess draft analyses as helpful for their future profession are less likely to consider the environmental conditions (r = .30, p = <.05).

These correlations change during the course: If one compares the patterns of the first and the third vignette, there are differences concerning the height and the direction of coefficients. Significant correlations between the second dimension (*Perception of Different Perspectives*) and the *importance of the analyses for professionalization* as well as the *willingness to make an effort due to extrinsic motivation* and between the *Consideration of other Contexts* (third dimension) and the assessment of *helpfulness for future pedagogical practice* become non-significant, and another correlation appears (Tab. 10). Student teachers who stated that they had to *overcome efforts* are also more likely to consider environmental conditions (r = -.39, p < 01).

Tab. 10: Results of bivariate correlation analysis (Pearson) of course evaluation and measured reflection competence—vignette 3 with two-tailed third dimension

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Conclusions

The first three dimensions of the STORIES model are correlated moderately with each other. This confirms our assumption that there are distinguishable dimensions of the process of reflection and that it might be possible to address these dimensions separately during teacher training.

On the other hand, one would expect a higher correlation between the development of alternatives and the first and second dimensions (linking theory and practice/different perspectives), because the development of alternatives should consider relevant theory as well as different perspectives of the actors involved. In other words, one might expect that a lack of theoretical knowledge or the failure to regard the perspectives of others should hinder the development of plausible alternatives. Verifying this will involve further qualitative analysis. The results show that there is no correlation between the first and third dimension during the analysis of vignette 1. In vignette 3, the first dimension does correlate with the development of alternatives but still to a lesser degree than the second dimension. This could indicate that the training fosters knowledge integration insofar as theoretical knowledge concerning the vignette is activated and thus further integrated into the development of alternative actions. On the other hand, even if this assumption turns out to be right, the results show that explicit references to theoretical concepts as well as to the perspectives of other actors involved are rudimentary. In other words, even if student teachers develop alternatives that draw on theoretical knowledge, they are not yet able or willing to explain or even justify their approaches.

Regarding the means of each category within the different dimensions, it is obvious that reflection occurs at a superficial level. Most student teachers name relevant aspects, but only a few of them are able to explain or justify their significance. Moreover, there is also a low correlation between the first and second dimension, which might be explained by the fact that the student teachers activated others' perspectives on account of having examined relevant theory, or it might also simply be due to effort: Student teachers who engage in analyzing and reflecting on the teaching situation may do so on all dimensions and vice versa.

Nonetheless, it is surprising that the fourth dimension is not correlated at all with the other dimensions. This might be due to the fact that the student teachers were asked to reflect on prepared drafts. Therefore, it needs to be tested whether correlations occur when student teachers reflect on teaching situations they have personally experienced. Moreover, the fourth dimension shows the lowest means of all dimensions. This floor effect supports the assumption that it might be difficult to create references to one's own development if the situations are not

self-experienced. Leonhard and Abels (2017) point out that it is important for students to choose the occasion for reflection by themselves. The personal relevance of the chosen occasion may increase the need and therefore the willingness to reflect. This indicates that the training should be adjusted to consider personal needs and that the fourth dimension should be used preferably in the context of reflection on self-experienced situations. It should be taken into account, however, that student teachers have to be trained in describing and writing down teaching situations to ensure a certain quality.

 With regard to student teachers' self-assessed reflection competence, our results show a positive mean with a small standard deviation concerning self-reflection and perspective taking after experienced conflicts. Student teachers differ in the extent to which they reject negative emotions, engage in negative thoughts after experiencing arguments, or avoid entering into conflicts with others. External assessment is more important for them. Nonetheless, hardly any of these self-assessments correlate with the actual performance on the task. The self-perception of being a *self-reflective individual who usually perceives other relevant perspectives* does not correlate with performance on *taking other perspectives or reflecting on problematic behavior* in the assigned task. Only two significant correlations are present. In the third vignette, student teachers who rejected negative emotions after conflicts were less likely to create personal developmental goals. In the first vignette, on the other hand, student teachers who tended to engage in negative thoughts after experiencing arguments tended to create more personal developmental goals. This indicates that a certain amount of uncertainty might be beneficial for one's own professional development.

Another interpretation of the results could be that student teachers have problems identifying strengths and weaknesses as well as formulating development tasks for their own professionalization. They might not recognize or realize the need for professionalization and tend to overestimate their capabilities. Furthermore, social desirability distorts their response behavior, because student teachers are aware that they are expected to be reflective practitioners. In addition, a positive attitude toward reflection is not necessarily associated with the competence to reflect or with the actual reflection performance.[8]

The evaluation of the assigned tasks by the student teachers gives rise to another interpretation: Student teachers who emphasize the *importance of reflection for their future profession* and evaluate *working on teaching situations* as positive show problems in *taking perspectives* and have difficulties in c*onsidering environmental conditions* while working on the first written draft. But these correlations vanish throughout the course. This may indicate that student teachers who are aware of their inexperience analyzing and reflecting on teaching

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situations nonetheless rate these competencies as highly relevant for their future profession and also appreciate the chance to develop their reflection competence by working on assigned drafts. The latter might explain the decrease in positive correlations throughout the course. Still, changes could also be explained by the differences between the vignettes themselves. Maybe the third case itself provides less possibilities to refer to different perspectives. Therefore, future studies need to consider the comparability of the different vignettes.

Finally, we wonder whether there are indeed necessary prerequisites for developing the attitude of a reflective practitioner or being able to analyze and reflect in depth on teaching situations. These prerequisites might be personal traits such as tolerance of ambiguity, dominance, or helpfulness or cognitive skills such as logical reasoning or accuracy of perception. They might operate not in terms of linear relations but in terms of a critical threshold that needs to be attained or (e.g., for dominance) must not be exceeded.

And of course, other questions also arise: Do student teachers experience competing beliefs while working at school during practical training? Do they experience that reflective teaching is worthwhile and appreciated by their colleagues? Or do they, on the contrary, learn that reflection is considered inconvenient or, even worse, seen as a troublesome interruption of well-established routines? How would such experiences interact with the idea of fostering reflection competence?

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