Investigating the Development of Analytical Skills in Teacher Education
Anders Jonsson & Sven A. Lennung
Malmö University

Abstract

An important aspect of teacher competence is analyzing complex classroom situations and suggesting appropriate actions that follow from the analysis. Novice teachers’ analyses are, however, typically simpler than analyses done by experienced teachers. The aim of this study was to investigate whether the analytical skills of pre-service teachers had developed throughout teacher education, and whether the pattern of strengths and weaknesses in students’ performances during their first semester had changed at the time of graduation. The results show that the skills did not improve during teacher education, since the students performed at the same level during the first and the last semester. Only two changes where identified: (1) The students had increased their awareness about the need to have more information before being able to make well-grounded decisions; (2) The students considered different motives for acting in particular ways to a lesser extent during the last semester.

Keywords: assessment, competence, evaluation, teacher education

Introduction

An important aspect of teacher competence is the ability to analyze complex classroom situations, such as being able to identify a problem, figure out what caused the problem, understand students’ incentives for behaving in particular ways, and also to take appropriate actions following this analysis. There are a number of studies, however, which report that beginner and novice teachers’ analyses of classroom situations are typically simpler and more descriptive than are analyses done by more experienced teachers (e.g., Berliner, 1986; Carter, Cushing, Sabers, Stein, & Berliner, 1988; Lin, 1999). This raises the question of how pre-service teachers can acquire this expertise, and a typical answer is that it requires extensive experience, while teacher education is usually seen to have little impact on such skills. On the other hand, arguments have been made about the possibility to feed forward this learning process, claiming that experiences need not necessarily be made by the students themselves, but can also be made vicariously, for instance through role plays or simulated situations (Elliott, 1991; McTal, Ronen Hammer, & Kahlisch, 1996). Further, there is both theoretical and empirical support for the assumption that students’ learning can be enhanced by making expectations explicit to them (Black & Wiliam, 1998; Frederiksen & Collins, 1989; Sadler, 1989).

Following this latter set of arguments, an assessment methodology called the “Interactive examination”, where students analyze classroom situations simulated through digital video, was developed in order to assess, as well as to support, pre-service
teachers’ learning of analytical skills. Previous research has shown that this “Interactive examination” can indeed be considered a valid instrument for assessing preservice teachers’ analytical skills (Jonsson, Baartman, & Lennung, 2009; Jonsson, Mattheos, Svingby, & Attström, 2007), and that this methodology supports student learning and improves their performance (Jonsson, 2010; Jönsson, 2008). This article reports on a comparison between students’ results on this examination during their first and last semester respectively, aiming to investigate whether the analytical skills of pre-service teachers developed throughout the teacher-education program, and whether the pattern of strengths and weaknesses noted in student performance during their first semester changed.

**Background**

Competence, as the concept is used here, refers to the integration of knowledge, skills, and attitudes into situation-relevant actions, in order to master relevant tasks (Taconis, Van der Plas, & Van der Sanden, 2004). To be “competent” thus means to be able to act knowledgeably in relevant situations. This definition suggests that no matter how much you know, you cannot be considered competent unless you can actually use this knowledge to solve problems within a certain field of practice. Moreover, it means that competence is not something we are born with, but rather a quality which can be learned and improved.

This definition of competence, however, raises the question of how beginners turn into competent workers. There have been several answers to this question, with contributions from prominent authors such as Gilbert Ryle, Michael Polanyi, and Donald Schön. However, the novice-to-expert framework presented by the Dreyfus brothers (1986) and the theory of “legitimate peripheral participation” by Jean Lave and Etienne Wenger (1991) are perhaps the most widely cited in the literature on progression from novice to competent. In the context of teacher education, much work has been done by David Berliner and his associates, referring mainly to the Dreyfus framework. One of the things that Berliner turns our attention to is that competent teachers can identify, analyze, and act upon things that go more or less undetected by novices. For example, in a study by Sabers, Cushing, and Berliner (1991), teachers with varying experience and expertise in teaching viewed three different television monitors. Each monitor focused on a group of junior high school students, and the participants had to express their thoughts as they viewed the monitors. They also had to answer questions about classroom management and instruction. What could be seen in this investigation was that the teachers categorized as “experts” were able to monitor, understand, and interpret events in more detail, and also with more insight, than the participants categorized as either “novices” or “advanced beginners.” Further, the teachers differed in how they attended to the “multidimensional nature of the classroom.” As the authors express it: “Experts not only used all three monitors to view the classroom activities, but by all outward appearances they seemed more at ease in completing the task. They gave the overall impression of enjoying the experiment and participated enthusiastically” (Sabers et al., 1991, p. 76). Similar results are presented from other studies (e.g. Berliner, 1986; Carter et al., 1988; Lin, 1999). In addition, these results are not confined to the “holistic recognition of patterns” in experts (see e.g. Berliner, 2004, p. 207) or tacit knowledge; pre-service teachers also have difficulties in dealing with general and theoretically-grounded issues when reflecting on teaching events (van den Berg, 2001).
Given the conclusion that novices and experts differ in their ability to identify, analyze, and act upon multifaceted information in the classroom, how can the students be guided towards this competence? Sabers et al. (1991) argue that there is probably a limit to what can be learned in teacher education, and that it takes extensive time to acquire competence in such a complex domain. This argument is supported by Björklund (2008) in a review of research on experience-based learning, where he suggests that the difference between problem solving by experts and novices can be explained by the fact that experts have acquired a larger knowledge base of “implicit memories” (i.e. memories that are not consciously attained) than the novices. In principle, experts have in some sense “seen it all before,” and can therefore act in an intuitive and non-reflective manner. Unfortunately, for teacher educators this would mean that there is no way to fast forward this process, and that “teacher education can, at best, start people on the path toward expertise and provide them with the tools and dispositions to better learn from their experience” (Sabers et al., 1991, p. 85).

As Elliott (1991) notes, however, even though professional learning (just like any other learning) is situated and experiential, this does not mean that is has to involve direct participation. Practical situations can also be experienced vicariously, for example by reflecting on case studies and/or discussing different ways to act in relation to simulation exercises. That case studies can indeed be effective in this regard is shown in a study by Metcalf et al. (1996). Here a group of students were exposed to a series of campus-based activities, which included role play and giving short lessons which were videotaped. The students also watched simulated classroom situations on video. With these situations as starting points, they had to provide explanations, suggest possible solutions, and propose potential consequences of the situations. Every activity was analyzed and discussed by the students in groups. The “reflective ability” of these students was then compared to a group of students who had been exposed to regular field-based education. Results from this comparison showed that the group of students exposed to campus-based activities had significantly improved their skills in identifying critical events in complex, pedagogical situations. They could also give more advanced explanations to these situations and were more inclined to provide rationales for different actions taken. Even skills in carrying out meaningful lessons, as measured in this study, were improved by this group, whereas the skills of the control group had not changed. The results from Metcalf et al. thus suggest that, by working systematically with simulated situations (such as video sequences and role play), pre-service teachers can (1) improve their skills in identifying critical events in complex situations, (2) give more advanced explanations to these situations, (3) become more inclined to give rationales for actions taken, as well as (4) improve their performance in giving lessons.

**Assessing Competence to Support Student Learning**

If we once again, in the light of the discussion above, ask the question: “Given the conclusion that novices and experts differ in their ability to identify, analyze, and act upon multifaceted information in the classroom, how can the students be guided towards this competence?,” we might re-phrase the answer. If students can learn from others’ experiences - through the use of role plays, case studies, or simulations - and if we (through the use of language) can communicate the standards of quality performance to the novices, then they would not have to work it out all by themselves in the course of their own experiences. Well-designed instruction in combination with explicit criteria and standards might in this way help the novices to focus on relevant details in the performance of others, and thus potentially make their own experiences
more effective, as well as making it possible for students to self-assess their own performance.

These assumptions underlie an assessment methodology called the “Interactive examination,” originally developed by Mattheos, Nattestad, Falk Nilsson, and Attström (2004) for dental students, which in this study has been adapted to teacher education. The examination consists of several parts, but only those relevant to the current study will be described here. For a more comprehensive report, see Jonsson et al. (2007) or Jönsson (2008). The examination is performed over the Internet, and one of the main parts is a personal task in the form of an authentic, professional problem, presented to the students as a classroom case, simulated through digital video (cf. Metcalf et al., 1996). Each student watches three cases and for all movies the students must: (1) Describe the situation without prejudice (Observation), (2) State a problem and analyze the situation displayed (Analysis), and (3) Formulate what actions should be taken, considering the needs of all those involved (Taking action). Students then submit their answers as word-processed documents. Since teacher competence involves handling a wide variety of situations, ranging from providing appropriate conditions for student learning to attending to an individual student’s social and psychological difficulties, from assessing student knowledge, to arranging meetings with students, parents, and/or colleagues, etc., the personal tasks in the “Interactive examination” have to reflect a similar complexity for the examination to provide valid data about student performance. Therefore the tasks do not focus on details or well-defined problems. Instead, they are (more or less) open for interpretation, so that the students themselves have to choose what is important, and identify one or more problems to be solved.

When submitted, students’ answers are assessed with the help of a scoring rubric. To achieve as high reliability as possible, as well as to aid in giving detailed feedback, the rubric used is analytic (i.e. designed for assessing different aspects individually) rather than holistic (Jonsson & Svingby, 2007). For each of the “global questions” (Observation, Analysis, Taking action) there are four or five assessment criteria in the rubric, resulting in a rubric with a total of 13 criteria (the different aspects assessed by the rubric are listed in Table 1). This means that the rubric was designed to capture what the students saw in the movies, how they interpreted the situations, and what strategies they used to deal with the situations displayed. The rubric was distributed to the students approximately three weeks before the examination, so that they could read and discuss the criteria with peers and instructors. The purpose of sharing the criteria with the students is that, in order for the assessment to support student learning, it had to be clear to the students what was expected of them (see e.g. Black & Wiliam, 1998). This sharing of criteria is one of the important differences between this study and the studies by Metcalf et al. (1996) and Mattheos et al. (2004) discussed above.

The “Interactive examination” was developed with the dual purpose of assessing the acquisition of selected aspects of teacher competence, as well as supporting student learning of these same competences, following the call from Frederiksen and Collins (1989) that assessments should lead to students becoming more skilled at whatever the assessments are set out to measure. The validation for both summative and formative purposes has been investigated and reported elsewhere (Jonsson et al. 2009; Jonsson, 2010; Jönsson 2008), showing for instance that the inter-rater reliability is reasonably high (Spearman’s rho .795; p<.01), although the tasks are open ended, and that students perceive the examination to be very authentic and relevant to their future profession.
To summarize: Competent teachers seem to be able to identify, analyze, and act upon things that are not always noticed by novices and also provide analyses that are more insightful, for instance going beyond simple questions of classroom management. In order to develop these skills it has been suggested that novice teachers need to gain extensive experience as teachers and that teacher education therefore might have a very limited influence on students’ professional development. As outlined above, however, well-designed instruction in combination with explicit criteria and standards might help novices to focus on relevant details, making it possible for students to improve their analyzing performance without extensive personal teaching experience. This has been shown to be the case in a previous study (Jonsson, 2010), where pre-service teachers’ analyses were greatly improved by providing the students with scoring criteria and exemplars. These findings suggest that at least certain analytic and reflective skills might be developed during teacher education, with the aid of vicarious experiences and clear expectations.

In the current study, the performance of students who carried out the “Interactive examination” during their first semester of the teacher-education program is compared to the performance of the same students during their last semester. The aim is to investigate (1) if the students’ analytical skills have developed throughout the teacher-education program, and (2) whether the pattern of strengths and weaknesses noted in student performance has changed.

Method

Context

The teacher-education program investigated in this study consists of three different components: a Course in the beginning and at the end of the program, covering general areas in the teaching profession that are common to all teachers regardless of subject major; A major subject, including both content knowledge and pedagogical content knowledge; and one or more minor subjects that do not need to include pedagogical content knowledge.

As part of the program, students are also assigned to “partner schools,” where they are supposed to participate in the day-to-day activities during their school-based education and, of course, learn how to teach through real-life experiences. Notable is that there is no single course, or set of courses, in which the practicum periods are gathered. Instead, the practicum periods are always “integrated” with campus-based education into courses, encompassing learning of both practical and academic nature. The actual level of integration might vary, however, as the use of quotation marks above indicates. A specific problem for instance is that the teacher educators observing the students during the practicum are not necessarily experts in the same subject as the students are teaching, which might lead to a focus on general issues (such as classroom management), since the educator is not familiar with the particular pedagogical content knowledge of the subject taught. Another problem that might affect the level of actual integration is that the assessment of student performance is often clearly divided between campus-, and school-based education, where the former primarily focuses on subject-related knowledge and the latter on procedural skills (e.g. Hegender, 2010). In relation to the particular focus of this study, there is a risk that intellectual skills may “fall between two stools” in the current organization, since they are neither clearly subject-related nor clearly procedural. This means that, unless there has been any intervention specifically aimed at developing analytical skills (besides the “Interactive
examination”), the students are left to develop the ability to analyze complex classroom situations by themselves on an experiential and intuitive basis.

Sample

The results of this study is based on a small sample of pre-service teachers (n = 19) specializing towards teaching in primary school. In 2004 a number of pre-service teachers (N = 171) carried out the “Interactive examination” during their first semester of the teacher-education program, and in 2007 those students specializing in teaching in primary school were asked to take the examination once more during their last semester. Of the 61 students specializing in teaching in primary school, and who carried out the “interactive examination” in 2004, 19 students agreed to take the examination once more during their last semester (response rate 31 %). The reasons for not taking part in the study are not known, but the small sample does not differ significantly from the initial sample with respect to the scores in the 2004 examination. In Sweden, the teaching in secondary school program is one year longer than for teaching in primary school. This means that those students specializing in teaching in secondary school were scattered throughout the university at this moment, taking different subject courses depending on their different majors, and were not included in the study.

Research Data and Analyses

Data for this study consists of two sets of answers from the personal task (i.e. classroom situations simulated through digital video) in the “Interactive examination”, one from 2004 and one from 2007, for the same students. In each of these data sets, students responded to the “global questions” (Observation, Analysis, Taking action) for three different movie sequences. There is considerable variation in length for students’ answers, but a typical answer may cover slightly less than a page, which means that the total material amounts to approximately 100 pages of student writings.

Student answers were assessed with a scoring rubric (the skills measured by the instrument are shown in Table 1) and the assessments were carried out by external assessors. Since the rubric has three levels (Fail, Acceptable, and Excellent), which were assigned 0, 1, and 2 points respectively, and each student did three movies, the range of scores for each criterion in the rubric was 0-6.

Since the (dependent) sample was not normally distributed, Wilcoxon’s signed-rank test, which is a non-parametric analogue to the t-test, was used both for the sample as a whole, comparing students’ examination scores from their first and last semester, as well as for individual students, comparing the change in personal scores. In the latter case, the sub-scores for each criterion in the rubric formed the basis for the analysis (i.e. the sum of the scores from the three movies for each of the 13 criteria). Further, frequency analyses were done, investigating how well the students performed in relation to each of the individual criteria in the rubric. From this information, the pattern of strengths and weaknesses in students’ answers from the first and last semester were compared, in order to identify qualitative differences in their analyses.

Different Conditions

Although most conditions were similar, there were some notable differences between the examinations in 2004 and 2007 respectively. First, in 2004 the students could choose three movies from a pool of nine movies. The movies in this pool...
differed with respect to the age of the children, the situations displayed, and the subject context. In 2007 there were only three movies that all students had to analyze. Two of these movies were new to the students, but one had also been used in 2004 and had therefore been analyzed by the most of the students. Second, in 2004 the students had access to the scoring rubric during the examination. The rubric, by making explicit what was to be assessed, could be used as a “tool of thought,” aiding the novice students when performing their analyses, in order to support student learning and improve their performance. However, at the end of their education, the students should hopefully manage without such scaffolding structures, and therefore the students in 2007 did not have access to the rubric. Third, the assessment was carried out by different assessors in 2004 and 2007. However, as reported in Jonsson et al. (2009), both internal consistency of the assessors (Cronbach’s alpha .793 and .833 respectively) and the inter-rater reliability have been shown to be quite high (.902; \(p<.001\), for the overall score and .795; \(p<.01\), at the criterion level), suggesting that although the use of different assessors will undoubtedly contribute to unwanted variance, this variation is small as compared to variance due to students’ performance.

**Results**

The results show that, when analyzed as a group, there was no significant difference in students’ scores on the examination when comparing scores from their first and last semester. The mean difference in total score was less than 1.5 points (maximum 78 points) between 2004 and 2007. When analyzing individual scores a somewhat different image emerges. Of the 19 students, nine had improved their scores, nine had lowered them, and one had exactly the same score. Most of these changes were small, however, and only two of the students significantly altered their scores (\(p<.05\)). On the other hand, these two students made very large improvements to their scores: 71 and 37 percent respectively on the total score.

When looking at changes in relation to individual criteria, there are some criteria where students showed greater difficulties in 2004 than in 2007, but also some where the reverse is true. Again, most of these differences are small. There are, however, some notable deviations from this general picture. In 2004, seven of the 19 students had difficulties (defined as failing to comply with the lowest standard in the rubric in at least one of the three movies) in discussing conceivable motives for the behaviors shown by students and teachers in the movie sequences. Three years later, in 2007, almost all of the students (16) had difficulties with this criterion.

A criterion where students are assessed as to whether they can specify what additional information is needed in order to make a well-grounded decision demonstrates the very opposite. Here all but one student had difficulties in 2004, while none had problems with this in 2007. There are also two criteria, where most students score very low in both 2004 and 2007. The first is when they are supposed to discuss possible consequences of the situations in the movies. The second weakness is their ability to use research-based arguments to justify their suggested actions. These changes in the pattern of strengths and weaknesses noted in student performance are summarized in Table 2.
### Table 1

The aspects of analytical skills assessed by the rubric in the “Interactive examination”

<table>
<thead>
<tr>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>The student should be able to:</td>
</tr>
<tr>
<td>Describe the situation without prejudice</td>
</tr>
<tr>
<td>Focus on relevant details</td>
</tr>
<tr>
<td>Describe the perspectives of all those involved in the situation</td>
</tr>
<tr>
<td>Describe the situation so that other people can understand it</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>The student should be able to:</td>
</tr>
<tr>
<td>Identify those involved in the situation</td>
</tr>
<tr>
<td>Identify a problem</td>
</tr>
<tr>
<td>Interpret the situation: Why did this situation occur?</td>
</tr>
<tr>
<td>Discuss conceivable motives for the behaviors shown</td>
</tr>
<tr>
<td>Discuss conceivable consequences of the situation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Taking action</th>
</tr>
</thead>
<tbody>
<tr>
<td>The student should be able to:</td>
</tr>
<tr>
<td>Give suggestions as to what additional information is needed in order to make a decision</td>
</tr>
<tr>
<td>Suggest actions that take both students’ and the teacher’s perspectives into account</td>
</tr>
<tr>
<td>Suggest alternate actions to be taken</td>
</tr>
<tr>
<td>Discuss pros and cons with different actions, both in a short and a long term perspective</td>
</tr>
<tr>
<td>Suggest actions that are in line with the observation and the analysis made</td>
</tr>
<tr>
<td>Justify the actions suggested by making references to course literature or other relevant sources</td>
</tr>
<tr>
<td>Widen the discussion by not only focusing on the context shown in the particular situation, but also include societal aspects such as curriculum, culture, different social categories, etc.</td>
</tr>
</tbody>
</table>
Table 2
A summary of the changes in the pattern of strengths and weaknesses noted in student performance between 2004 and 2007

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Number of students displaying difficulties’ in 2004</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>The analysis discusses conceivable motives for the behaviors shown.</td>
<td>7</td>
<td>16</td>
</tr>
<tr>
<td>Gives, when relevant, suggestions as to what additional information is</td>
<td>18</td>
<td>0</td>
</tr>
<tr>
<td>needed in order to make a decision.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The analysis discusses conceivable consequences of the situation.</td>
<td>12</td>
<td>19</td>
</tr>
<tr>
<td>The actions suggested are supported by references to course literature</td>
<td>18</td>
<td>17</td>
</tr>
<tr>
<td>or other relevant sources.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. 1. Defined as failing to comply with the lowest standard in the rubric for at least one of the three cases.

Discussion

The aim of this study was to investigate whether the analytical skills of pre-service teachers specializing in teaching in primary school could be demonstrated to have developed throughout the teacher-education program, and whether the pattern of strengths and weaknesses noted in students’ performances during their first semester had changed.

Have the Students Developed their Analytical Skills?

The results show that, when analyzed as a group, there was no significant difference in students’ scores on the examination when comparing scores from their first and last semester. Furthermore, of the 19 students investigated, only two significantly improved their scores. Before jumping to the conclusion that the teacher-education program has failed in helping the students to develop these skills, some methodological issues need to be considered. First, the group of students investigated in this study is but a small self-selected sample (31 %) of the students that took the examination in 2004. There was, however, no significant difference between this small sample and the larger 2004 sample with respect to the scores on the 2004 examination.

Second, while the students in 2004 had access to a scoring rubric, the students in 2007 did not have anything to guide them while analyzing the movies. The purpose of this arrangement was to see whether the students – after going through the entire teacher-education program – had developed the “intellectual tools” needed in order to analyze complex classroom situations. In this way, the knowledge gained through their teacher education was supposed to compensate for the more explicit guidance provided by the rubric. As can be seen in the results, this actually happens, since the last-semester students do perform at the same level as the first-semester students, but without the help of the rubric.

Third, the different assessors in 2004 and 2007 might have given rise to unwanted variability. However, this variation is thought to be small as compared to variance due to students’ performance.
Another issue that may have affected the results is that one of the movies in 2007 was already used in the 2004 examination. Since most of the students analyzed this movie back then, they might have remembered how to analyze it, and in this way affected the results. However, no significant difference in students’ scores could be found between this movie and the other (new) movies.

Last, but not least, as opposed to the students in 2004, the students in 2007 were volunteers, who did not have any stakes (in the form of grades) in the assessment. This means that they had no external incentives to do well on the examination, which might have affected their willingness to engage in the tasks. However, the fact that they did volunteer, and also that they completed all tasks, might reflect an intrinsic motivation and interest in the competences assessed.

Taken together, since the students performed at the same level during their last semester as during their first, but without the assistance of the rubric, a very optimistic conclusion is that the students have developed some “tools of thought” to apply when analyzing complex classroom situations. In this respect they can be said to have developed the analytical skills to some extent throughout the teacher-education program, even if their results on the “Interactive examination” have not changed.

A more realistic, although pessimistic, interpretation might focus on the fact that last-semester students performed at the same level as they did as first-semester students, implying that there has not been any substantial development during the teacher-education program. Even if the first-semester students were aided by a rubric, which the last-year students were not, the rubric was designed for assessing first-year students, and it might be argued that you could expect more from last-year students. If the students had developed their analytical skills further, ceiling effects could be expected when using a rubric designed for first-semester students. This, however, was not the case in the current study. A problem here is that (in Sweden) it is only mandatory to provide the goals (i.e. “expected learning outcomes”) in the course syllabus, but not any standards. This means that while it could be stated for instance that the students are expected to be able to “discuss the influence of different social and cultural conditions” after a specific course in the teacher-education program, there is also not necessarily any information on how well they are supposed to “discuss the influence of different social and cultural conditions.” Consequently, there are no commonly accepted standards to compare the last-year students’ performances with, to see whether there has been sufficient development during the program. Still, it is obvious from this study that there has been very little progression from the first to the last semester and that these students are still very much novices when it comes to analyzing complex classroom situations. This finding would seem to lend support to the notion of Sabers et al. (1991), that teacher education has limited influence on these competencies. It should be acknowledged, however, that there have been no specific instructional interventions directed towards these competences, except for the “Interactive examination” during the first semester, included in the campus-based education for these students. Further, as was discussed previously, there is a risk of excluding these intellectual skills in the school-based education, since the assessment often seems to focus on procedural skills (Hegender, 2010).

Has the Pattern in Students’ Performances Changed?

Even if there has been no significant change in students’ overall scores from the first to the last semester regarding their analytical skills, there can still be changes according to individual criteria. When comparing the pattern of strengths and
weaknesses in students’ performances, however, the overall picture is also that of no change. Most students in 2007 managed to cope with the criteria that the students succeeded in complying with in 2004. Also, the weaknesses noted in many of the students’ analyses in 2004 (i.e., not being able to discuss the consequences of the situations displayed and not being able to theoretically justify their suggested actions), were still present at the time of graduation.

There were some differences, however. For instance, the students have learned to judge whether there is enough information available in order to make a well-grounded decision, which was a weakness in many of the students’ analyses during the first semester. Although it cannot be ascertained that this skill was acquired through teacher education, it is quite plausible considering the fact that none of the students mastered this skill in the beginning of the program, while most of them did in the end. This indicates that the students have become aware of the need to have more nuanced information about the (school) students and the context in order to plan for action to be taken, as opposed to suggesting ad hoc solutions based on the (possibly scarce) information available.

There were also differences in the opposite direction, where the students performed less well in 2007 than they did in 2004. This may seem a bit puzzling, since we are not dealing with factual knowledge that might well be lost in the haze of time, but with more consistent skills that are probably not as easily forgotten. What these results suggest is therefore not necessarily that the students have lost the ability to discuss conceivable motives for the behaviors that students or other teachers display (which is the criterion in question), but that this quality is not part of the “tools of thought” for analyzing complex classroom situations that the students have developed during their education. Either they have not encountered or thought of this particular aspect, which means that they do not know that it is missing in their analyses, or they have considered it unimportant and consciously left it out. Since being able to see the situations through the eyes of other persons (either students or teachers), and trying to understand the reasons for their behaviors, could be seen as a very important skill of teachers, it seems unlikely that the students would consciously leave this aspect out of their analyses. A more likely interpretation is that they do not automatically consider different reasons for other peoples’ behaviors when analyzing situations like these, but make assumptions about the reasons for the behaviors displayed, possibly based on own experiences. Needless to say, this limits the number of potential solutions seen and suggested by the students and may also make these solutions less appropriate for individuals not sharing the same experiences as the pre-service teachers.

A similar argument can be made for not being able to discuss conceivable consequences of a situation, as it seems unlikely that the students would consciously leave this aspect out of their analyses if they did think about it. Still, since this is a criterion that many students had difficulties with both in the beginning (when they had access to the rubric) as well as in the end of the program, it might be a criterion that is actually too difficult for novices. Visualizing different scenarios with the situations as starting points may actually require experiences that the students have yet to gain.

This is in contrast to the other criterion that many students had difficulties with both at the beginning and the end of the program, i.e., to support the actions they suggested by making reference to course literature or other relevant sources, which is not a criterion likely to depend on students’ experiences in the field. Instead, justifying your actions as a teacher on for instance research literature is probably a skill most easily gained during the teacher-education program, as compared to gaining such a skill through working as an in-service teacher.
Conclusions and Implications

As has been argued in this article, an important part of teacher competence is analyzing complex classroom situations, including understanding students’ incentives for behaving in particular ways, and suggesting appropriate action that follows from the analysis. To develop such competencies takes time, however, and it has been argued that teacher education can merely pave the way, and that the students have to learn from their own experiences (Sabers et al., 1991). Still, there are studies showing that teacher education does make a difference. For instance, Blömeke et al. (2008) found significant improvements along several dimensions of teacher competence, when comparing students’ performance at the beginning and at the end of teacher education with students from four countries (Germany, South Korea, Taiwan, and USA). These authors report that criteria such as making judgments about lesson goals, and the use of professional terminology, are especially strong indicators of teacher-education effects.

The current study also provides some tentative evidence of the development of analytical skills, since the students performed at least at the same level during their last semester as during their first, but without the assistance of a rubric. This interpretation, however, is very optimistic and a more credible conclusion is that there has not been any substantial development during the teacher-education program regarding the analytical skills investigated in this study. This conclusion is further corroborated by the fact that there are weaknesses in students’ performances which are consistent throughout the teacher-education program. Similar tendencies can be found in the study by Blömeke et al., where assessment procedures for German students remained at the same low level at the end of teacher education as it was in the beginning. Studies like these can thus give indications of areas that might need to be strengthened in teacher education, acknowledging of course that neither study claims to have a representative sample and therefore that these findings may not necessarily generalize to a larger population of students.

To conclude, this study has shown that the analytical skills of pre-service teachers do not develop substantially during teacher education, since they perform at the same level during the last semester as they did during their first. The only exceptions are changes in two of the criteria assessed: (1) The students have increased their awareness about the need to have more information about the students and the context before being able to make well-grounded decisions; (2) The students consider different motives for acting in particular ways to a lesser extent during the last semester. There are also criteria in relation to which the students perform consistently low. One of these is the skill of justifying your analysis and suggested actions from course literature or other relevant sources, and since this is a skill that is not likely to require extensive experiences from the field, it might be considered especially problematic that the students have not developed this skill during the teacher-education program. The second criterion where the students perform consistently low, on the other hand, requires them to envisage potential consequences of the situations; something that might actually call for students to meet and handle a range of different situations.

The main implication of this study is that further attention needs to be directed towards pre-service teachers’ development of analytical skills. In relation to research, this means that additional research is needed to establish to what extent the learning of such skills can be facilitated during teacher education. This would perhaps be most interesting in relation to “discussing conceivable consequences of different situations,” a skill that turned out to be a consistent weakness for the students and a skill that might
be difficult to address. While the “Interactive examination” presents situations for the students to analyze, they do not see the consequences of the actions they suggest. If these actions could somehow be simulated, however, the students could see what consequences their actions had, and they could perhaps also go back and try other solutions to the same problem. In this way students could potentially be aided in their development to discuss conceivable consequences of different classroom situations – by experiencing them vicariously and reflecting on different solutions to the same problem. Another possible area for future research, as suggested by this study, would be to investigate the development of these skills by in-service teachers. For instance: To what extent do teachers develop analytical skills and which factors are important in order for teachers to excel in this area?

The major implication for teacher education would also be to pay closer attention to students’ development of analytical skills. While there are studies (e.g. Jonsson, 2010; Metcalf et al., 1996) suggesting that the learning of analytical and reflective skills can be improved by for instance reflecting on simulated situations and by clarifying expectations, this study indicates that not all students develop such skills during their teacher education and are still novices at the time they graduate. From an even broader perspective, the results point towards the need for a more integrated curriculum in teacher education, where skills not directly related to subject matter are addressed during the campus-based parts of teacher education and skills not procedural in nature are addressed during the practicum, in order to aid the students in basing their actions on relevant knowledge – i.e. acting knowledgeably.

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About the Author

Anders Jonsson holds a position as Assistant Professor at Kristianstad University College, Sweden, and is also a researcher in Educational Research at the Centre for Profession Studies (CPS) at Malmö University, Sweden. His research interest is in assessment, especially the assessment of professional competency in higher education, but is also involved in projects concerning assessment of science in compulsory school.

Sven A. Lennung is an Associate Professor in Educational Sciences. He has recently returned to research after several years as head of a publishing firm specializing in course literature for higher education.
Correspondence concerning this article should be addressed to Anders Jonsson, Malmö University, Centre for Profession Studies, SE-205 05 MALMÖ, Sweden.
E-mail: anders.jonsson@mah.se
Phone: 0046-701-751668

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