Formative assessment in Swedish mathematics classroom practice

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Research shows that substantial learning gains are possible through the use of formative assessment. However, little is known about Swedish mathematics teachers' use of formative assessment, and thus about the possible value of professional development programmes. This study uses teacher interviews and classroom observations to examine the classroom practice of 38 randomly selected primary and secondary school teachers in a mid-sized Swedish municipality. A framework of formative assessment comprising one big idea and five Key strategies structured the analysis. The study identifies characteristics of current formative assessment practices. The results show that the teachers do use a variety of formative assessment activities, but also that there is much room for development towards a more effective formative classroom practice.

A body of research has shown that formative assessment is one of the most effective classroom practices for student learning (e.g. Black & Wiliam, 1998; Hattie, 2009). The research community does not agree on the definition of formative assessment (Bennett, 2011), but the following conceptualisation captures the meaning of many definitions provided in the literature:

> Practice in a classroom is formative to the extent that evidence about student achievement is elicited, interpreted, and used by teachers, learners, or their peers, to make decisions about next steps in instruction that are likely to be better, or be better founded, than the decisions they would have taken in the absence of evidence that was elicited. (Black & Wiliam, 2009, p. 9)

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This definition allows formative assessment to be implemented in different ways and with different foci. Some researchers (e.g. National Mathematics Advisory Panel, 2008) focus on the teacher assessing the students to gather evidence on student learning, with subsequent adjustment of instruction. Some focus on teachers' feedback given to students based on the gathered evidence on student learning (e.g. Shute, 2008). Others (e.g. Gielen et al., 2010) focus on the students' role in the formative assessment process. This role may be as self-regulated learners, which includes self-assessment and subsequent actions to achieve learning goals (Zimmerman, 2002). Students may also support each other's learning, which involves peer-assessment and subsequent suggestions to peers on how to reach their learning goals. The reviews by Black and Wiliam (1998) and Hattie (2009) included approaches to formative assessment with different foci. In addition, some scholars include all of the above-mentioned approaches in their conceptualisation of formative assessment (e.g. Wiliam & Thompson, 2008). Research reviews focusing on each of these strategies for formative assessment also found them to be successful for enhancing student achievement. The reviews show strong relationships between student achievement and formative assessment approaches such as teachers' adjustment of lessons based on evidence on student learning collected through a frequent use of computer-based quizzes (Yeh, 2009), feedback (Hattie & Timperley, 2007), self-regulated learning (Dignath & Büttner, 2008), self-assessment using rubrics (Panadero & Jönsson, 2013) and peer-assisted learning (Rohrbeck, Ginsburg-Block, Fantuzzo & Miller, 2003).

However, despite being promoted in many countries (Organisation for Economic Co-operation and Development, 2005) and by professional organisations (Tierney, 2006), formative assessment is still not widely practised in countries such as the USA (Stiggins, 2002), Norway (Smith, 2011) and Hong Kong (Carless, 2005). In England, a national strategy for formative assessment (using the term *assessment for learning* instead of formative assessment) was launched in 2008. However, this reform has been heavily criticised by researchers for misrepresenting the core ideas of formative assessment and for leading to the implementation of a distorted view of this concept, such as by not considering students as active agents in the learning process (Swaffield, 2011).

In Sweden, only a few, small-scale studies have examined the use of formative assessment in mathematics classrooms. Björklund Boistrup (2010) investigated feedback in five Swedish mathematics classrooms. This study analysed the communication between teachers and students during three types of assessment acts that are vital in formative assessment (feed back, feed forward, feed up). From this analysis, the author

suggested different possibilities for students' active agency and learning in four construed discourses of assessment identified in the mathematics classrooms: Do it quick and do it right; Anything goes; Anything can be up for a discussion; and Reasoning takes time. Another Swedish case study looked at the assessment process in several subjects (including mathematics) in one fifth grade classroom (Olovsson, 2014). The findings show that the assessment process primarily embodied oversimplified learning goals (e.g. to reach page 52); teaching was organised as individual work with tasks according to a weekly plan; and assessment and feedback were directed at deconstructed, easily-marked goals. There is a considerable need for studies including both larger groups of randomly selected teachers, and covering Swedish mathematics teachers' use of not only one single formative assessment strategy, but a wider array of different formative assessment strategies available to them.

The research reviews (see above) demonstrating the potential of formative assessment for increasing student achievement have implications for teacher education and teacher in-service training. The nature of such implications is dependent on the extent current teaching already employs formative assessment. It would of course be a misuse of resources to initiate professional development programmes in formative assessment if the teachers were already carrying out this practice. This is particularly important when the content of the professional development initiative is formative assessment since it is difficult to implement such initiatives successfully and would require many resources over a long period of time (e.g. Leahy & Wiliam, 2012; Schneider & Randel, 2010). Thus, it is important to study whether there is room for development towards a more formative classroom practice in schools. If such room for development is identified, it is of equal importance to find out how teachers conduct formative assessment, and how this practice can be further developed. Such insights would be useful when making evidence-based decisions about the exact content of professional development programmes in formative assessment. These insights would also be a valuable contribution to the research field by providing opportunities for comparing them to other countries' findings. Therefore, it is valuable to complement existing research on Swedish mathematics teachers' formative assessment practice with studies that include larger numbers of teachers and a wider range of ways of practising formative assessment.

In the study reported in this paper we investigated the teaching of 38 randomly selected primary and secondary mathematics teachers from a mid-sized Swedish municipality in order to answer the following research question: Do mathematics teachers in the municipality use formative assessment in their classroom practices and, if so, how?

Method

Participants

The participants consisted of 21 primary (14 women and 7 men) and 17 secondary (5 women and 12 men) school teachers. They were randomly selected from teachers who were scheduled to teach mathematics in grade four and grade seven during the 2011–2012 academic year in a mid-sized municipality in Sweden. In the selection procedure, schools were first stratified based on the number of classes in grade four and seven respectively, and then one to three teachers were randomly selected from each school depending on the number of classes in these grades. Of the 48 selected teachers, seven primary and three secondary school teachers chose not to participate in the study.

Framework

When analysing the teachers' use of formative assessment we used a framework that operationalizes the definition of formative assessment by Black and Wiliam (2009) above. The framework conceptualises formative assessment as a practice based on an adherence to a "big idea" of using evidence on student learning to adjust instruction to better meet the students' learning needs, and a use of the following five Key strategies (KS) (Wiliam & Thompson, 2008):

KS 1. Clarifying, sharing and understanding learning intentions and criteria for success.

KS 2. Engineering effective classroom discussions, questions and tasks that elicit evidence of learning.

KS 3. Providing feedback that moves learners forward.

KS 4. Activating students as instructional resources for one another.

KS 5. Activating students as the owners of their own learning.

The "big idea" guides all work with formative assessment and clarifies that the teacher needs to collect evidence on student learning, and based on this evidence modify teaching to meet all students' learning needs. For this work to be efficient the first Key strategy emphasises the importance of the teacher and students attaining a shared interpretation of the students' learning goals. The second Key strategy is about collecting evidence on student learning, which can be used to provide feedback that meets students' learning needs (Key strategy 3). Key strategy 4 and 5 state that the teacher is not the only possible active agent

in these processes. The teacher may also support students' motivation and skills so they can take the role as peer and self-regulated learners assessing and providing feedback to themselves and their peers. This framework does not in itself specify particular activities, therefore many activities can be used towards achieving the purposes of the big idea and each Key strategy, although some are more successful in contributing to the attainment of, for example, a shared understanding of the learning goals. A more detailed description of the framework is provided by Wiliam and Thompson (2008).

Data collection

In autumn 2010, all the teachers were observed twice in their classrooms and later interviewed for approximately one hour. The observations provided data for describing the teachers' formative classroom practices. Furthermore, these classroom observations were used in the interviews as a starting point to discuss some of the formative assessment activities that we identified in the classrooms. They were also sometimes brought into discussions in the interview about formative assessment activities the teachers claimed to use. The interviews were primarily intended to obtain the teachers' descriptions of their classroom practice, but also included in-depth data about the reasons for their teaching designs.

An observation scheme was developed and used for the classroom observations. The observation scheme was structured in line with the big idea and the five Key strategies, and included support questions such as: "How does the teacher present the learning intentions?". This example question pertains to Key strategy 1. The teachers were informed that we would visit them twice over a six-week period, but were not told the exact date and time until the evening before the visit. This increased the possibility to observe ordinary lessons rather than lessons specifically prepared with us in mind. In the beginning of the lessons we introduced ourselves and let the class know that we were observing the teacher, not the students. The observations were carried out in grade 6 or mixed-grade classes (grades 4–6) for the primary school teachers and in grade 7 to grade 9 for the secondary school teachers.

The teacher interviews were semi-structured and based on an interview guide. The teachers were encouraged to use their own terminology to describe their practice because they may not have been familiar with formative assessment terminology, such as "Key strategies". The interview guide used the same structure as the observation scheme and included support questions such as: "How do you use the results from the diagnostic test?".

Data analysis

The purpose of the analysis was to identify the formative assessment activities regularly used by the teachers. We define formative assessment activities as: activities used in classroom practice that possess the potential to contribute to the attainment of the goal of at least one of the Key strategies, and the big idea of formative assessment. The framework of formative assessment, that is the big idea and the five Key strategies described above, were used for the analysis. All five Key strategies (KS) contribute to the big idea of using evidence on student learning to adjust instruction to better meet students' learning needs. For example, collecting evidence about student learning (KS 2) is necessary in order to make adjustments that better meet students' needs. However, apart from teacher feedback the teachers' adjustment of instruction is not included in any of the strategies. Therefore, in the analysis, the Key strategies were complemented by this part of the big idea that we named *adjusted teacher instruction* (ATI). It describes what kind of adjustments the teachers make in response to an information collection.

All interviews were recorded and transcribed. The interviewees' statements were then used together with field notes from the observations to create descriptions (including quotes from both data sources) of each teacher's classroom practice regarding the use of formative assessment. The descriptions were structured in accordance with the five key strategies and the big idea. The teachers were given the opportunity to read the description and comment on the researcher's interpretation of their classroom practice. Finally, the descriptions were revised to a version that the teachers and researchers could agree upon; this procedure is a form of participant validation (Kvale, 2009). The descriptions were then used as data for the subsequent analysis. In the descriptions, we searched for activities that we considered as belonging to the five *Key strategies* (KS) or the *adjusted teacher instruction* (ATI). One example would be when the teacher elicits evidence of student learning from diagnostic tests (the activity A6 in table 2), an activity that pertains to Key strategy 2.

We identified frequently used formative assessment activities through a three-step selection process (described in the next paragraph). Those which passed these three steps were then regarded as being regularly used in classroom practice. Since almost all activities teachers use are different in some small way, activities with the same basic characteristics are regarded and presented as the same activity. For example, when teachers use a diagnostic test to gather evidence of student learning (and use this information for adjusting teaching), they may display the evidence for themselves in terms of points or with words describing the students' understanding. Both of these examples are categorised as the acti-vity "the

teacher uses diagnostic tests to elicit evidence of learning." This means that although the results will show different types of activities, not all differences between the ways formative assessment activities are carried out are captured in the presentation of results. A compilation of the most commonly used activities are presented in table 2 in the Results section. In the Discussion section we will discuss the extent to which different identified activities can be expected to contribute to achieving the purposes of the "big idea" and each Key strategy.

In Step 1 all formative assessment activities were identified. A specific challenge in categorising activities in Step 1 concerns the collection of evidence about student learning (Key strategy 2), since this evidence is not always used for formative purposes (e.g. tests used for summative purposes). For activities to be categorised as belonging to Key strategy 2, we required that the information about student learning identified in these activities were used for adjusting instruction for at least some students. To pass Step 2, formative assessment activities must be used regularly by the teachers. For an activity to be regarded as used regularly we required that the teachers express that they often use that activity, such as using the terms "a lot" or "usually use". For teachers who provided a timespan for how often they used an activity, engaging in an activity more than every two weeks was considered regularly, except for activities that relate to something usually done once or twice a chapter (e.g. end-of-chapter tests). Finally, to pass Step 3, we required the classification of an activity as formative to be well founded. The criterion was that the interviewee gave a "rich" description of the acti-vity or that the interview data was supplemented with observation data. A "rich" description meant that the teacher exemplified how he or she uses the activity or gave an elaborated description of the activity. Thus, it was not enough for teachers to just say that they used the activity.

Findings

In total, the primary teachers used 53 different formative assessment activities while the secondary teachers used 35 activities. Individual teachers used 6–20 different activities regularly (except for one primary teacher who used 35 activities) and most teachers used 11–15 activities, see table 1. The median number of activities used was 14 for the primary teachers and 15 for the secondary teachers.

Overall, we found that the teachers did use formative assessment in their classroom practice. We were able to identify and describe the most common formative assessment activities regularly used in their classroom practice. First a general description of these activities is provided,

Table 1. *The number of formative assessment activities used by the teachers*

	6–10 activities	11–15 activities	16–20 activities*
Primary school teachers	4	13	4
Secondary school teachers	2	8	7

Note. * In addition one primary teacher used 35 activities

and then they are summarised in table 2. Thereafter a description of the formative classroom practice of one teacher will be described to exemplify how these activities were included in the classroom practice.

Table 2 shows that altogether the teachers performed activities within all five Key strategies (KS) and had different ways of adjusting instruction (ATI) based on the information they collected about student learning. The primary and secondary school teachers' use of formative assessment activities are broadly similar. The most commonly used activities within each Key strategy (except for KS 5) and within the adjusted teacher instruction are the same for both groups of teachers. There are some differences between the two groups of teachers concerning KS1, 2 and 5, and minor (or no) differences concerning ATI, KS 3 and 4 (see table 2).

The teachers worked with clarifying learning intentions (KS 1), but they mostly did so by only describing stated goals (A1), or through also giving examples (A2). The teachers collected evidence in several ways (KS 2), but seldom from all students at once (this mainly happened once or twice for each textbook chapter when a test (A7), diagnostic test (A6) or homework assignment was used (A9)). When asking questions during whole class sessions, the procedures used only made it possible for a few students to answer the questions. Usually it was the students who raised their hands who would answer, and the students who did not want to answer did not have to. Regarding KS 3 (feedback that moves learners forward), the most commonly-used activity involved teachers giving hints to their students when helping them with tasks. Nevertheless, the quality of the hints could differ considerably, and many teachers stated that when a lot of students needed help in a short time-period, they often decided to help them in a more instructive manner through stating how to solve the task. In principal, the activities used connected to KS 4 and 5 are similar to those used for KS 1. The teachers encouraged students to help each other and take responsibility for their learning, for example, by telling their students that it is good to ask their peers for help and important to take responsibility for using the lesson time for mathematics.

Of particular interest was how the adjusted teacher instruction was linked to how teachers gathered information about student learning (KS 2) since the teachers often made different adjustments depending on how they gathered this information. After end-of-chapter tests (A7), some

Table 2. *The most commonly-used formative assessment activities*

	Formative assessment activity	PT	ST
	KS1. Clarifying, sharing and understanding learning intentions and criteria for success		
A1	**Overall learning intentions**: The teacher describes the overall learning intentions for the area (chapter).	19	17
A2	**Examples**: The teacher exemplifies (uses or relates to examples) in order to clarify overall learning intentions.	3	9
A3	**Learning is a goal**: The teacher formulates the learning as a/the goal in his/her communication with students.	2	8
A4	**Repeated learning intentions**: The teacher refers to the overall learning intentions during ongoing work with the area (chapter).	6	4
	KS2. Engineering effective classroom discussions, questions and tasks that elicit evidence of learning		
A5	**Individual work evidence**: The teacher elicits evidence of student learning during lessons, usually when students work individually in the textbook and while helping them with tasks. The teacher listens to the students' questions and explanations, observing how they solve tasks.	21	16
A6	**Diagnostic test evidence**: The teacher uses diagnostic tests to elicit evidence of learning.	20	16
A7	**Test evidence:** The teacher uses tests to elicit evidence of learning.	9	16
A8	**Share of solution discussion**: The teacher invites students to present their task solutions and then uses these solutions to create discussion and learning in the class.	16	4
A9	**Homework evidence**: The teacher uses homework to elicit evidence of learning.	9	9
A10	**Be prepared to answer**: The teacher puts questions to students that do not raise their hands to create engagement and learning.	6	10
A11	**Discussion questions**: The teacher uses discussion questions to create student engagement and learning and to elicit evidence of student learning.	2	5
A12	**Notebook evidence**: The teacher uses students' notebooks to elicit evidence of learning.	6	0
	KS3. Providing feedback that moves learners forward		
A13	**Hints**: The teacher provides hints (questions/clues) as feedback that guide and encourage the learner to be an active thinker, without giving the correct answer.	14	17
	KS4. Activating students as instructional resources for one another		
A14	**Peer helpers:** The teacher encourages students to help each other (mostly not describing how).	9	12
A15	**Pair/Group problems:** The teacher gives tasks to the students to solve in pairs or groups.	10	11
A16	**Student guidance for KS 4:** The teacher provides descriptions of how to act as resources for one another.	4	6
	KS5. Activating students as the owners of their own learning		
A17	**Autonomy promotion:** The teacher encourages the students to take responsibility for their own learning.	6	12
A18	**Notebook self-assessment:** The teacher hands over the responsibility to the students to correct their own notebooks and take appropriate actions based on their self-assessment.	11	17
A19	**Diagnostic test/Homework self-assessment:** The teacher hands over responsibility to the students to correct their diagnostic test or homework and take appropriate actions based on their self-assessment.	0	7
	ATI. Adjusted teacher instruction		
A20	**Task track decision**: The teacher uses evidence of learning from diagnostic tests to make decisions about further work in the textbook, often to decide between two sets of tasks (basic or advanced).	14	14
A21	**Individual instruction:** The teacher provides extra or adjusted instructions for individual students.	16	11
A22	**Whole class instruction:** The teacher provides extra or adjusted instructions for whole class.	12	11
A23	**Adapted material:** The teacher designs adapted material, e.g., selected tasks and manipulative materials.	11	8
A24	**Right task adjustment:** The teacher ensures students are working with the right tasks, often chosen in dialogue with the student.	6	5
A25	**Group instruction:** The teacher provides extra or adjusted instructions for groups of students.	4	4

Note. Columns 1 and 2 show the formative assessment activity (A). Columns 3 and 4 show the number of primary school teachers (PT) and secondary school teachers (ST) using the activity out of a total of 21 PT and 17 ST. The table is arranged according to the key strategy (KS) and adjusted teacher instruction (ATI) the activity belongs to, starting with the activity used by most teachers within each KS or ATI.

failing students were provided with extra practice tasks (A23) or given individual instruction (A21). The teachers also collected information during the lessons, usually when students worked individually (A5). For example, after noticing that several students were having difficulties with the same task, about half of the teachers discussed this task with the whole class during the lesson, or they adjusted the lesson plan for the following whole-class session (A22). That is, lesson adjustments made by the teachers as a response to information about student learning were often based on only a few students (e.g. information gathered during students' individual seat-work), and when they were based on many students (e.g. end-of-chapter tests) the adjustments were often made for only a few students (i.e., those who failed the test). However, with textbook diagnostic tests the collection of information and adjustments are made for all students. After a textbook diagnostic test has been carried out, a decision was made for each student whether to follow the easier or the harder track in the textbook (A20). Most of the teachers used a textbook structured with tracks and thus the textbook had a serious impact on how the teachers used diagnostic tests to adjust their instruction.

The formative classroom practice of one primary school teacher

To illustrate how formative assessment activities were included in the instruction, this section will provide a description of one teacher's classroom practice. Eric was chosen as a typical teacher since, by using 14 formative assessment activities, he was one of four primary school teachers closest to the median number of activities used. In addition, ten of Eric's activities were used by at least eight other primary teachers and 13 of his activities are found in table 2.

When Eric and his class started work on a new chapter, he read the general descriptions of the learning intentions (Key strategy 1) in the textbook to the whole class, for example: "when we are finished you are supposed to know this" (the teacher refers to a list of bullet points in the textbook saying for instance "[...] know the connection between addition and subtraction" or "[...] know how to use the equal sign"). He used examples to further clarify these intentions. Eric did not repeat the learning intentions in the textbook during the following lessons. However, he spoke to his students about the purpose of carrying out classroom activities being learning. When Eric emphasized learning as a goal, this complemented another type of goal he emphasised. This "what-to-do goal" concerned the students completing a number of tasks. For this reason, the feedback from the teacher often referred to this latter kind of goal, for example, "Good job Johan, you have finished your tasks."

Eric elicited evidence of learning from all his students (Key strategy 2) in diagnostic tests and from homework. Two other activities gave information, but only for parts of the class. Firstly, he collected evidence of learning through talking to and observing students while they worked individually in their textbook. In these situations, he consciously interacted more with the students he thought needed more support. Secondly, he gathered evidence of learning during whole-class discussions. For example, Eric let individual students describe their task solution, and then invited the rest of the class to discuss the solution. He later involved the more insecure students in those discussions.

Eric gave feedback formulated as hints to guide students in the right direction (Key strategy 3) when he interacted with the students while they worked individually. Eric encouraged (told) his students to help each other, but overall the students did not interact very much, and organised pair or group work was rare. Eric had not explicitly told the students about how they can act as resources for each other (Key strategy 4), but he indirectly modelled this behaviour and provided opportunities for this when he invited students to show their solutions on the blackboard. Eric often spoke to his students about taking responsibility for peers' learning as well as their own (Key strategy 5). In addition, Eric allowed his students to correct their own notebooks.

Eric adjusted his instruction in different ways based on the evidence of student learning. At the beginning of a chapter, all the students worked with a set of basic tasks in the textbook. When these basic tasks were completed, a diagnostic test from the textbook was used to make a decision on whether to continue with basic or advanced textbook tasks. Another way Eric modified instruction was by providing extra, or adjusted, instruction for individual students. In order to do this, he used gathered information from listening, observing and talking to his students while they worked on tasks, as well as from diagnostic tests. Eric also adjusted the number of weeks the class worked on a chapter to be longer or shorter than planned.

Discussion

This paper reports on the first Swedish study of a randomised selection of mathematics teachers' use of an array of different formative assessment strategies. The study contributes with knowledge about the characteristics of these teachers' formative assessment practice, and complements existing small-scale studies focusing on a single formative assessment strategy used by Swedish mathematics teachers (Björklund Boistrup, 2010; Olovsson, 2014). It provides possibilities to compare the formative assessment practice in a Swedish municipality with practice in other

countries, and may in combination with future studies constitute one part of the basis for conclusions about the characteristics of the formative classroom practice carried out in larger parts of Sweden. The identification of the characteristics of the teachers' formative classroom practice may also be useful when making decisions about professional development programmes in formative assessment.

This study shows that the random sample of participating mathematics teachers do regularly use formative assessment activities within all five Key strategies, and apply different methods of adjusting instruction based on the retrieved information about student learning. However, the identified characteristics of this practice also show that the teachers' classroom practice leaves much room for development towards a formative classroom practice that uses more of the potential of formative assessment. Despite the numerous formative assessment activities used, many of them may be regarded as rather inefficient for contributing to the purposes of the big idea and five Key strategies. These formative assessment practices is in conformity with classroom practice argued to be in place in several other countries (Carless, 2005; Smith 2011; Stiggins, 2002), and will be discussed in the next paragraph.

In the following, we will discuss the extent to which the teachers' practice can be expected to contribute to the attainment of the purposes of the big idea and each Key strategy, and exemplify how the practice may be improved. Collecting evidence about student learning (Key strategy 2) has the potential to inform the teacher about the next suitable step in instruction in line with the big idea of using evidence about student learning to adjust instruction to better meet students' learning needs. The teachers collected evidence in several ways, but in their everyday practice they mostly collected evidence from just a few individual students rather than the entire class. Many of the adjustments were based on information about a few students, although instruction adjustments were made for the entire class. Alternatively adjustments were made for only one student at a time. In addition, when the teachers posed questions during whole-class sessions their purpose was often not to collect information, but to generate engagement in learning. However, students who are not motivated to answer questions are not required to do so, hence these students will not engage in these learning activities and provide the teacher with information about their understanding. Often the teachers did not plan their questions in advance, which makes it less likely that they used high-quality questions designed to reveal important student misconceptions that needed attending to. A developed practice that would better meet the purposes of Key strategy 2 (engaging and collecting important information about each student's learning in

order to modify instruction to meet their needs) may include the use of an all-response system, for example, students writing their answers on small whiteboards. With this kind of question management, the teacher can both engage students in thinking and rapidly receive information about all their students' learning. Based on this information the teachers can adjust instruction according to different groups of students in their class. Thus, using an all-response system together with planned questions targeting specific learning intentions has the potential to contribute to adjustments that are tailored to better meet all students' learning needs.

The teachers had similar ways of working with Key strategies 1, 4 and 5. The teachers described the learning goals (Key strategy 1) and they encouraged their students to help each other (Key strategy 4) and to take responsibility for their own learning (Key strategy 5). But they rarely used activities that help their students with specifically how to take an active role in these Key strategies as peer-assisted and self-regulated learners. Thus, the formative classroom practice was mainly the responsibility of the teachers, a consequence which researches predicted to happen for the English national strategy for assessment for learning (Swaffield, 2011). Consequently, there is much room for development also regarding these three strategies. Attaining a shared understanding of the learning goals (Key strategy 1) could be facilitated by involving the students in formulating, discussing and negotiating the goals, as well as providing more detailed examples and feedback on the students' interpretations of the goals. Teachers can support students' progress in becoming well-functioning peer-assisted (Key strategy 4) and self-regulated learners (Key strategy 5) by describing how to assess and provide feedback to their peers and to themselves. The teachers can also provide opportunities for students to practice these learning activities, as well as giving them feedback on the quality of, and how they can further develop, these types of learning. With regard to Key strategy 3 there are several ways the teachers could develop their feedback to be more consistent with the types of feedback indicated by research to be beneficial for student learning. For example, the teachers could complement their clues that encourage the students to think with feedback that helps students identify what they have already done successfully (Hattie & Timperley, 2007). Such feedback may motivate students to make more effort to use the clues about how to carry on in their learning. The teachers could also provide more carefully structured feedback that specifies suggestions for future actions, along with extra time to use this feedback.

Research has highlighted the difficulties of supporting teachers in learning and implementing formative assessment (e.g. Leahy & Wiliam, 2012; Schneider & Randel, 2010). However, the above discussion shows

that there is room for much improvement in the teachers' formative classroom practice, and consequently that there is potential in those professional development initiatives in formative assessment that actually work. In such professional development programmes the teachers improve their formative assessment practice to the extent and quality needed to attain the large student learning gains research has shown possible (see refe-rences in the Introduction). Furthermore, the evidence provided in this study about how teachers currently carry out formative assessment, and how they may improve this practice, may be used in the design of professional development programmes. Programmes that take into account the characteristics of the current formative assessment practice are likely to better meet the teachers' learning needs.

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