

Article

Innovation of Pedagogical Practices of Future Teachers

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Abstract: The basic topic of this article is the undergraduate preparation of future teachers in the Czech Republic, specifically the issue of the pedagogical practices of future teachers. We focused mainly on reflective activities within this preparation. The first part of the article deals with the mapping of this area in the educational systems of other countries or other regions of the Czech Republic. The second part is devoted to a description of the current state of reflection among science teacher education students. It also proposes an innovation of the system of reflection implementation using modern IT tools in the context of full-time and distance education. The third part presents the outputs of the e-questionnaire prepared for both face-to-face and distance learning.

Keywords: pregraduate preparation; student; future teacher; supervising; practice



Citation: Konečná, P.; Smolka, P.; Trčková, K.; Václavíková, Z.; Žáček, M. Innovation of Pedagogical Practices of Future Teachers. *Educ. Sci.* **2023**, *13*, 355. <https://doi.org/10.3390/educsci13040355>

Academic Editor: Andras Balogh

Received: 10 January 2023

Revised: 19 March 2023

Accepted: 22 March 2023

Published: 30 March 2023



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1. Significance of Teaching Practice in the Context of Pregraduate Education

In the past decades, one of the most discussed issues across all pedagogical and didactic fields has been the setting of the system in order to be functional, reacting to the changing profile of students, and being able to reflect current social needs, which arise with the sharp increase in the use of IT technology and the change of lifestyle. The ways of searching for the answer vary, and the same holds for experts' opinions. However, there is a common core—accepting the fact that the change in the educational system starts by innovating the preparation of future teachers.

An inseparable part of the preparation of future teachers is the acquisition of the subject competence, competence in planning their teaching, social competence, a good work ethic, and, finally, change and development competence [1]. Learning to teach is based on the cooperation and collaboration of schools and institutions preparing teachers [2]. Providing multiple observations and subsequent reflections in the presence of lecturers, cooperating teachers and peers offer opportunities for a deeper reflection and integration of academic, pedagogical, and practical knowledge and skills [3].

Reflective teaching practice helps teachers plan, implement and increase their performance, and reassess their strengths and weaknesses [4]. A teacher should be able to reflect on the used methods, objectives, and means [1]. The observation of lessons is carried out using structured and non-structured approaches [5]. The value of observation increases if the observer knows what to look for. Observation experience and the observer's self-confidence grow. It moves in three recognisable ways: from an unknown position to a central position, from a deductive position to an induction position, and from the focus on teaching skills to the focus on educational values [6]. Class observation is a valuable tool providing us with an image of what is going on in the class, thus leading to a higher educational standard and more effective educational methods [7]. The observers of teaching fill in questionnaires (observation protocols) which include observation experience

related to the lesson organisation, the teacher's time management, the pupils' performance in completing tasks, the task schedule, the teacher's questions and the pupils' answers, the pupils' performance in teamwork, class interaction, new educational activities, and teamwork. When collecting information on teaching, various approaches are used, such as time samples in intervals during a lesson, form coding, wide narratives, or narrow narratives, which focus only on a certain aspect of teaching [8]. The assessed teaching can be evaluated by an average evaluation in the form of a score or theoretical response [9]. The evaluation of the practice should include the following suitability criteria: epistemic, cognitive, interactive, mediating, affective, and ecological [10].

At the early stage of teachers' preparation, students of teaching often perform for their peers (future teachers) in the university environment, which contributes to their skills of observing various teaching strategies and reflecting on and revising lessons. Students are familiarised with constructive criticism. When creating teaching styles, observation using video recordings plays an irreplaceable role [11]. Video enables repeated watching of lessons and their episodes, helps the detailed breakdown and analysis of a teaching situation, and provides immediate feedback and the possibility of self-evaluation [12]. Video recordings of lessons are considered the most efficient and objective tool to support the reflection of practice. It helps professionally develop and increase the self-awareness of junior teachers as pedagogues [13] and offers more time to think over what has been said [14].

2. Teaching Practice in the Pregraduate Preparation of Teachers in the Czech Republic

Teaching practice belongs to fundamental courses of preparatory education for teachers. It is based on the observation of pedagogical reality at schools (inspectional activities) and pedagogical outputs of students of teaching in real class conditions [15]. It serves as a connecting element between the theoretical pedagogical-psychological courses and field-didactic courses of pregraduate preparation of students and their future independent creative activities in school. In real school conditions, students become familiar with the educational and administrative activities of a teacher, an educational institution, the school, and the curricular documents. Although the organisation and the length of practices differ in schools across the Czech Republic, their typology and main objectives remain the same. Within practices, contacts between individual grades of schools are formed; senior active teachers are acquainted with new findings in science, research, and didactic trends while academic staff, based on feedback, reflect on the current needs of school practice. The teaching practices of students of teaching are essentially controlled by an expert guarantor. It can have the assistive form (the student is engaged in the lesson as the pedagogue's assistant and carries out tasks arising from a particular pedagogical situation; finally, the student processes everyday reflections and a list of elaborated materials according to the teacher's assignment), block sitting-in-a-class form (the student observes a lesson, inspects a group of selected teachers in the student's field subjects, and lesson endings are noted down in a so-called pedagogical diary), the block output form (the student teaches independently as part of the teaching practice, takes notes about the practice, and reflects on lessons in their pedagogical diary together with the written preparations), or the continuous practice form [16]. The main objectives of teaching practice include the interconnection of the theory with the practice of all components of university preparation, to familiarise future teachers with the conditions of a real school environment, to show them various teaching styles of selected senior active teachers, and to engage students in activities from the teacher's profession. Practice is in the form of hearing, independent teaching, video recordings of students' teaching and their analyses, microteaching, work outside class and school, active participation in a school event, etc. [17]. During teaching practice, the student acquires competencies, such as project, communicative, organisational and control, diagnostic, and reflective competencies [18]. The research [10,19–22] proves that it is essential to focus the teaching practice on a profound analysis and evaluation of the teaching process since the reflection of a teacher's results is thinking over educational objectives, professional goals,

and strengths and weaknesses of their work. The analysis should lead to the recognition of critical parts of teaching and proposals for their improvement.

Those must be critically and professionally evaluated and justified. Reflection helps professional development, education, and creative learning.

Therefore, an inseparable part of teaching practice is a reflection (observed or implemented) and self-reflection of teaching connected with its didactic analysis and evaluation of its quality. The subject of reflection and evaluation can be both real school teaching and video recordings of school teaching. The evaluation usually uses an observation record of the lesson, either criterial or documentary. The criterial record of a lesson is already structured into categories—evaluation criteria. The observer chooses and marks those observed in the lesson. A documentary record of a lesson is a detailed description and explanation of all the most important phenomena and their mutual relations observed in the lesson. Unlike the criterial record, which simplifies analytical evaluation due to the category offer, a didactic analysis of teaching based on a documentary record is more challenging and requires deeper and more extensive knowledge of the issue and relations [19]. During the process of self-reflection, the student of teaching performs reflective processing of the mutual relationship with the pupils and subject matter. This reflection should direct to the future. First of all, a so-called empirical (simple) reflection is performed. It is based on answers to simple questions: “what and why did I do”, “what was the impact”, and “how could I do it differently”? In an empirical reflection, the student only describes and sorts experiences [15]. Generally, the more the student processes experience acquired in pedagogical situations and integrates the previous level of reflection in new reflections, the more detailed the analyses of the pedagogical situation will be, and new experience will be implemented into teaching. In this case, we are talking about students’ higher-level reflection, so-called abstracting reflection.

The process of a controlled reflection of students’ pedagogical activities, which incorporates planning, preparation, implementation of inspections and supervisory interviews, and keeping required documentation, is called supervision. Supervision plays an educational (process of reflection and an emphasis on new creative teaching of the studying), supportive (forming the basis of professional thinking), and control role (control and formative evaluation of students’ practical activities). A very effective type of supervision is considered peer supervision (or intervention) when the students are supervisors to each other. A prerequisite of quality supervision work is auto-supervision when a student of teaching is their own supervisor and performs self-reflection and evaluation. An interview, completed with written documentation, is a tool for supervision work [22].

3. Pregraduate Preparation of Teachers at the University of Ostrava

A significant part of the field portfolio at the University of Ostrava (hereunder “UO”) is formed by programmes focused on the pregraduate preparation of future teachers hand-in-hand with lifelong learning oriented on further education, extending specialisation, and the development of competencies of teachers from practice. This results from the fact that the foundation stone of the University of Ostrava was the Faculty of Education, which has been providing preparation for future teachers as the only institution in the whole region since the 1960s of the last century.

Currently, the pregraduate preparation of teachers is provided at three Faculties of the OU—Faculty of Education, Faculty of Arts, and Faculty of Science. The biggest concentration of degree programmes oriented toward teaching is, of course, at the Faculty of Education, which provides complete preparation of future teachers for pre-primary, primary, and selected specialisations for the lower secondary and secondary schools. The Faculty of Arts and the Faculty of Science primarily focus on the preparation of future teachers of secondary and lower secondary schools for professional specialisation. The three Faculties closely cooperate in the provision of education in the pedagogical–psychological area. They also cooperate in creating combinations of individual specialisations. This cooperation is facilitated by a common programme board, which ensures, among others,

the compatibility of individual specialisation with respect to field particularities. The output from the activity of the programme board is a unified concept of pregraduate practice implementation.

3.1. Description of the Original Implementation of Practice at the Faculty of Science Subsection

The Faculty of Science at the University of Ostrava prepares future teachers of mathematics, physics, chemistry, informatics, biology, and geography. Students of teaching programmes undergo ongoing hearing practice, ongoing hearing practice with teaching, and continuous practice. The whole process is supervised by a field guarantor of practices from the corresponding department at the Faculty of Science of the UO.

The students meet the reflective assistant practice in their Bachelor's studies for the first time. However, it is not field-oriented yet, i.e., the student observes lessons on subjects of specialisation. During the summer semester of the first year and the winter semester of the second year of the consecutive Master's studies, the students take part in two ongoing practices. The first one only includes hearings. The objective of the hearings is to learn to reflect on the educational process of pupils, develop their skills of observation, note down and analyse the course of the educational process, or recognise various teaching styles at different schools. Students inspect selected teachers of their specialisation subjects, which are under the supervision of a field guarantor of practices. During each semester, the students must undergo at least five sittings in a class with analyses for each specialisation, process a reflection of the practice, and take part in the final evaluation of the ongoing practice.

Apart from the development of competencies acquired within the hearings, an ongoing hearing practice with teaching is focused on the creation of didactic qualifications to project, implement, and critically reflect on their own lessons. The practice is held in three phases: preparation, implementation, and evaluation. The preparatory phase serves the student of teaching to independently inspect lessons of the senior active teacher in a particular class where the student will teach the next lesson. Then, the student with the help of the senior active teacher creates the plan for the very first teaching attempt. Based on the recommendations of the senior active teacher, the student independently carries out a didactic analysis of the subject matter, suitable teaching methods and forms, and suitable didactic tools. A detailed scenario of a teaching situation is primarily consulted with the senior active teacher and with the field didactician and other students as well. During the implementation phase, the student's first performance is in front of the class, the senior active teacher (mentor, school supervisor), inspecting classmates—future teachers—and the field didactician (faculty supervisor). The evaluation phase is based on analysing the teaching situation, providing feedback and recommendations for the next teaching attempts.

The pregraduate field–didactic preparation of teachers in a given subject is finalised by continuous teaching practice. Supervised by senior active teachers, the students learn to prepare and implement various types of lessons. They acquire basic didactic skills, apply theoretical knowledge, and verify their skills in educational work in the class. They become acquainted with documentation and obtain insight into school life. The student must teach a minimum of 25 lessons. Having finished the practice, the students must submit a portfolio that includes inspection records, samples of lesson preparations, tests, motivational activities, evaluation of the supervising teacher, and self-reflection. After the practice has been finished, the field didactician, together with students, performs the final evaluation of the practice.

In all types of practice, students observe the pedagogical activities of the training teacher or their classmates and carry out reflection (self and peer supervision), through which they adapt their own actions for continuous and postgraduate practice and gain the best conditions for abstract reflection. In the course of teaching, they record their observations in an observation sheet—a pre-prepared template for taking a criterial record of teaching. This then serves as the basis for a reflective dialogue in the group of students

of teaching in the analysis of the teaching situation, which leads to an improvement of the work with the target group of students.

3.2. Identification of Critical Places in the Original Implementation

The process described in Section 2 takes place in a particular class under the physical presence of all stakeholders of the educational process. The subsequent reflection is performed on records, which are mostly taken under time pressure and the fragmented attention of the observer due to more parallel activities. The information value of such a record does not have to be fully complex and accurate.

Regarding didactic analysis and the evaluation of the quality of teaching, we have been long-term tackling two basic critical points:

- During a lesson, teachers concentrate on the professional and didactic part of the lesson and do not observe themselves. The teacher does not possess any observation record of the lesson. Therefore, it is impossible to carry out an objective auto-reflection [23].
- An observation record is created by converting the mental image of a lesson, i.e., of what the observer remembers, retrospectively recalls, and describes with an emphasis on the most significant moments and connections. Each observing evaluator takes ground in their own vision of quality teaching; thus, the observation record is partially subjective [19].

According to [19], in order to ensure teachers' education and systematic development of their reflective competencies, it is highly essential to provide as much quality observation support for the didactic analysis of teaching as possible. The same holds for expert discussions about teaching. Such observation support are video recordings of lessons. The convenience and popularity of using video when preparing (future) teachers results from numerous studies and research works. It can be used in more ways for various purposes [24].

Based on the identification of critical points and the description of the current structure, the main objective was to design and validate a comprehensive system for managing the practice of future teachers. In the proposal, we focused on covering the whole process of managing and evaluating the practice of future teachers with a significant deployment of IT resources. The system has been designed to smoothly enable the implementation of the practice during the transition between different forms of teaching (distance, combined, full-time). The aim of the validation is to demonstrate this robustness of the system.

One of the contributions of our work is to justify why it is appropriate to use audio-visual recording in combination with electronic questionnaires for reflection. The involvement of the video recording is crucial, particularly because of the time mismatch between the ongoing practice and the subsequent completion of the questionnaire. We have also deployed multiple questionnaires in our system, which differ precisely in the moment of completion—the delay relative to the lesson being assessed, which reveals perceptions at different stages.

Changing unstructured lesson records to structured ones seems to be very useful, allowing for better processing. The e-questionnaires are adapted to the skills of student teachers who are able to record and evaluate without problems the teacher's formal speech, the organization of the educational process, the application of didactic principles in practice, and the teacher–pupil relationship. The design of the electronic questionnaire is still very dynamic, and we are responding to comments. However, in order to be able to compare developments over time, we deploy these new versions only after a delay.

3.3. Description of the Innovation

Our reaction to the identified critical points is grounded in a fundamental innovation of the whole system of pregraduate practice. The key element of the adaptation is the system setting, which integrates video and electronic reflective questionnaires. The essence is to provide the possibility for retrospective asynchronous observation for the purposes of developing the professional vision of a (future) teacher [23].

The innovation in the implementation of teaching practice takes advantage of the wider exploitation of IT technology, which enables encompassing various forms of education. It means it can include full-time learning, distance learning, or even a hybrid form. The objectives of the innovation consist in the following points:

1. Introduction of a central information system and registration of practice organisation. The system will enable to harmonise schedules of the observing and observed persons regarding the teaching itself and the ex-post evaluation of the recording as well. This point also includes the provision and access to technical means necessary for practice implementation.
2. Elaboration of standardised electronic forms that will enable to create detailed evaluation records in the next phases of preparations and evaluation of the teaching process:
 - a. Phase of planning a lesson.
 - b. Phase of reflecting on a past lesson.
 - c. An area of lesson self-reflection.
3. Providing a standard of lesson recordings within the central information system, both from full-time and distance online learning, or from the hybrid form. The recording will be made accessible to authorised persons.
4. Processing of analyses based on questionnaire data and their interpretation towards publishing the results, adjustment of the process of supervising practices, and a proposal of further innovations.

The first steps of our innovation were focused on resolving points 2 and 4. Two sets of questionnaires were created and implemented in the cloud environment of Microsoft 365 using the MS Forms tool. With respect to the implementation of a hybrid cloud at the University of Ostrava, it was possible to use the identity of students and academic staff of the UO as well as to create guest accounts for an external teacher to make the implementation of the questionnaires and access to video recordings possible. All of such steps had to comply with the GDPR (General Data Protection Regulation). The GDPR are binding and general principles for the protection of personal data, privacy, and identity applicable throughout the EU. From a research perspective, it is important to ensure the protection of respondents' personal data and to anonymise the collected data to an effective extent.

The first questionnaire set encompasses the area of a teacher who prepares and leads the lesson. The purpose of this set is to support the self-reflection process. The set includes the following e-questionnaires (The proposed structure of the questionnaire corresponds with an ideal implementation since the teacher can watch a video recording of the lesson for the purposes of self-reflection. In the situation when this was not possible to ensure technically or organisationally, only questionnaires A1 and A2 were used.):

- A1. A lesson plan, filled in before the lesson.
- A2. After the lesson, also filled in by the student who lead the lesson. Filled in as soon as the lesson finishes. It evaluates the course compared with the plan, without watching the video recording.
- C. Self-reflection of a teacher, filled in by the teacher after watching the video recording.

Figure 1 represents a time sequence of implementing individual questionnaires with respect to the time of the held lesson. The scheme depicts both the trajectory of full-time teaching and the trajectory of distance online teaching. Mutual compatibility of these processes enables their combination and thus the introduction of the hybrid form. The scheme also clearly shows the phase of taking the recording and its further processing.

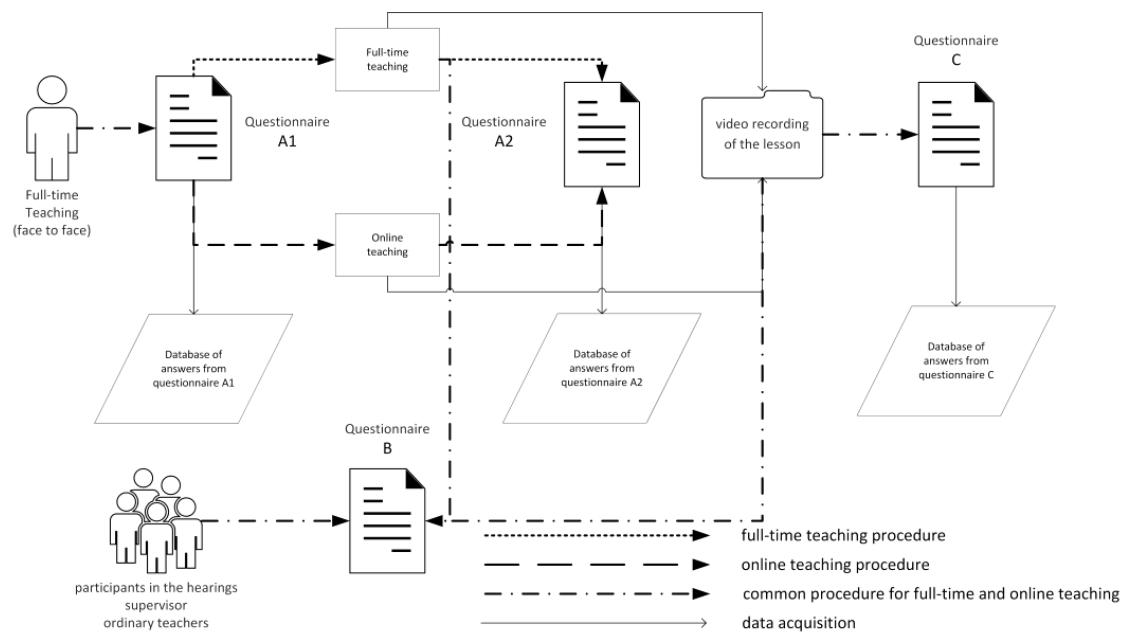


Figure 1. Diagram of the interconnection of the first set of reflective e-questionnaires.

In order to encompass the activities of all stakeholders of the reflective teaching practice, it was necessary to extend the scheme and questionnaires, which then enabled to record findings of other engaged persons. This led us to the creation of the second set of questionnaires B, which serves for hearing participants of the pregraduate practices (it mostly concerns an active class teacher at the given school, the guarantor of the practices, and other students). The structure of the questions corresponds with the questionnaires of set A designed for teachers. The objective was to enable a comparison of a professional view of a teacher and those inspecting. Figure 2 depicts the extension of the monitored processes directly related to the implementation of teaching with processes of other stakeholders of the reflective teaching practice. This scheme also depicts the trajectories of full-time teaching, online distance teaching, and potential hybrid teaching.

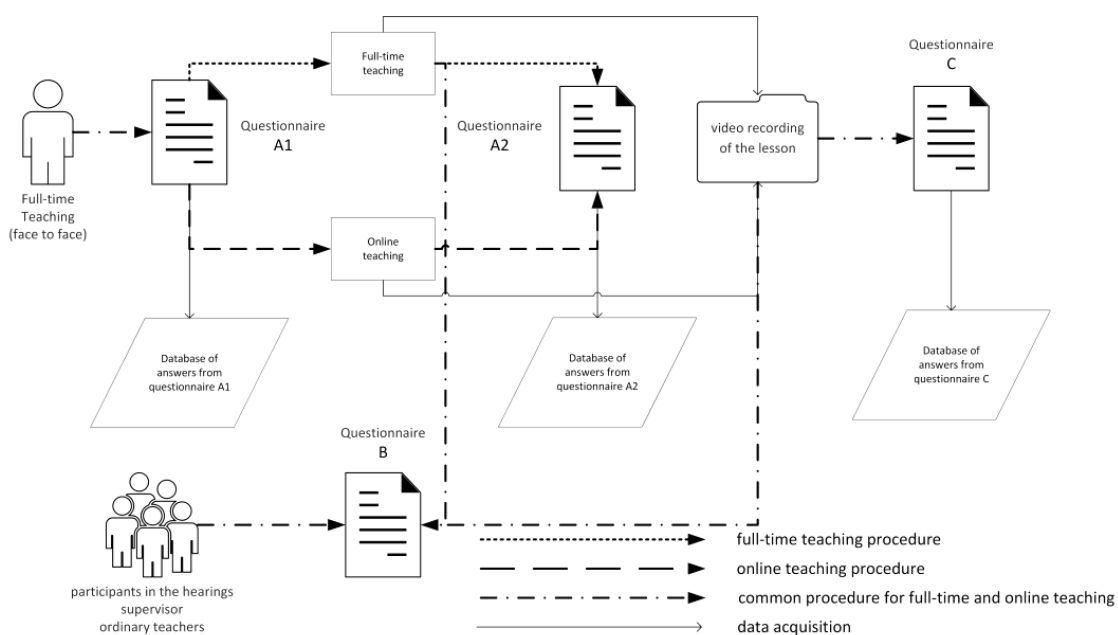


Figure 2. Diagram of the integration of questionnaire B into the already designed system.

3.3.1. Pilot Verification—Phase 1

The pilot verification of the above-mentioned step took place at the end of 2019 and in the first half of 2020, which was also the time of school closure due to the pandemic in the Czech Republic. This led us to use the video recordings and e-reflective questionnaires to implement and evaluate virtual inspections within hearing teaching practices. Formerly used observation sheets were not unified across various fields and did not correspond with the e-reflective questionnaire. Therefore, we also restructured the observation sheet so that the evaluated criteria corresponded with the e-reflective questionnaire.

The student of teaching records the following into the observation sheet:

- Basic information—name and surname of the evaluator and teacher, date of inspection, type and name of the school, grade, topic, thematical unit, and lesson objectives.
- Organisation of the lesson—timeline of the teacher's and pupils' activities, individual teaching phases, used teaching methods and didactic tools.
- Expertise of the teacher—evaluated based on observation of a suitable selection of didactic tools, verbal and written expression of the teacher, ability to identify a mistake and work with pupils' mistakes, ability of fair evaluation, and the ability to support active learning.
- Class atmosphere—evaluated based on observation of mutual communication and cooperation of the teacher and pupils, level of the ability to respect individual needs of the pupils, teaching style of the teacher, and the teacher's ability to appraise or admonish.
- Overall impression of the lesson—includes positives and negatives of the lesson, remarks.

This phase of the pilot verification was participated by students of teaching of mathematics and chemistry; in total, 84 e-reflective questionnaires were completed. Their results were subsequently used in the final evaluation of this ongoing practice.

The students could also include their final remarks at the end of the questionnaire. This could concern the following:

- the structure of the e-questionnaire and the questions, whether it was understandable, and whether they would recommend any modification;
- supplementary evaluation of the observed teaching outside the scope of the answers to the questions in the questionnaire.

In the first group of comments, students pointed out minor typos, the possibility of double interpretation of the questions, and similarities (duplication) of some questions. These shortcomings were eliminated in the further implementation, and some questions were more precisely specified. For example, the question whether the teacher was able to work with a mistake was modified to "Was the teacher able to work with a pupil's mistake?" Similarly, following the observation that the question asking whether the teacher was able to identify individual needs of a pupil did not provide an opportunity to comment on whether the teacher was able to work with pupils as identified, the question was reformulated as "Did the teacher reflect the individual needs of a pupil?" with the response options Yes, No, or I did not notice such a pupil. This group of questions was supplemented by several questions relating to the teacher's ability to motivate pupils.

In examining the supplemental teaching evaluation, we tried to determine whether the comments that are associated with one teacher, across all evaluators (students), are of similar nature or have common elements and, conversely, whether similar information or focus appears in the comments of one evaluator (student) for all evaluated teachers. Unfortunately, since students did not comment (inserting a comment was not mandatory) or because the comments were diverse, we did not observe links, with a few exceptions. We can note that within the individual student ratings, we identified one with a higher sensitivity to evaluating the teacher's teaching style, one with a stronger emphasis on evaluating all the positives of the teacher's teaching, and one with an attempt to be as objective as possible (always stating both pros and cons). Given the low num-

bers of student comments and, thus, some subjectivity of interpretation, we cannot draw relevant conclusions.

3.3.2. Pilot Verification—Phase 2

As mentioned above, the B version of the questionnaire was slightly adjusted on the bases of phase 1 of the pilot verification. Apart from minor modifications, the introduction of the questionnaire was changed to mirror version A, i.e., we added missing questions focused on the topic and objectives of the lesson, the evaluated field, and the date of implementation.

The pilot verification—phase 2 was carried out within the implementation of continuous teaching practice 2, which includes both hearings and students' active teaching. Therefore, all versions and the e-reflective questionnaire were pilot-verified in this phase. In total, we acquired 35 A1 questionnaires, 29 A2 questionnaires, 20 C questionnaires, and 87 Bv2 questionnaires.

The first part of the questionnaire was focused on the basic characteristics of the lesson. The respondent filled in the evaluated field, name and surname, e-mail, topic of the lesson, topic of the preceding lesson, and brief formulation of the lesson objectives. The structure of respondents by field of study is shown in Figure 3.

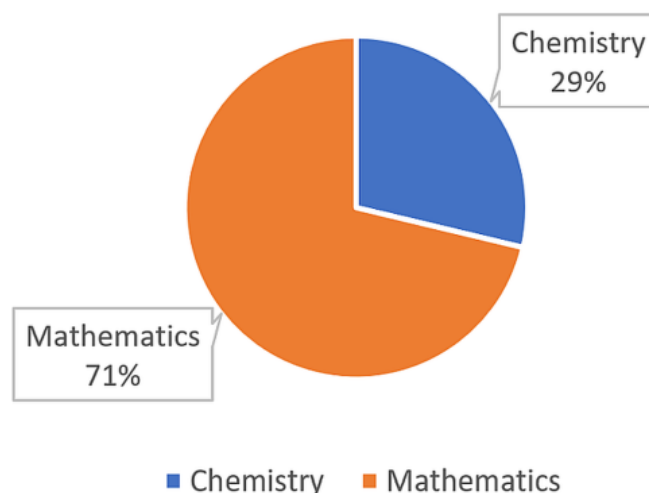


Figure 3. Number of completed Bv2 questionnaires by specialty.

The second part of the questionnaire monitored the expertise of the observed person—the student-teacher as perceived by the respondents of this questionnaire. The following graph depicts both the questions and the distribution of the answers. The respondents could choose from YES-NO answers, as we can see in Figure 4.

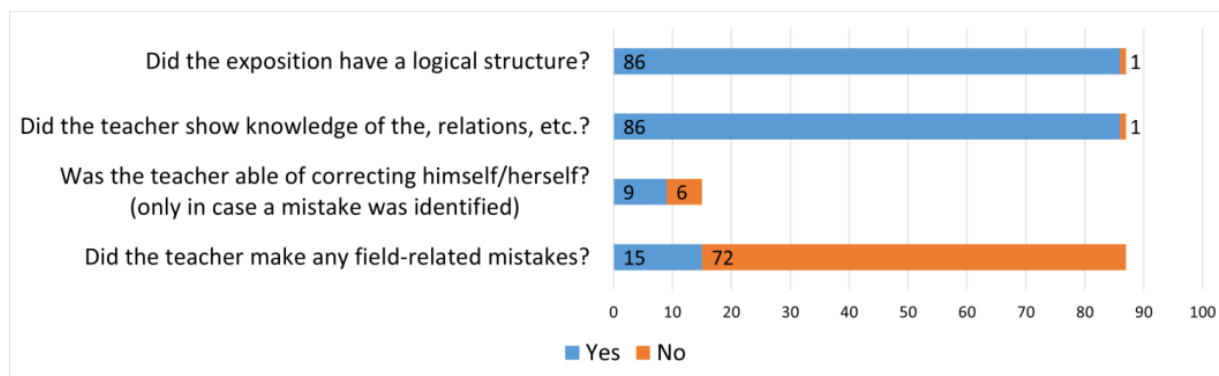


Figure 4. Structure of expertise of the observed person from the field perspective.

One can observe here certain difficulties in identification of whether the teacher made a mistake. Regarding the fact that the lesson was led by students who are not mostly experienced in teaching, the occurrence of mistakes was expected to be more frequent.

The third part of the questionnaire mapped the didactic level of the evaluated lesson. The questions were more varied from the point of view of the offered answer ranges. Their types are depicted in the following graphs.

The first group of questions was focused on the student-teacher's competencies in the area of working with didactic tools and the effective use of suitable teaching methods. Those competencies were, in general, evaluated positively, see. Figure 5.

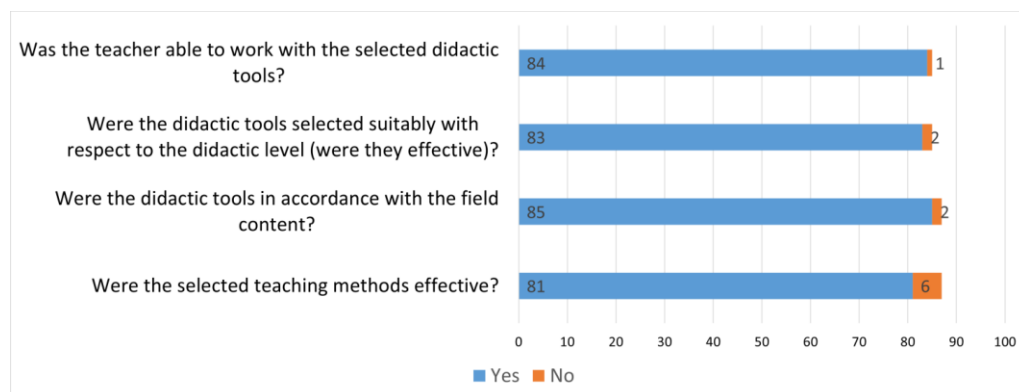


Figure 5. Structure of expertise in the area of working with didactic tools.

The evaluation of the expression was focused on both the verbal and written expression of the student-teacher. Attention was also paid to non-verbal expression and gestures. The following graph depicts the evaluation of the verbal and written expression of the teacher.

Non-verbal expressions are considered to be gesticulation, movements, posture, facial expression, eye contact, choice of classroom position, choice of distance between teacher and pupil, body contact, touch, etc. Respondents are familiar with this scale in theoretical subjects of pedagogy and didactics.

Once again, we can observe (Figure 6) a high level of positive evaluation—answers Yes and Rather yes are represented in 89% and more of the responses. On the other hand, if we focus on questions with more answers Rather yes, Rather no, and No, i.e., if we identify areas where the students see room for improvement, it concerns areas of a written expression regarding graphical management, structuring, clarity, and verbal expression regarding terminological accuracy and partially regarding the use of standard language rules.

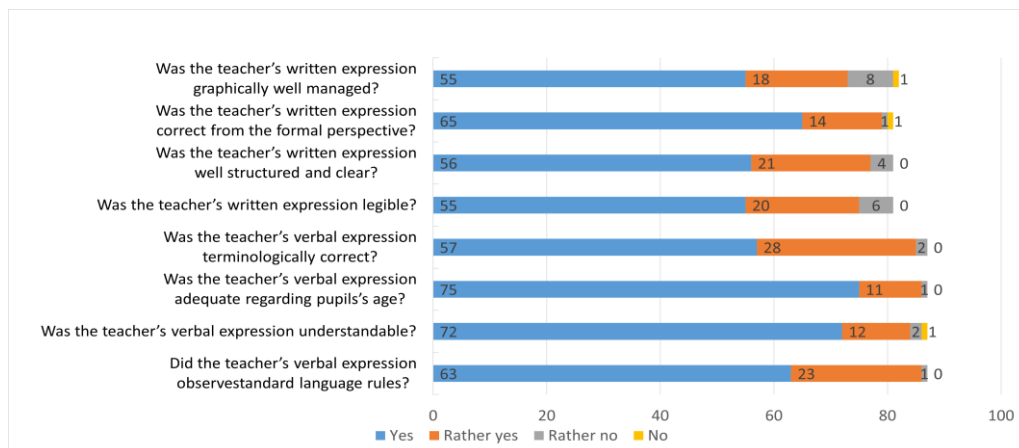


Figure 6. Evaluation of the teacher's verbal and written expression.

The next question researched the quality of non-verbal expression and gestures. The respondents could select values ranging 0–10, where 0 represented utterly inadequate non-verbal communication and 10 represented adequate non-verbal communication. This area achieved a score of 8.53.

A very interesting area of didactic abilities is the ability to identify a pupil's mistake and work with it. We can observe a certain disproportion between standard situations in a lesson and questionnaire results. If the pupils are at least partially actively engaged in the lesson, a pupil's mistake is highly to occur. The high percentage of answers "situation did not occur" implies two conclusions: the inspecting students did not notice the pupil's mistake, or the student-teacher did not engage the pupils in the lesson in a way so that they could actively respond (see Figures 7 and 8).

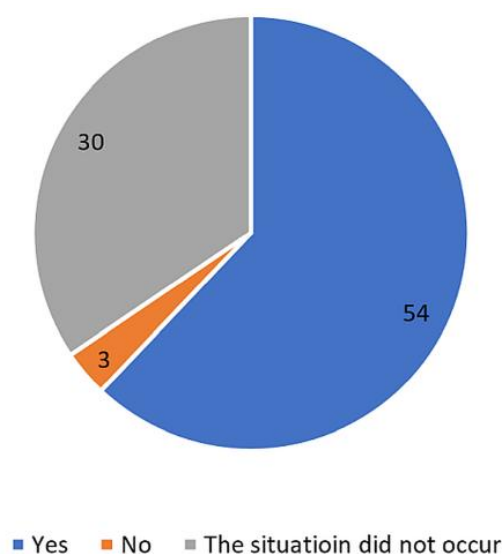


Figure 7. Graph of the teacher's ability to recognize a student's mistake.

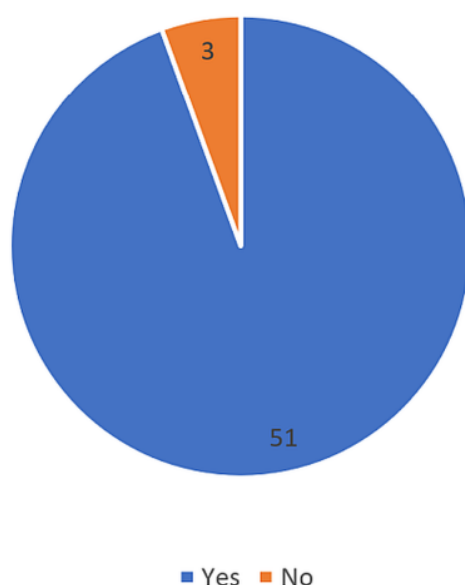


Figure 8. Chart of ability to work with students' mistakes.

The questionnaire also paid attention to whether the student-teachers support the active learning of the pupils. We received 46 positive answers; in 41 cases, the support of active learning of pupils was not identified. This fact partially justifies the results from the previous question. The question of activation of pupils closely relates to the motivation and

enthusiasm of pupils for learning. Answers to these questions were of a similar structure as the previous one. In total, 48 cases were motivating, and 39 were not.

An inseparable part of teaching is feedback. Feedback is provided by the teacher to pupils through various ways of evaluation (not only by classification but by reactions to pupils' answers, questions, or impulses). At the same time, the pupils should be drawn toward healthy self-evaluation. The results of the survey focused on this area showed that the activity related to pupils' evaluation was observed in 64 cases, 91% of which were verbal evaluation and 9% summative evaluation. There was no other type.

Regarding the support of healthy self-evaluation of pupils, i.e., if the teacher promotes and supports this trend, the results were not very positive; see the following Figure 9.

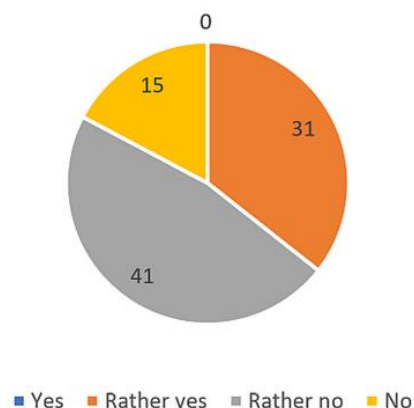


Figure 9. The degree of support for student self-assessment in teaching.

The fourth part of the questionnaire is devoted to the teacher–pupil interaction during a lesson. This part included a whole set of questions that are depicted in the following Figure 10. It can be seen, once again, that the evaluation of this area is rather positive. If we look at the answers from the other side, i.e., where the students saw some room for improvement, it concerns the ability of a student to admonish a pupil, to require accurate expression of the pupils, and to provide the pupils with the opportunity to communicate, show empathy, appraise the pupils, and admit their own mistake.

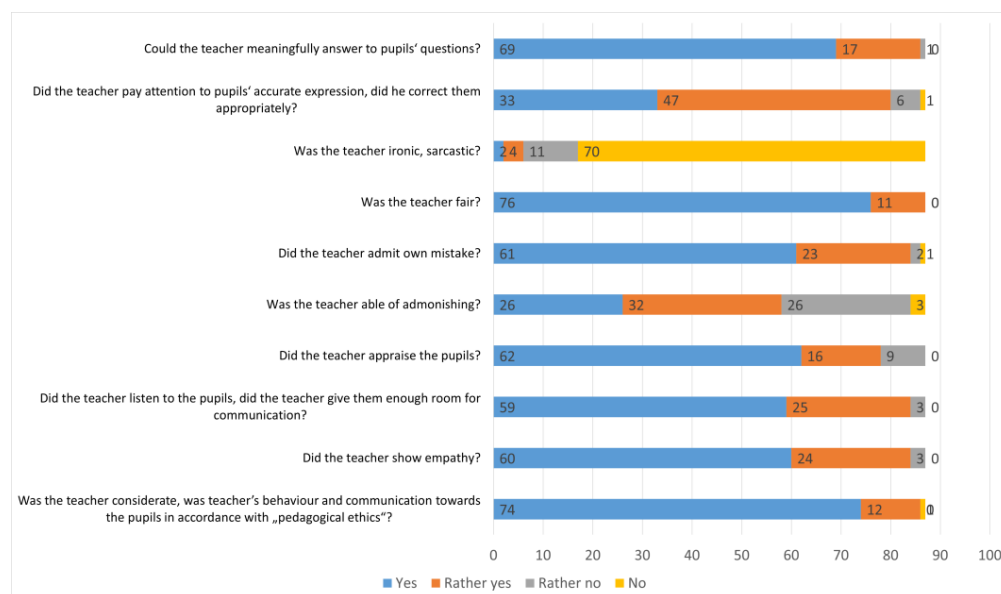


Figure 10. Graph of the structure of interactions between teacher and student during the lesson.

Part of this interaction is a specific approach of the teacher to individual needs of a pupil. In this question, the respondents were expected to state whether they had no-

ticed such an approach. Such needs were not identified in most of the observed classes; see Figure 11.

Did the teacher reflect on individual needs of a pupil?

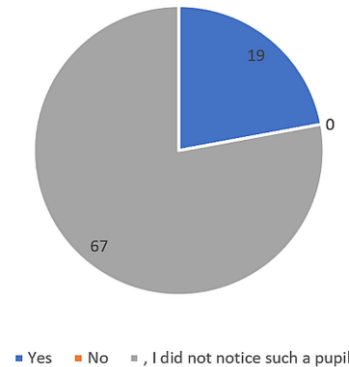


Figure 11. Structure of teachers' response to pupils' individual needs.

The teacher–pupil interaction creates in the educated group a climate that is also affected by the atmosphere of the class and the teacher's style. The questionnaires grasp the atmosphere by questions focused on pupil activity (see Figure 12), which are followed by questions on the teacher's style (see Figure 13). The style of the student-teachers was mostly evaluated as democratic, almost liberal. Concerning the class atmosphere, there is room for improvement in the area of pupils' activation since they did not fully engage in the discussion nor asked questions and did not always answer the teacher's questions.

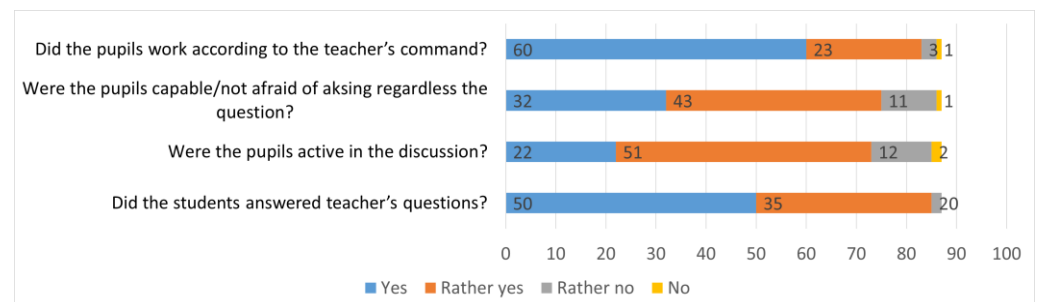


Figure 12. Structure of pupils' activities during lessons.

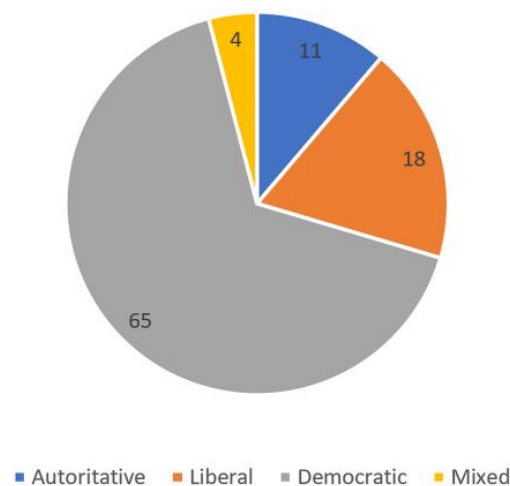


Figure 13. Structure of teaching styles used by the teacher.

Finally, concerning the teacher–pupil interaction, it is necessary to mention the ability of the teacher to keep the discipline (Figure 14), adequately react to non-standard situations, and ease the tense atmosphere. In this area, no significant deficiencies in the student–teacher’s abilities were identified, and there were no non-standard situations requiring the teacher’s reaction, respectively (Figure 15). This corresponds with the standard situation at schools where the practices are carried out.

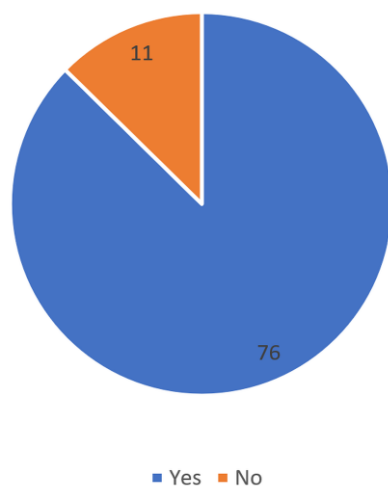


Figure 14. Chart of the teacher’s ability to maintain discipline in the classroom.

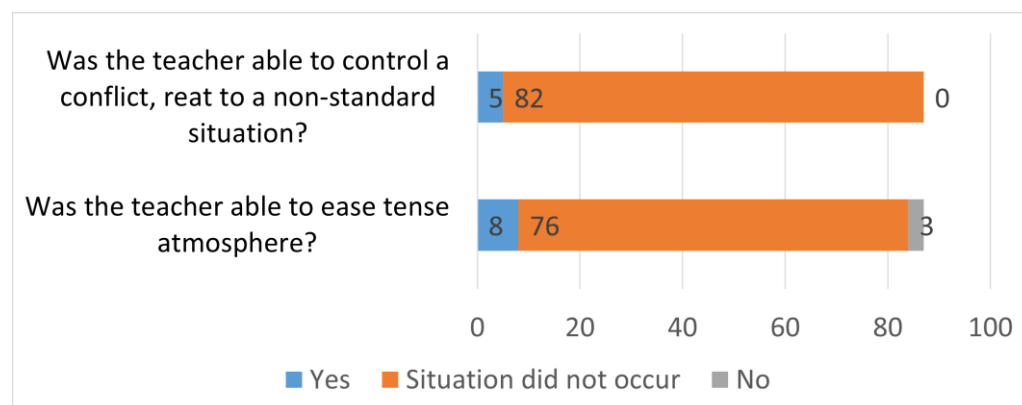


Figure 15. Teacher’s ability to influence classroom climate.

4. Summary

The students mostly evaluated the teaching of their colleagues–students in a positive way. However, they also identified areas where they found room for improvement. A fully negative evaluation was very rare.

The students could also include their final remark at the end of the questionnaire about the structure of each e-questionnaire variant and the questions, whether it was understandable, and whether they would recommend any modification.

Part of the evaluation of the second phase was a discussion of these remarks. Based on feedback provided by the evaluators, the questionnaires underwent a minor modification even for the planned third phase of the implementation of the new system of practice reflection.

Apart from the above-mentioned partial observations, we encountered a problem during the second phase where part of the teaching had to be carried out in an online environment. Thus, some of the recordings were not classical video recordings of standard classroom teaching but recordings of synchronously conducted teaching in an online environment (usually MS Teams, Google Classroom, etc.). Our Bv2 questionnaires to reflect

on such conducted teaching were not fully adapted, which in some cases made it difficult for students to choose an appropriate answer. This was also the reason why we did not include the final part of the questionnaires, which focuses on the hygienic conditions in the classroom (air quality, lighting conditions, classroom equipment, etc.) in the evaluation of the second phase. This could not be evaluated in the online teaching environment and, in most cases, not even from the video recordings taken during the full-time teaching. Therefore, the third phase required preparing a variant of questionnaire B for distance learning conducted synchronously online.

5. Conclusions

Our reconsidering of the system of the pregraduate preparation of teachers, primarily the digitization of the whole process, proved to be highly functional and desired. Although we had to face initial obstacles in the form of teachers' and students' prejudices (namely the will to be recorded, resistance to questionnaires in general, etc.), we managed to find an optimal and balanced strategy. This strategy will lead to the acquisition of required competencies of future teachers and will not lay much burden on the stakeholders. A huge benefit is a fact that the whole conception goes across all fields of natural science; thus, future teachers can draw inspiration from other areas, and we will be able to observe slight nuances in field didactics.

It is obvious that the whole process is organic, and it is essential to develop it continuously to reflect current needs. It is expected that each pilot verification will result in partial changes and modifications of both the questionnaires and, for instance, the system setting of some phases. Over time, we expect that there will be a significant divergence in the conception of online and face-to-face learning. This will also relate to a bigger difference in the type of evaluating questionnaires for various types of learning. Although the pandemic period made us work hard on the online form, there is still room for further innovations.

In near future, we are going to fine-tune the whole process by finishing the central information system, which is already under development. We also want to reflect on the world trends in the area of analysing the video recordings of the students taken during their teaching and practicing pedagogical and didactic skills.

In terms of the implementation of this system, we can conclude that the system has proven its robustness and usefulness. The validation also includes comments and suggestions that are a source for further adaptation of our proposed system.

Author Contributions: Conceptualization, P.K. and Z.V.; methodology, K.T.; validation, P.K. and K.T.; formal analysis, M.Ž.; investigation, M.Ž. and P.S.; resources, P.S.; data curation, M.Ž.; writing—original draft preparation, P.S.; writing—review and editing, P.S.; visualization, M.Ž. and Z.V.; supervision, P.K. All authors have read and agreed to the published version of the manuscript.

Funding: This research and APC was funded by the Education Policy Fund of the Ministry of Education of the Czech Republic and was aimed at supporting study programmes at non-teaching faculties of universities specifically focused on the preparation of science teachers.

Informed Consent Statement: The study collected and worked with data that were already anonymized at the time of collection and did not allow for identification of study respondents.

Data Availability Statement: The data used in this study are not shared, as this approach was not envisaged at the time of collection. Therefore, data sharing is not applicable to this paper.

Conflicts of Interest: The authors declare that they have no conflict of interest in relation to this research and article.

References

1. Postholm, M.B. Teachers developing practice: Reflection as key activity. *Teach. Teach. Educ.* **2008**, *24*, 1717–1728. [[CrossRef](#)]
2. Mtika, P.; Robson, D.; Fitzpatrick, R. Joint observation of student teaching and related tripartite dialogue during field experience: Partner perspectives. *Teach. Teach. Educ.* **2014**, *39*, 66–76. [[CrossRef](#)]
3. Samaras, A.P.; Gismondi, S. Scaffolds in the field. *Teach. Teach. Educ.* **1998**, *14*, 715–733. [[CrossRef](#)]

4. Zahid, M.; Khanam, A. Effect of Reflective Teaching Practices on the Performance of Prospective Teachers. *Turk. Online J. Educ. Technol. TOJET* **2019**, *18*, 32–43.
5. Larssen, D.L.S.; Cajkler, W.; Mosvold, R.; Bjuland, R.; Helgevold, N.; Fauskanger, J.; Wood, P.; Baldry, F.; Jakobsen, A.; Bugge, H.E.; et al. A literature review of lesson study in initial teacher education. *Int. J. Lesson Learn. Stud.* **2018**, *7*, 8–22. [\[CrossRef\]](#)
6. Cockburn, J. Perspectives and politics of classroom observation. *Res. Post Compuls. Educ.* **2005**, *10*, 373–388. [\[CrossRef\]](#)
7. Lasagabaster, D.; Sierra, J.M. Classroom observation: Desirable conditions established by teachers. *Eur. J. Teach. Educ.* **2011**, *34*, 449–463. [\[CrossRef\]](#)
8. Richards, J.; Lockhart, C. Teacher development through peer observation. *TESOL J.* **1992**, *1992*, 28–36.
9. Bell, C.A.; Dobbelaer, M.J.; Klette, K.; Visscher, A. Qualities of classroom observation systems. *Sch. Eff. Sch. Improv.* **2019**, *30*, 3–29. [\[CrossRef\]](#)
10. Breda, A.; Pino-Fan, L.R.; Font, V. Meta Didactic-Mathematical Knowledge of Teachers: Criteria for The Reflection and Assessment on Teaching Practice. *EURASIA J. Math. Sci. Technol. Educ.* **2017**, *13*, 1893–1918.
11. Carrier, S.J. Implementing and Integrating Effective Teaching Strategies Including Features of Lesson Study in an Elementary Science Methods Course. *Teach. Educ.* **2011**, *46*, 145–160. [\[CrossRef\]](#)
12. Roller, S.A. What they notice in video: A study of prospective secondary mathematics teachers learning to teach. *J. Math. Teach. Educ.* **2016**, *19*, 477–498. [\[CrossRef\]](#)
13. Romano, M.; Schwartz, J. Exploring Technology as a Tool for Eliciting and Encouraging Beginning Teacher Reflection. *Contemp. Issues Technol. Teach. Educ. (CITE J.)* **2005**, *2005*, 149–168.
14. Jordan, L. Video for peer feedback and reflection: Embedding mainstream engagement into learning and teaching practice. *Res. Learn. Technol.* **2012**, *20*, 16–25. [\[CrossRef\]](#)
15. Průcha, J. *Pedagogická Encyklopedie*, 1st ed.; Portál: Praha, Česká Republika, 2009; ISBN 978-80-7367-546-2.
16. Rohlíková, L.; Vejvodová, J. *Vyučovací Metody na Vysoké Škole: Praktický Průvodce Výukou v Prezenční i Distanční Formě Studia*, 1st ed.; Grada: Praha, Česká Republika, 2012; ISBN 978-80-247-4152-9.
17. Průcha, J.; Walterová, E.; Mareš, J. *Pedagogický Slovník*, 7th ed.; Portál: Praha, Česká Republika, 2013; ISBN 978-80-2620403-9.
18. Janík, T.; Havel, J. *Pedagogická Praxe a Profesní Rozvoj Studentů: SBORNÍK z Mezinárodního Pracovního Semináře Konaného dne 9. Prosince 2005 na Pedagogické Fakultě MU v Brně*, 1st ed.; Masarykova Univerzita v Brně Pro Katedru Pedagogiky a Centrum Pedagogického výzkumu PdF MU: Brno, Česká Republika, 2005; ISBN 80-210-3884-5.
19. Slavík, J.; Hajerová Múllerová, L.; Soukupová, P. *Reflexe a Hodnocení Kvality Výuky*, 1st ed.; Západočeská Univerzita: Plzeň, Česká Republika, 2020; ISBN 978-80-261-0920-4.
20. Nezvalová, D. Pedagogická praxe v pregraduální přípravě učitelů a její reflexe. *Pedagog. Orientace* **2018**, *2018*, 62–69.
21. Leshem, S.; Bar-Hama, R. Evaluating teaching practice. *ELT J.* **2007**, *62*, 257–265. [\[CrossRef\]](#)
22. Vašutová, J. *Vzděláváme Budoucí Učitele: Nové Přístupy k Pedagogicko-Psychologické Přípravě Studentů Učitelství*, 1st ed.; Portál: Praha, Česká Republika, 2008; ISBN 978-80-7367-405-2.
23. Václavíková, Z.; Žáček, M.; Smolka, P.; Trčková, K.; Konečná, P. The power of video in teachers' training and in their professional development. In *AIP Conference Proceedings*; AIP Publishing LLC: Melville, NY, USA, 2022; p. 060009.
24. Janík, T.; Minaříková, E.; Pášová, M.; Uličná, K.; Janík, M. *Profesní Vidění Učitelů a Jeho Rozvíjení Prostřednictvím Videoklubů*; Masarykova Univerzita: Brno, Česká Republika, 2016; ISBN 978-80-210-8305-9.

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