

Reflection and Feedback as Predictors of Directed Development of Assessment Competence

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ABSTRACT

The assessment is part of the complex profile of teacher competencies that supports the development of teachers' and students' generic and professional competencies. The paper focuses on formative assessment, i.e., the approach to assessment as learning and assessment for learning that takes place during the learning process, which ultimately contributes to self-regulated learning. This paper aims to determine if there are changes in the use of formative assessment in the classroom. For this purpose, Biology teachers participated in reflective learning-based professional development.

In this action research, reflective learning was applied in learning communities. The learning process consisted of acquiring theoretical knowledge about formative assessment, applying what has been learned in the classroom, and (self)analyzing video recordings of the lessons according to the formative assessment representation form. The analysis provided (internal) feedback on progress and aspects for improvement as a starting point for a new cycle of reflective learning.

The initial recordings of the lessons showed that formative assessment needs improvement. The results indicate that professional development in formative assessment varied among teachers. One teacher was found to make steady progress during professional development, while other teachers were found to have sporadic and incoherent changes. We believe that the improvement of the professional development model should include explicit incentives for teachers to implement phases of self-regulated learning during professional development.

Keywords: assessment as learning, assessment for learning, formative assessment, online learning community, professional development

Introduction

Assessment is an important aspect of the teaching process. This complex process includes monitoring, assessment, and evaluation. Monitoring to assess the success of the learning and teaching processes allows for formative assessment. An assessment approach to learning is used when student learning is monitored and assessed throughout its duration and when teaching is targeted and improved based on these results. On the other hand, when students approach self-assessment, i.e., when they monitor and modify their learning to achieve the learning goal, it is referred to as assessment as learning (MZO, 2017). Both approaches result in feedback (Yan et al., 2021) that has a positive effect on student achievement (Yin et al., 2008) because it shows them how to improve their learning (Bennett, 2011). At the same time, teachers also learn how to improve their teaching. Both approaches require the use of the metacognitive dimension of knowledge to achieve self-regulated learning (Vizek Vidović & Marušić, 2019).

Although the formative assessment and summative evaluation have been present in Croatian education for a long time, approaches to assessment for learning and assessment as learning (including assessment of learning, which has a summative character) have emerged only in recent years. With the introduction of new subject-specific and cross-subject curricula and guidelines for the assessment of the learning process and reaching the education outcomes, professional training as well as the overall professional development of Croatian teachers requires significant changes. Unlike instructional programs that prescribe the topics to be taught in a particular subject to a particular class, the curriculum approach enables teachers' autonomy in choosing and modifying how they will achieve and assess the predetermined outcomes.

Although teachers are required to use both assessment approaches, they should implement them because of the many benefits they have in reaching the mandated outcomes of the subject curricula and the curriculum expectations for cross-curricular topics. Formative assessment promotes conceptual understanding and acquisition of knowledge at higher cognitive levels because it uses open-ended questions, interactive, and collaborative activities (Yin & Buck, 2019). It facilitates students' cognitive engagement and contributes to their understanding of the content being learned (Gikandi et al., 2011). It also increases motivation, improves student learning, and contributes to the objectivity of summative evaluation (Harlen & Deakin Crick, 2003). The effectiveness of formative assessment depends on how teachers implement it in the classroom (Yan et al., 2021). Vingsle (2014) describes formative assessment as a complex process that is difficult to incorporate into classroom practice, and its successful incorporation depends on personal, i.e., teachers' beliefs and attitudes, and formative assessment knowledge and skills (Heitink et al., 2016). It is continuously improved through professional development (DeLuca et al., 2019), and psychological and

practical support is essential for teachers to effectively play their role in implementing formative assessment (Yan et al., 2021).

Formative assessment may include posing questions and discussion, observation of various activities, note taking, use of various formative assessment techniques, and peer assessment (Yin & Buck, 2019). The aim of the professional development in this action research was to systematically help teachers improve their knowledge and skills in using formative assessment. In addition, we wanted to make teachers aware that formative assessment is an important component of constructive alignment.

Biggs and Tang (2014) emphasize that constructive alignment implies the alignment of goals, activities, and assessments. This requires the teacher to “create a learning environment that encourages students to engage in these learning activities and assesses student performance against the intended learning outcomes” (p. 97). The setting of the objective at the beginning of the lesson as the standard by which the success of learning and teaching is judged, the practice of giving students specific feedback on their activity, instruction that guides and prompts students to self-assess, and the use of assessment questions at the end of the lesson were examined for the achievement of the objective in analyzing the lessons. The extent to which teachers ask questions that encourage students to think and show them what they are still missing to reach a certain level of understanding was examined. In addition, the extent to which teachers encourage students to express their understanding of the content in their words and record it independently and concisely was observed. These activities help to achieve the objective of the lesson while also serving to assess learning. The extent to which teachers teach students how to approach learning and how to solve problems, and the extent to which they encourage students to verbalize their learning (metacognitive teaching and use of metacognitive knowledge and skills in the learning process) were also observed. Finally, the extent to which students were encouraged to monitor their progress and assess their learning was observed. Reflective learning about formative assessment in the context of learning communities, implementation of learning in classroom practice, and analysis of video recordings of the lesson for (self-)reflection to guide further professional development should have enabled the acquisition of the teacher’s content pedagogical knowledge (Shulman, 1986) which includes knowledge of learners, teaching, and curriculum in addition to knowledge of content (Ball et al., 2008). Formative assessment is part of numerous educational reforms around the world (Birenbaum et al., 2015) and it is essential for effective professional development (Bennett & Gitomer, 2009), highlighting the need for its improvement. Therefore, the aim of this paper is to determine if there are changes in the elementary school Biology classroom related to the use of formative assessment in a six-month video-based online professional development course based on reflective learning.

Methodology

The study was conducted during the 2020/2021 school year as part of the “Professional development of teachers for improving elementary students’ learning outcomes in science and mathematics” project. Four teachers teaching elementary school Biology were observed for the study. In this study, the names of the teachers are presented with initials.

Changes in formative assessment practice were caused by reflective learning (RL), which is shown in Figure 1.

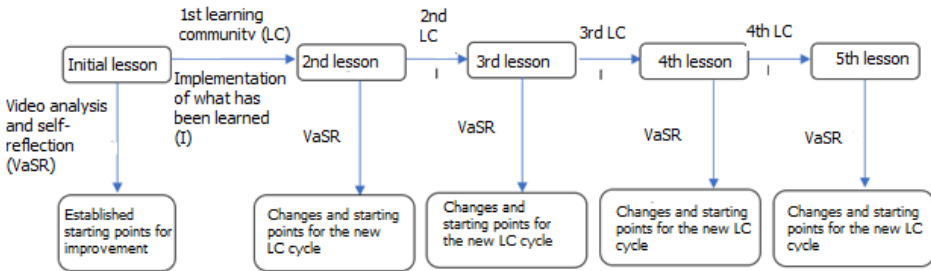


Figure 1. Cycles of reflective learning during professional development

Video recordings of lessons were analyzed using the OZON form (cro. Obrazac za opažanje nastave, Teaching Observation Form, Bezinović et al., 2012). This form describes and evaluates classroom activities divided into six categories: classroom atmosphere, lesson structure, student involvement and motivation, individualization and differentiation of teaching, teaching metacognitive skills and learning strategies, feedback, and formative assessment. From the entire form, features related to assessment for learning and assessment as learning were extracted for this study (the features can be seen in the results section in Table 2).

Based on the analysis of the video recordings, both the researchers of the project and the teachers themselves conducted the reflection on the lesson. After the analysis of the initial lesson using the OZON form identified the starting points for improvement for each teacher, the first lesson followed. Then, the teachers implemented what they had learned in the classroom practice. The lesson was re-recorded, and the analysis of the video recordings was done again using the OZON form to identify the changes compared to the previous lesson and to define the starting points for a new cycle of reflective learning. The same system was applied until the last, fifth lesson. A total of five lessons from each teacher were recorded and analyzed, and four learning communities were held with the topics and outcomes listed in Table 1.

Table 1. Topics and outcomes of learning communities

Learning community	Topic	Outcomes
1 st	Assessment regarding the objective	<ul style="list-style-type: none"> ▶ Predict the importance of defining the objective in the assessment process. ▶ Plan the assessment regarding the objective.
2 nd	Feedback	<ul style="list-style-type: none"> ▶ Analyze the conditions for constructing specific feedback. ▶ Plan teaching to enable students' independence in creating internal feedback.
3 rd	Concept map – teaching and assessment technique	<ul style="list-style-type: none"> ▶ Use the concept map as a technique in the teaching and assessment process.
4 th	Learning by solving problems	<ul style="list-style-type: none"> ▶ Plan the teaching of Biology while simultaneously achieving metacognitive teaching using problem-solving tasks.

In the research, the ethical aspect of the research was fully respected. Considering that the method of observing classes the researcher will requested the written consent of the parents of the students and the principal of the school, in addition to the written consent of the teacher. Teachers were provided with protection of privacy and confidentiality of data. In the analysis and interpretation of the research results, instead of their names, labels were used to distinguish the research participants. At the same time, specifying the exact data of the institutions where the research was conducted was avoided. Upon completion of the research, the participants were informed about the results of the research.

Results

Features of teaching in the formative assessment that need to be improved

The analysis of the initial lesson revealed that not a single teacher states the objectives, i.e., the outcomes, at the beginning of the lesson as a measure for assessing her teaching and the students' learning (Table 2). It is also evident that not a single teacher explains the criteria by which students can assess their own activity and progress concerning the set objective, nor do they use these criteria to highlight progress and learning. Only one teacher did not prepare questions or assignments to check students' understanding and performance in class, while the others used them to a lesser extent to give students specific feedback on their work (Table 2). Another common feature that needs improvement based on the analysis of the initial lessons is the lack of use of metacognitive knowledge and skills that form the basis of the assessment-as-learning approach. None of the

teachers taught students how to approach learning or encouraged students to verbalize the steps they used in their work (Table 2). Only one teacher encouraged her students to monitor and review their work and evaluate their activities and progress. Since the same teacher did not set an objective for students to evaluate against, this feature was also rated as needing improvement. The other features listed in Table 2 were not observed in all teachers, so they are also rated as needing improvement.

Changes in the features of formative assessment through professional development

The analysis of the initial lesson was followed by a learning community and the topic was *Assessment regarding the objective*. The analysis of the video recording of the second lesson, in which the teachers had to implement what they had learned, showed progress compared to the initial lesson (see Table 2). In terms of learning community outcomes, most changes were expected in the shaded and italicized features in Table 2. Since no significant changes were found compared to the initial lesson, the next learning community was organized with the topic of *Feedback*, which followed up on the first lesson. After that, the third lesson was recorded, which we also analyzed. Table 2 shows progress in the objective setting in the second lesson (only one teacher states the objective, but to an insufficient extent in the sense that she states it at the beginning of the lesson but does not relate it to self-assessment). The same teacher (VŠ) improved her assessment for learning practice in the third lesson because she stated the objective of the lesson, provided specific feedback regarding the objective and prepared questions to check students' understanding and performance. Teacher OZ only explained her assessment criteria in the third lesson, emphasized students' progress and learning, and used questions to check students' understanding and performance. Thus, in the third lesson, progress in instructional features related to assessment for learning was noted compared to the previous two lessons for teacher OZ. She asked students to assess their activity and progress, but this was rated as an inadequately observed feature due to the lack of presentation of the objective. Features that did not improve even in the third lesson were those related to metacognitive teaching (teaching students how to approach learning and/or solve specific tasks) and the application of metacognitive knowledge and skills (students describing and explaining the steps they use in their work). For students to use or practice applying metacognitive knowledge and skills, teachers must organize lessons that set the stage for this to happen. All teachers use questions that promote higher-order cognitive processes to a greater or lesser extent in all three lessons, but all challenge only the cognitive level of understanding and application without problem-solving. Teaching students to learn the content of Biology through problem-solving, in addition to achieving the objective defined

by the Biology curriculum in terms of developing metacognitive knowledge and skills, is an aspect that the subsequent learning communities have sought to improve.

Table 2. Teaching features in the analysis of the initial recording that need to be improved, the analysis of the second and third recorded lesson after the implementation of what has been learned during professional development, and the progress made regarding a particular feature

Features of a particular assessment approach	Teacher 1 st (initial) lesson				Teacher 2 nd lesson				Progress IRT the 1 st lesson*	Teacher 3 rd lesson				Progress IRT the 2 nd lesson
	JM	OZ	VŠ	IK	JM	OZ	VŠ	IK		JM	OZ	VŠ	IK	
<i>The teacher clearly states the objectives of the lesson (learning outcomes).</i>	-	-	-	-	-	-	+/-	-	↗	-	-	+	-	↗
<i>The teacher provides specific feedback to students.</i>	+/-	+/-	-	+	+/-	+/-	-	+	↔	+/-	+/-	+	+	↗
<i>The teacher explains his criteria for assessing students' work and achievements using specific examples.</i>	-	-	-	-	-	-	-	-	↔	-	+	-	-	↗
<i>The teacher emphasizes the progress of the students and their success in learning (and not their shortcomings).</i>	-	-	-	-	-	-	-	+	↗	-	+	-	-	↔
The teacher has prepared questions or tasks to check the students' understanding and achievements in class	+	+	-	+	+	+	-	+	↔	+	+	+	+	↗
Assessment as learning														
The teacher asks thought-provoking questions (which stimulate higher-level cognitive processes).	-	+/-	+/-	+	+	+/-	+/-	+	↗	+/-	-	+/-	+	↙

Table 2. Continued

Features of a particular assessment approach	Teacher 1 st (initial) lesson				Teacher 2 nd lesson				Progress IRT the 1 st lesson*	Teacher 3 rd lesson				Progress IRT the 2 nd lesson
	JM	OZ	VŠ	IK	JM	OZ	VŠ	IK		JM	OZ	VŠ	IK	
<i>The teacher directly teaches the students how to approach learning, solving certain tasks, or practicing.</i>	-	-	-	-	-	-	-	-	↔	-	-	-	-	↔
The teacher encourages the students to express in their words how they understood the content being taught.	+	+	+/-	+	+	+	+	+	↗	+	+	-	+	↘
The teacher asks the students to describe and explain the steps they use while solving a task.	-	-	-	-	-	-	-	-	↔	-	-	-	-	↔
The teacher encourages students to monitor and check their work (e.g., to spot and correct mistakes, and check the solution they have reached).	-	-	-	+	-	-	-	+	↔	-	+	-	+	↗
<i>The teacher asks the students to evaluate their work and progress.</i>	-	-	-	+	+	-	-	+	↗	-	+	-	+	↔
The teacher encourages the students to independently take notes and organize the content being learned (e.g., by highlighting the main concepts or creating presentations).	+/-	+	+/-	+/-	+	+	+/-	+/-	↗	+	+	+/-	+	↗

* Symbols and abbreviations: no progress (↔), progress (↗), regression (↘), IRT – in relation to; JM; OZ; VŠ; IK-teacher's initials

The third learning community focused on *concept maps* as a teaching and assessment technique. In choosing this topic, we were also motivated by a conversation with teachers about formative assessment during the second learning community. It was determined that the main causes of difficulty in implementing formative assessment were lack of knowledge, over-involvement of the teacher in lesson preparation, lack of time during the lesson to use the method, and students' perception that they value assessment more than feedback. The third learning community served to increase knowledge about formative assessment. It explained how concept maps can be used for both assessment and instruction. The analysis of the representation of the features and the possible progress after the implementation of what was learned in the third learning community are presented in Table 3. In the features related to the assessment of learning, if we consider all teachers together, progress consists only in the emphasis on progress and success in the work. This feature was improved in teacher VŠ compared to the previous lesson, while teacher OZ had already adopted this feature in the previous lesson.

In the features related to the approach of assessment as learning, the most significant change was observed in the direct instruction by the teacher on how to approach the solution of certain tasks. This feature was only partially represented by three teachers, as it only referred to the explanation of how to complete the concept map without relating it to the objective, in the sense that they used the map as a technique that leads to the adoption of a defined objective and the verification of the adoption of the same objective. Although the concept map allowed teachers to monitor and review students' work and to independently capture and organize learning content, it did not fully contribute to assessment because there was no verbalization of learning progress as a conscious activity that trains the use of metacognitive knowledge and skills in the learning process. This feature was only partially present in one teacher because the objective was not defined as a standard against which students could more easily identify and define their progress (Table 3).

Table 3. Teaching features in the analysis of the fourth and fifth recordings after the implementation of what had been learned during the professional development and the progress made regarding a particular feature

Features of a particular assessment approach	Teacher 3 rd lesson				Teacher 4 th lesson				Progress IRT the 3 rd lesson*	Teacher 5 th lesson				Progress IRT the 4 th lesson*
	JM	OZ	VŠ	IK	JM	OZ	VŠ	IK		JM	OZ	VŠ	IK	
The teacher clearly states the objectives of the lesson (learning outcomes).	-	-	+	-	-	-	+	-	↔	-	-	+	-	↔
The teacher provides specific feedback to students.	+/-	+/-	+	+	-	+	+	+/-	✓	+	-	+	+/-	↔
The teacher explains his criteria for assessing students' work and achievements using specific examples.	-	+	-	-	-	+	-	-	↔	-	-	-	-	✓
The teacher emphasizes the progress of the students and their success in learning (and not their shortcomings).	-	+	-	-	-	+	+	-	↗	+/-	-	+	-	✓
The teacher has prepared questions or tasks to check the students' understanding and achievements in class.	+	+	+	+	+	+	+	+	↔	+	+	+	+	↔
Assessment as learning														
The teacher asks thought-provoking questions (which stimulate higher-level cognitive processes).	+/-	-	+/-	+	+/-	-	+	+	↗	+	+	+	+	↗
The teacher directly teaches the students how to approach learning, solving certain tasks, or practicing.	-	-	-	-	+/-	+/-	+	+/-	↗	+/-	+/-	+/-	+/-	✓

Table 3. Continued

Features of a particular assessment approach	Teacher 3 rd lesson				Teacher 4 th lesson				Progress IRT the 3 rd lesson*	Teacher 5 th lesson				Progress IRT the 4 th lesson*
	JM	OZ	VŠ	IK	JM	OZ	VŠ	IK		JM	OZ	VŠ	IK	
The teacher encourages the students to express in their words how they understood the content being taught.	+	+	-	+	+	+	-	+	↔	+	-	-	+	↔
The teacher asks the students to describe and explain the steps they use while solving a task.	-	-	-	-	-	+	-	-	↗	-	-	-	-	↔
The teacher encourages students to monitor and check their work (e.g., to spot and correct mistakes, and check the solution they have reached).	-	+	-	+	+	+	+	+	↗	+	+	+	+	↔
The teacher asks the students to evaluate their work and progress.	-	+	-	+	-	+	-	-	↙	-	-	-	-	↙
The teacher encourages the students to independently take notes and organize the content being learned (e.g., by highlighting the main concepts or creating presentations).	+	+	+/-	+	+	+	+	+	↗	+	+/-	+	-	↙

In the last learning community, we emphasized *learning through problem-solving*. Also, during the learning community, we explained the use of the *flipped classroom* in teaching Biology. The flipped classroom concept assumes that learning at lower cognitive levels occurs through independent work at home and learning through problem-solving at school (Bergmann & Sams, 2015). The material that enables students to remember the relevant information they need to solve the task is selected by the teacher, who designs assessment methods for learning and assessment methods as learning that occur both in independent learning at home and in the classroom at school. The flipped classroom was offered to allow teachers more time to organize learning through problem-solving in the classroom and to allow students to practice using metacognitive knowledge and skills, thereby strengthening their ability to use assessment as learning.

The changes in the features caused by the last learning community can be seen in Table 3. In the characteristics related to assessment for learning, there was some progress only in teacher JM. She provided feedback to the students on their work and highlighted their progress. Teacher OZ regressed in her teaching compared to the previous lesson, while the other two teachers showed neither progress nor regress. In the features of assessment as learning, it was observed that all teachers asked questions at a higher cognitive level due to the use of problem-solving learning. Neither teacher showed progress in teaching students how to approach problem-solving. The teachers told students how to learn in class but did not instruct them on how to approach problem-solving or how to apply what they learned to a new problem. They also did not ask students to explain the steps they used to solve the given problem and did not encourage students to monitor their progress.

Discussion

The research conducted shows that implementing formative assessment in the classroom is not an easy task, as Yan et al. (2021) state. Yan and Brown (2021) stated that the practice of implementing formative assessment is far from satisfactory. The analysis of initial recordings related to the use of formative assessment in learning and teaching also indicated a need for improvement. The reason why teachers did not use formative assessment is due to its complexity and the fact that assessments for learning and assessment as learning were introduced only recently in the Croatian educational system. However, this intention was not accompanied by changes in teachers' professional development, which was still traditional. The usual practice of professional development in Croatia amounts to teachers attending professional meetings, organized for a large number of teachers, where they receive only theoretical knowledge with some examples of good practice. Implementation of what is learned in the classroom and subsequent reflection,

according to the teachers involved in our research, is generally completely absent. In contrast to common practice, the professional development we organized was characterized by continuous support in introducing the expected changes in the classroom. According to Leahy and Wiliam (2012), support included providing knowledge about formative assessment, providing examples of teaching with formative assessment, and providing constructive feedback. In addition, our professional development included collaborating to provide teachers with opportunities to discuss, reflect, and receive feedback from their colleagues about their teaching methods (Heitink et al., 2016). Professional development in formative assessment should allow teachers to try out what they have learned, reflect together, and revise their practice concerning what they have learned (Borko, 2004). Although all of this was included in our professional development, the results showed that implementing formative assessment is a challenging process and that the teachers who participated in the study only partially accomplished this.

The key elements of formative assessment are defining explicit learning goals and success criteria, providing feedback to students on their performance, self-assessment, peer-assessment, teacher-student collaboration, interpreting evidence of expected progress, and using the information provided by formative evaluation to improve teaching and learning (Trumbull & Gerzon, 2013). In our research, we observed assessment for learning and assessment as learning listed in the OZON form (Bezinović et al., 2012). According to the changes in the features listed in Table 2 and Table 3, no changes were observed during the period of development in terms of continuous development. Features that improved in one lesson (recorded as the presence of the feature in at least one teacher or the presence of the feature in a larger number of teachers) remained the same in the next lesson or showed a decrease in the sense that fewer teachers used it in class. For example, the explanation of the criteria for assessing one's work and the students' performance based on concrete examples occurs only in teacher OZ in the third lesson (Table 2) and again in the fourth lesson (Table 3), while in the last lesson, it does not occur for her or the other teachers. A clear statement about the objectives of the lesson was recorded only by teacher VŠ. In her case, it was partially recorded already in the second lesson and fully from the third lesson onward. This teacher showed a clear improvement in the assessment for learning in the fourth lesson, which was maintained in the last lesson as well. Improvements in assessment as learning in the third lesson were not recorded. Towards the end of the training (4th lesson), progress is also evident in this assessment approach. VŠ is also the only teacher for whom we observed continuous progress in both assessment approaches during the professional development training. For other teachers, we have sporadic and incoherent changes with no observed continuous progress in improving some features in the last lesson (JM), with no changes (IK, where many features were present in both assessment approaches in the first

lesson), or a situation where there is progress in the third and fourth lessons and then a regress in the last lesson (OZ).

Vermunt and Endedijk (2011) point out that teachers respond to innovation in different ways. Some focus on improving their teaching performance in the sense that they immediately apply what they have learned, while others want to understand how what they have learned changes their basic teaching principles and understand why and under what conditions what they have learned works in their practice. Teachers need time to reflect on their teaching practice and revise and adapt their instructional routines to what they have learned (Ruiz-Primo & Furtak, 2007). In addition to teachers' positive attitudes toward formative assessment and their willingness to implement it in their teaching, a stimulating school environment and school policies that provide ongoing support for teachers to implement this important aspect of teaching are needed (Yan et al., 2021; Yan & Brown, 2021).

Vermunt and Endedijk (2011) emphasize that there are teachers who do not focus enough on their learning when it comes to professional development. They have difficulty setting goals and are cautious and hesitant to introduce innovations into practice. This may also explain the results of our study.

What we noted earlier in the analysis of the initial lesson, and further noted in the analysis of subsequent lesson recordings was the teachers' lack of knowledge about how to teach students to use metacognitive knowledge and skills. Although assessment as learning is fundamentally metacognitive, a different approach to assessment also requires using the metacognitive dimension of competence to *learn how to learn*. Apart from encouraging their students to acquire metacognitive knowledge and apply metacognitive skills, teachers must simultaneously develop metacognitive competencies themselves in the process of professional development. This means that teachers should use the results of their efforts to improve their teaching (Hattie, 2015), which implies assessment for learning. At the same time, they should develop a habit of assessment as learning. This means that they should set a specific goal for their professional development and monitor changes and, if necessary, change the path leading to the achievement of the defined goal (Labak, 2022). Our professional development intended to break down the complex process of formative evaluation into smaller parts and implement them in smaller steps in the Biology classroom. According to Leahy and Wiliam (2012), this prevents teachers from reverting to their previous practices after introducing new ideas. We received additional support towards the end of the professional development when we suggested the use of the flipped classroom to teachers. With its settings, the flipped classroom allows for both the application of assessment approaches and the change in overall teaching practice needed to effect change in formative assessment (Trumbull & Gerzon, 2013). For two teachers (VŠ and IK), the use of the flipped classroom led to no changes, for

one teacher it led to some changes in approach to assessment as learning (JM), and for one (OZ) it led to a regression in teaching performance (Table 3, 5th lesson). This result shows that it is difficult for inexperienced teachers to plan and implement flipped classrooms. Complex changes such as formative assessment are difficult for teachers to design and implement in the classroom. We believe that it would be easier for teachers if they were given detailed examples of how to design a lesson in which the principles of formative evaluation are followed. The possibility of bringing about change by using such ready-made materials while teachers are in the stage of becoming independent and learning formative assessment represents the direction in which this research will continue.

Conclusions

The professional development described in our research resulted in changes not only in formative assessment but in overall instructional practice. In this study, we focused only on observing changes in instructional features related to assessment for learning and assessment as learning. Since no single teacher fully achieved the changes we observed, but only on some features, we can conclude that they were in the process of change. However, for more comprehensive changes, it is necessary to invest more time and effort for them to be noticed in the classroom.

Although the analysis of lessons was conducted for reflection and self-reflection to identify new starting points for improvement, it was the researchers who determined the aspects that needed improvement based on the analysis of all teachers' lessons. It is possible that some teachers themselves did not recognize this need, but saw it as something they already use, already know, or can easily incorporate into their teaching practice. In addition, no explicit planning of self-regulated learning via formative assessment was required during the professional development. In the professional development preparation phase, there was no incentive to set learning goals and strategically plan the path to achieve the goal. In the performance phase of professional development, there was no incentive for self-reflection, and in the reflection phase, there was no incentive for self-assessment and self-regulation of one's practice. Therefore, in addition to learning theory, implementation, analysis, and (self-)reflection of teaching, the professional development of formative evaluation should include an incentive for teachers' active participation in professional development in the sense that development is approached as self-regulated learning.

Some of the teachers pointed out the need to be suggested how to achieve the expected changes because they were often not able to find appropriate solutions on their own. For this reason, we think that it would be good to give concrete suggestions on how to conduct classes following the goals set. Once teachers

master these approaches, they can be encouraged to find their solutions. In our case, we did not provide teachers with ready-made solutions, which resulted in the expected changes being only partially realized. Of course, we do not believe that ready-made solutions should become common practice, but only a transitional phase in the introduction of new, complex teaching approaches for which more time needs to be allocated.

The research was largely conducted at the time of the coronavirus epidemic (COVID-19), due to which female teachers had to adhere to strict epidemiological measures (e.g., maintaining social distance) in the classroom. Thus, in addition to the usual problems related to teaching and its changes, they had to face constraints that did not support the achievement of the established criteria. All of this may have contributed to the limited introduction of the planned changes.

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