



From Passenger to Pilot – Using Formative Assessment to Support Students With Intellectual Disabilities to Become Self-Regulated Learners

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Students with intellectual disabilities (ID) risk leaving school without having the opportunity to develop their independence to become less reliant on others. This study aims to gain insights into how formative assessment as a teaching design can support self-regulated learning (SRL) among students with ID. Two experienced Swedish special school teachers, using formative assessment to support students' SRL competence, participated in this study. Data consisted of the teachers' written teaching descriptions, classroom observations, and teacher interviews. The analysis showed that the teachers managed to implement a formative classroom practice aiming to support the students to develop subject-matter knowledge as well as SRL skills. Three themes of challenges were identified: Low expectations and caretaking, Experiences of shortcomings, and Learning difficulties. Overcoming such challenges is discussed. The study shows promising examples of the use of theories and principles of formative assessment to promote SRL competence among students with ID and also incentives for doing so.

Keywords: formative assessment, self-regulated learning, self-determination, independence, intellectual disabilities, special school

INTRODUCTION

Preparing students with intellectual disabilities (ID) to become self-governing is important in order to reduce their reliance on others later in life. This aim can be communicated in terms of enhancing students' capacity for self-regulated learning (SRL), that is, developing skills to take control of their own learning (e.g., Zimmerman, 2000; Zimmerman and Moylan, 2009). Having SRL competence is important for one's learning, for empowerment, and for having active agency in one's own life. Thus, developing SRL competence can be seen as a learning goal in itself, a goal of lifelong learning capacity.

In Sweden, after a student has been diagnosed with an intellectual disability and thereby has the right to participate in special school education, the parents decide whether to accept that opportunity. Sweden is one of the few countries where education for students with ID has separate national curricula, course syllabi, and timetables (see, e.g., Göransson et al., 2011). In Sweden, ID is defined as a developmental disorder that includes both intellectual and adaptive difficulties in the cognitive, social, and practical domains. Therefore, to determine whether a child could be described as having ID, and would benefit from being enrolled in a special school, the child will undergo a pedagogical, a psychological, a medical, and a social evaluation, to determine whether or not the child has the ability to complete the regular school curricula (Swedish Education Act, 2010:800, Chapter 7, §5). However, even if the evaluations show that the child has the right to take part of the special school support, it is still up to the parents to decide. Children with ID can enroll special school either as integrated in a regular school class or in a class where all students have ID. The present study is conducted in a special school that is a part of a regular upper secondary school for students without ID who are enrolled in for example – the Natural Science program, the Vehicle Engineering Program, the Hotel, Restaurant and Bakery Program, and so forth. Some of these programs are also offered to students with ID, but with customized curricula, separate and smaller study groups, and with one extra year – that is, 4 years instead of 3 years. Traditionally, the schooling in special school classes has emphasized students' social care and well-being to a greater extent than their academic knowledge development (Swedish Schools Inspectorate, 2010). A curriculum reform in 2013 put a stronger focus on the learning goals (Swedish National Agency for Education, 2016), yet segregation, exclusion from general education curricula, and restrained future opportunities remain (Hanreddy and Östlund, 2020).

Nonetheless, the upper secondary special school curriculum does not differ from the regular curriculum with regard to strengthening students' lifelong learning, assuming students' desire and possibility to take personal responsibility for their learning, and ensuring that students are involved in learning and assessment processes (see Swedish National Agency for Education, 2013). That is, the skills and abilities to engage in SRL are as emphasized in the special school context as they are in regular upper secondary schools.

One teaching approach suggested to support students' lifelong and self-regulated learning is formative assessment (e.g., Black and Wiliam, 1998; Hattie and Timperley, 2007; Clark, 2012; Wiliam, 2014; Butler and Schnellert, 2015; Panadero et al., 2018), which gives students active agency in assessment and learning processes (e.g., Björklund Boistrup, 2010; Heritage and Wylie, 2018). The core principle in formative assessment is the process of eliciting and using information about students' learning to adjust the teaching to better meet their needs. Other aspects consider, for example, the use of feedback and students' involvement in this process. The theories and principles guiding formative assessment practice are developed in regular schools, and their applicability in other educational contexts, such as for students with ID, is as yet underexplored (Butler and Schnellert, 2015).

The present study reports on two Swedish special school teachers' use of formative assessment to enhance their students' capacity for SRL. Both teachers work in upper secondary school teaching students with moderate ID and who are enrolled in the Hotel, Restaurant and Bakery program. We explore how the theories and principles of formative assessment can be used to design a formative classroom practice aiming to promote SRL competence among students with ID. Possibilities as well as challenges met while implementing such practices are also in focus. The aim and research questions will be presented in detail later.

THEORETICAL CONSIDERATIONS

In the research field of formative assessment, two strands of educational research, assessment and SRL, are merged to understand how assessment can help students regulate their learning (see Panadero et al., 2018). Below, we explore the concepts of SRL and formative assessment and their relation to each other.

Self-Regulated Learning

Research in SRL has been triggered by a desire to understand how students can become competent and independent learners (Paris and Paris, 2001; Panadero, 2017). According to Zimmerman (2008), SRL does not refer to students' mental ability or academic performance skills. SRL could rather be understood as proactive processes that students may use to gain academic skills, setting goals, implementing strategies, and monitoring their achievements.

Zimmerman's (2000) three-phase model describes the iterative process of *planning* (forethought phase), *monitoring* (performance phase), and *evaluation* (self-reflection phase), where cognitive, metacognitive, and motivational aspects sensible to the social context can be placed into this process (Zimmerman, 2000; Zimmerman and Moylan, 2009). According to this model, self-regulated learners are characterized by productive motivational beliefs and proactive work of analyzing tasks, setting goals, and developing plans to achieve those goals (forethought); working toward those goals and monitoring progress (performance); and self-evaluation and, if necessary, adapting learning strategies (self-reflection). Thus, in the classroom the students should be active agents during such assessment and learning processes; for example, "students who ask questions, take notes, and allocate their time and resources judiciously are in charge of their own learning" (Paris and Paris, 2001, pp. 89–90). Such SRL competence is described as the ability to apply regulatory skills, that is, thoughts and actions used to control the learning process (Zimmerman, 2000).

The development of SRL skills can be described on a continuum from emergent to autonomous use of these skills at four levels: observation, emulation, self-control, and self-regulation (Zimmerman, 2000; Schunk and Zimmerman, 2013). This means that, under certain circumstances, the student can use SRL skills to an extent with increasing independence, but the support needed will vary between situations and students.

On the first level, the student identifies SRL skills from a role model; on the second, the student, with support, emulates the SRL skills; on the third, the student uses the SRL skills supported by structured circumstances; and on the last level, the student can use the skills independently in various situations. Teachers can support students' movement to a higher level of SRL by showing them how to use the SRL skill and verbally describing what it means and why doing so (level 1); organizing activities to practice mastering the SRL skill and giving feedback directed toward SRL (levels 2 and 3); and organizing activities where needed to adapt the SRL skills (level 4).

In general, *social modeling experiences* are crucial for students' development. Both adults and peers can constitute models that the student can be inspired by, emulate, and learn from. Built on Vygotsky's notion of *scaffolding*, adults or peers assist in the process where learners are increasingly able to operate independently. The social support *fades out* whenever possible to let the student take responsibility and have as much active agency as possible. In this way, the support moves from externally initiated social support to internally initiated support (Zimmerman, 2000; Schunk and Zimmerman, 2013). When social support fades out it should be replaced by non-social support that helps and guides students' strategies and actions. Thus, besides modeling, explaining, and motivating, teacher support may include the provision of structures and guidance (e.g., checklists), assignments where guides are needed, and assistance to students in monitoring their strategy use and progress (e.g., by asking reflective questions). The instruction can be of two types: *implicit instruction*, which entails modeling the skills or giving feedback in the form of questions (rather than giving explanations), and *direct instruction* of SRL skills, where the teachers make clear why, when, and how to use the skill.

As will be shown below, the most effective type of formative feedback for enhancing student learning is directed toward SRL (Hattie and Timperley, 2007).

Formative Assessment

Feedback is a core element in formative assessment, but various conceptualizations exist. Per definition, formative assessment includes the process of eliciting and using information about student learning in decisions about the teaching and learning in the classroom to better meet the needs of the students (e.g., Black and Wiliam, 2009). In this process, students' active involvement and the interaction between the teacher and students, as well as between the students, are seen as crucial aspects.

Wiliam and Thompson (2008) provide a conceptualization of formative assessment that defines three teaching and learning processes (*Where the learner is going; Where the learner is right now; How to get there*) and relates these processes to the agents in the classroom (*Teacher, Peers, Learner*) to construct five key strategies that teachers can use to operationalize formative assessment in classroom practice:

1. Clarifying, sharing, and understanding learning intentions and criteria for success.
2. Engineering effective classroom discussions, questions, and tasks that elicit evidence of learning.

3. Providing feedback that moves learners forward.
4. Activating students as instructional resources for one another.
5. Activating students as the owners of their own learning.

It is suggested that an integrated continuous use of all these strategies, embedded into ordinary classroom practice, would be the most efficient use of formative assessment (Black and Wiliam, 2009). That is, teachers should create and make use of "moments of contingency" where students' needs will guide the teaching and learning in the classroom. Empowering students to take charge of their learning is a dimension of formative assessment sometimes called *assessment as learning* (e.g., Clark, 2012; Earl, 2013), demonstrating the fundamental change in thinking about teaching and assessment needed to realize the full potential of formative assessment (see Black and Wiliam, 1998; Clark, 2012; Panadero et al., 2018). Developing control of their own learning process and progress, the students not only enhance their learning of content expectations but also develop skills associated with SRL competence, which can be viewed as two interdependent learning goals in the classroom (Clark, 2012).

Assessment *for* learning has been proposed as an alternative term for formative assessment to state its part of everyday teaching, the students' involvement, and the focus on learning (see Klenowski, 2009). However, since the informants in the present study had participated in a professional development program focusing formative assessment and self-regulated learning, the concept of formative assessment has been used throughout the text.

Using Formative Assessment to Enhance Students' Self-Regulated Learning

Formative assessment classroom practice is suggested to have the potential to promote students' SRL development: "The theory of formative assessment is found to be a unifying theory of instruction, which guides practice and improves the learning process by developing SRL strategies among learners" (Clark, 2012, p. 205). When using the full potential of formative assessment, such practice brings SRL into existence (Clark, 2012). Regulatory goals and processes are central in both formative assessment and SRL (Andrade and Brookhart, 2020), where creating and using internal feedback corresponds to monitoring the learning process in combination with self-adjustment in SRL (Zimmerman, 2000; Schunk and Zimmerman, 2013), which in formative assessment is included in the concept of self-assessment (Andrade and Brookhart, 2016). Self-assessment is recognized as a core element of self-regulation (Brown and Harris, 2016; Panadero et al., 2018), and formative assessment is identified as having a central role in all phases of SRL (e.g., Wiliam, 2014; Andrade and Brookhart, 2016). Hattie and Timperley (2007) summarize the regulatory process in three feedback questions that students can ask themselves – *Where am I going? How am I going?* and *Where to next?* – to direct their learning toward the learning goal. Ultimately, the student can take an agentive role in assessing their own learning with the intention of comparing their current learning status with the goal and assessment criteria to make judgments about their

goal attainment (Sadler, 1989; Nicol and Macfarlane-Dick, 2006; Hattie and Timperley, 2007).

The components of assessment and feedback in formative assessment are essential in support of SRL (e.g., Black and Wiliam, 2009; Clark, 2012; Panadero et al., 2018).

Formative assessment, done well, assists students to conceptualize what it is they are trying to learn, how they will know they are learning, and how they will move forward with next steps. These processes activate students' cognitive and motivational capacities, focus students on their learning goals, and provide feedback and strategies they can use to help them reach their goals. In short, assessment can help students self-regulate their learning. (Panadero et al., 2018, pp. 14–15)

Apparently, in all assessments, making learning goals and the “features of excellent performance” transparent is uncompromising (Shepard, 2000, p. 11). Students' understanding of the learning goal is an “indispensable” condition for monitoring their own learning (Sadler, 1989, p. 121), and feedback not related to the learning goal will have a minimal effect on the student's achievement of that goal (Hattie and Timperley, 2007). Hattie and Timperley, examining different types of feedback, proved feedback directed toward SRL to be the most effective type, however, it is related to corrective feedback and feedback targeting the underlying processes of a task. A form of recipe for how to proceed is crucial in formative feedback:

Simply telling a student to “work harder” or “recalculate your answer” does not possess the qualities of formative feedback or promote self-regulated learning because it does not strategically guide (or scaffold) learning by informing the student how or why they need to do this [...] students are provided with instruction or thoughtful questioning which scaffolds further inquiry and deepens cognitive processing. This instructional approach closes the gap between their current level of understanding and the desired learning goal. (Clark, 2012, p. 211)

Furthermore, students need to find the feedback useful and know what to do with it (Jönsson and Panadero, 2018), and they also need opportunities to make use of the feedback they receive (Hattie and Timperley, 2007). The power of feedback is found in the moment of reducing the discrepancies between actual and desired performance (Sadler, 1989), fulfilled by increasing effort, motivation, and engagement; seeking additional information from the teacher, peers, or other sources; or revising initial ideas and finding new strategies (Hattie and Timperley, 2007).

Seeking and using feedback from others is one SRL skill (Butler and Schnellert, 2015), and the teacher can promote feedback exchange in various ways. The concept of co-regulation has been used to place the processes of assessment within the classroom context (e.g., Heritage, 2018; Andrade and Brookhart, 2020) and expose how students in this context can be given necessary multiple opportunities to narrow their learning gaps (Reinholz, 2016). Through community participation, students may also implement and refine their SRL competence (Clark, 2012), given a “multiplicity of external supports for the student that have the potential for appropriation by the student as metacognitive strategies in the development of his self-regulation skills” (Heritage, 2018, p. 61). In addition, peer feedback is

suggested to help students develop lenses for self-assessment (Reinholz, 2016).

The theories and principles for using formative assessment to support development of SRL competence are clear and robust, but their applicability in a special school and among students with ID is still unsettled.

RELATED WORK

The following text introduces work related to the present study, that is, studies showing the potential in and feasibility of using formative assessment among students with ID in order to improve their SRL competence.

Formative Assessment and Students With Intellectual Disabilities

A formative classroom practice aims to create a teaching climate and a learning culture that support students' motivation to learn, and it aims to provide opportunities to learn how to learn, that is, to develop SRL competence. Engaging in SRL entails students being active and involved in the learning and assessment processes, for example, by choosing to ask a peer for help when needed or following up on and guiding their own learning (e.g., Zimmerman and Moylan, 2009; Clark, 2012). Clarifying and recognizing the learning process together with motivating and incorporating students in this process are also beneficial for students with ID (Hanreddy and Östlund, 2020). This implies that class assistants, who normally do not have to pass a pedagogical exam, need to be involved in terms of supporting students' motivation, activity, and involvement in learning processes.

Findings from four Swedish school development projects about using formative assessment for students with ID showed that class assistants and teachers working as staff teams experienced an enhanced ability to provide feedback to meet the students in their zone of proximal development (Östlund, 2019). Moreover, the teams raised their awareness of dilemmas tied to the important balance between the caring and the learning requirements. The assistants and teachers experienced advantages from working together with formative assessment and described acquiring strategies to give students more time and space in the classroom, to better listen to their students, to provide appropriate feedback, and to help the students become more involved in and aware of their own learning (Anderson and Östlund, 2017). In addition, they reported indications of raised confidence, trust, and interactive learning among the students. Such learning interactions are rare in special schools, where “vertical relationships” with teachers and assistants are found to be more common than “horizontal relationships” with peers (Östlund, 2015). Östlund found that knowledge-oriented activities in particular were characterized by high adult control, while the care-oriented activities better provided the students with more agency and opportunities to take initiative and control.

These previous studies have mainly focused on the learning of the teachers and assistants, yet they indicate the potential for using formative assessment in special schools. However,

using formative assessment is a complex endeavor (Black and Wiliam, 2009), and in special school classes, the assessment can be particularly demanding because of the heterogeneity among the students (Karvonen et al., 2013). Challenges as well as how to overcome them were also reported by the staff teams in the study by Anderson and Östlund (2017). Challenges they found in teaching and assessing students with extensive learning difficulties included getting all students involved, dealing with huge variations in students' learning needs, finding alternative ways of communication, and so on. An example of overcoming challenges was given in the situation of asking students questions such as "What have you learned?" and "How did you learn that?" The staff found these questions too broad and abstract for the students to answer, so instead they switched to asking the students to share and put into words what they had done during the lesson. Still keeping the aim of opening up for students' own thoughts and words.

Promoting self-regulated learning among students with ID has had a central position in research fields other than education, often communicated in terms of self-determination.

Self-Regulated Learning and Students With Intellectual Disabilities

Within the field of disability research, self-regulation skills are spoken of in terms of self-determination. Providing opportunities to develop self-determination skills has been identified as a best practice in transition services (preparing for life after school) and special education (Test et al., 2009; Shogren et al., 2012; Lee et al., 2015). Self-determination is seen as important for the ability to act as the causal agent in one's own life (e.g., Shogren et al., 2015; Wehmeyer, 2015) and for educationally valued outcomes when students self-direct their own learning (e.g., Wehmeyer et al., 2000, 2012). Comparing theories of self-determination and self-regulation, Butler and Schnellert (2015, pp. 126–127) found those theories well aligned, but recognized that self-determination theories may add knowledge about how the instructional environment can be structured to enhance student motivation by fulfilling basic psychological needs.

Students with ID are found to be less self-determined than non-disabled students (see Wehmeyer et al., 2007), and self-regulatory strategies in problem-solving tasks are less developed among adolescents with ID than among children without ID (Nader-Grosbois, 2014). Students with various learning disabilities can experience specific challenges in regulating their own learning because of, for example, weak executive functions, metacognitive knowledge, and motivational beliefs (Butler and Schnellert, 2015; Licardo and Schmidt Krajnc, 2016). Yet lower capacity for SRL can be due to a lack of opportunities and support to develop SRL competence (Wehmeyer et al., 2007). Teachers may lack sufficient knowledge about how to support SRL competence among their students (Licardo and Schmidt Krajnc, 2016), or they may believe their students lack the prerequisite cognitive abilities to build such competence (Wehmeyer, 2005). Previous studies about self-determination show that it is possible for students with ID to develop skills associated with SRL competence and that there are strong incentives for education to

create opportunities for such development (Butler and Schnellert, 2015; Wehmeyer, 2015).

How to Support Students With Intellectual Disabilities to Become Self-Regulated/Self-Determined

Burke et al. (2020) reviewed 34 articles reporting on interventions aiming to promote overall self-determination and skills such as problem solving, choice and decision-making, goal setting and attainment, and planning among students with ID. The most frequent intervention (35%) – using the Self-Determined Learning Model of Instruction (SDLMI) – was found efficient in promoting, for example, students' problem-solving and decision-making skills. This model aims at engaging students in self-regulated and self-directed learning, raising attainment of academic and functional goals, and enhancing access to the general education curriculum. In practical terms, students are assigned a self-regulated problem-solving process where they set an educational goal, develop an action plan to reach the goal, and self-monitor and self-evaluate to determine whether sufficient progress is being made toward the goal or if adjustments are needed. The goal of and processes in the SDLMI are well aligned with goals of formative assessment and processes in SRL (further outlined below). There are a number of studies supporting the effectiveness of SDLMI. Shogren et al. (2019) reported on 40 special education teachers' implementation of the SDLMI to support their students' self-regulation skills to enhance their chances of obtaining meaningful employment. After 1 year of implementation, the teachers reported a positive impact on their students' self-regulation skills. In a later study, Shogren et al. (2020) reported on a 2-year intervention showing a positive impact on students' self-regulation skills, when 64 special education teachers used the SDLMI to enhance their students' skills to set and reach learning goals.

Similar to formative assessment, the SDLMI is a complex instructional model requiring teachers to creatively embed the model practice in their existing classroom practices and change from a primarily teacher-directed approach to a primarily student-directed approach (Shogren et al., 2020). Teachers working with students with ID also need to consider risks of dependency, learned helplessness, low self-value, and low self-esteem, and they need to ensure that environments and activities empower the students to become actively causal agents (Licardo and Schmidt Krajnc, 2016).

However, there is still a need to develop knowledge on how to design instructions that offer opportunities and support for lifelong learning for students with ID (Raley et al., 2020). In this study, we use theories and principles of formative assessment developed for general education and explore ways in which they are applicable in special schools. Using formative assessment as a guiding model can be advantageous because it takes into account the classroom situation as a whole, focusing on creating a teaching climate and a learning culture that will support students' motivation to learn, and on providing them with opportunities to learn how to learn.

AIM AND RESEARCH QUESTIONS

This study aims to offer insights into how a formative classroom practice could be designed to support SRL competence among students that are enrolled in special schools and have moderate intellectual disabilities. A further aim is to capture challenges that may arise as well as ways to address those challenges.

RQ1: How did the special school teachers use the principles of formative assessment to design a classroom practice to support their students with intellectual disabilities to develop self-regulated learning skills?

RQ2: What challenges did the special school teachers identify and address when using formative assessment to promote self-regulated learning among students with intellectual disabilities?

METHOD

The present study concerns teachers' teaching design and their positive and negative experiences of using formative assessment to promote students with ID to develop their SRL skills. The present study therefore has a qualitative approach gathering and triangulating qualitative data such as: observations, interviews, and the teachers' written descriptions of their teaching designs.

Participants

The teachers in the present study were two out of more than 20 upper secondary school teachers participating in a five-semester-long professional development program (PDP) focusing on teaching designs of formative assessment. Four of the teachers taught students with intellectual disabilities (ID) and two of those agreed to participate in this study. The authors of the present paper participated in the PDP intervention as researchers with a special interest in teaching students with intellectual disabilities.

The two participating teachers had long experience (>15 years) of teaching students with ID and were both teaching students enrolled in the Hotel, Restaurant and Bakery program. During the PDP, they both pointed out that it was important and challenging for their students to develop self-regulating skills, and they also called for guidance on how to implement formative assessment in a special school context. Their names, Maria and Julia, are fictitious.

Data Collection

Data collection during the PDP consisted of each of the two teachers' three written descriptions of their teaching designs (after semesters two and four and after the PDP), 11 h of classroom observations, and four teacher interviews. To write these descriptions, the teachers were asked to describe their teaching context, their teaching designs with respect to promoting SRL and how they used formative assessment to do so. They were furthermore instructed to present detailed examples of their teaching design, how they enacted the three phases of SRL and the key strategies of formative assessment. The observations were not recorded but extensive notes were taken following an observation guide (see **Supplementary Appendix**). The observations aimed to

capture teaching activities that could be identified as formative assessment (the core principle in formative assessment and the five key components) and as having the potential to support students' self-regulation (in the three phases and development levels of SRL). The authors used the SRL and formative assessment activities identified during observations and from the teachers' written descriptions as a starting point during the interviews. The teachers were asked to describe how they chose, planned, carried out, and reflected on these activities, and also exemplify and describe any development regarding students' SRL skills. Finally, the teachers were asked to share their experiences of challenges that arose during their teaching and how they decided to deal with them (see **Supplementary Appendix**). The semi-structured interviews were audio recorded on all occasions but one. Each researcher followed one teacher.

Ethical Considerations

All necessary ethical requirements set by the Swedish Research Council (2002, 2011) were followed. Accordingly, the aspects of beneficence, non-maleficence, informed consent, and anonymity have been taken into account in planning and carrying out the study. To ensure the students' anonymity, the observations were not recorded and no notes on students' utterances were taken. All teacher-student interactions narrated in the Results section originate from the interviews or the teachers' written descriptions.

Data Analysis

Data regarding Maria's and Julia's classroom practices were analyzed separately by the two authors. The data analysis consists of the following steps and is guided by the frameworks of formative assessment (William and Thompson, 2008) and of self-regulated learning (Zimmerman, 2000; Schunk and Zimmerman, 2013).

To answer RQ1, the first step was to conduct a direct content analysis (Hsieh and Shannon, 2005) including all data to identify activities that could be categorized as a formative classroom practice – that is, as any of the five key strategies (William and Thompson, 2008). As a second step, the identified activities were, if possible, categorized as supporting any of Zimmerman's three phases of self-regulation: the forethought phase, the performance phase, or the reflection phase. The third step was to classify these supportive activities as targeting any of the levels of self-regulation: observation, emulation self-control, and self-regulation (Zimmerman, 2000; Schunk and Zimmerman, 2013).

To address RQ2, interviews and teachers' written teaching descriptions were further analyzed to identify challenges experienced while introducing formative assessment to promote self-regulated learning among students with ID. Along with this analysis, any strategies used to overcome the challenges were also noted. A thematic content analysis (Braun and Clarke, 2006) was thereafter conducted to form themes used to categorize the identified challenges.

The results of the analysis are presented in the following and deal with one research question at a time.

RESULTS

In the following, we present the results along with the research questions. We start with two narratives describing how Maria and Julia implemented a formative classroom practice with the aim of supporting their students' self-regulating skills. The narratives are presented separately since the analysis showed that Maria and Julia integrated the aims of developing students' subject and self-regulation skills to different degrees. The narratives will therefore exemplify two approaches on how formative assessment could be used to support students to develop their self-regulated learning. Maria who focuses on subject learning goals and uses formative assessment to support students to reach these goals. She is stressing the fifth key strategy of formative assessment – Activating students as the owners of their own learning – to promote students' SRL. Julia who has chosen to address students' SRL as a specific and articulated learning goal and uses formative assessment to support her students to reach that goal while learning subject skills. The results regarding RQ2, identifying challenges and how these challenges are addressed, are presented jointly.

The Teachers' Use of Formative Assessment to Support Self-Regulated Learning

Maria's Classroom Practice

The narrative is based on Maria's teaching of subjects such as language, home and consumer studies, and administration in a group of eight students with ID. The students are 17–18 years old and in their last year in upper secondary school. Some of the students have additional disabilities, such as language or autism spectrum disorder, but all students have basic skills in reading, writing, and maths. We start by describing Maria's basic teaching strategies, followed by her way of using each of the key strategies of formative assessment to support her students' learning, where supporting students' SRL is accounted for as part of key strategy five.

Maria focuses on the knowledge and competencies specified in the syllabus that students will benefit from in the long term. The students should learn for life (including developing independence) and learn to learn from their own experiences and from interaction and communication with peers. With respect to the students, Maria does not put them in situations that are too demanding, for example, by asking very broad questions such as "What can you do to learn this?" However, she believes that the students can develop independence if they are given opportunities to solve reasonably difficult problems themselves and find the routines that work for them, and by developing a dynamic mindset. That entails believing in their possibilities to get smarter and influence their achievements: "[so] they realize that they have the opportunity to influence their own result and that it [the achievement] is connected with the effort they make and whether they do it in the smartest possible way."

Maria uses formative assessment in a way that aims to support the students to be active and engaged in the assessment processes

within the frames she has set up. The five key strategies in formative assessment are used as follows:

Clarifying, Sharing, and Understanding Learning Intentions and Criteria for Success

Maria makes clear the connection to the syllabus when she presents learning goals on the whiteboard and clearly communicates the expectations, for example: "You will learn to write an instructive text." To help the students understand what they are aiming for, she discusses the learning goals, refers to them during lessons and from one lesson to the next, and uses various strategies to clarify what constitutes quality and progress. To concretize and visualize what "quality" and "making progress" mean, Maria shows examples of instructive texts of low, average, and high quality. She often role-plays a situation, acting as a student who is comparing her instructive text to the levels of quality and checking her progress: "I [make] a mistake and correct myself, say no, it is better if." In addition, she discusses the quality levels she wants to visualize. Maria believes that the concrete situation is crucial for students' understanding of what it means to do the activity in line with what is desirable.

Engineering Effective Classroom Discussions, Questions, and Tasks That Elicit Evidence of Learning

Maria collects information about students' learning, which she uses to adapt tasks to suit their specific interests and needs. For example, her students write their instructive texts using Google Docs, which makes it easy for Maria to observe their work. To include the students in the assessment processes, she asks them to tell or write to her about what they already know and what they want to learn more about to develop their instructive texts. Maria also elicits evidence of learning during classroom discussions, during which she passes questions between the students – as well as activities such as showing thumbs up, aside, or down to get the students' perceptions of their learning. She also asks questions that the students answer individually by holding up mini-whiteboards, an activity that aims to engage the students as well as provide information about their learning needs. Maria emphasizes the importance of a safe classroom climate for the students to share and demonstrate their knowledge.

Providing Feedback That Moves Learners Forward

Maria provides oral, written, and practical feedback, striving to make it clear and concrete, goal directed, task directed, and reflection directed. For example, when writing comments in Google Docs to support her students to develop their instructive texts, she points out what they have accomplished and possibilities for development. To encourage students to actively reflect on their accomplishments and their progress toward the learning goal, she refers to goals written on the whiteboard, and uses question formulations such as "What if?.", "Why can't we take . . .?", and "How did you know?" Maria monitors students' understanding and use of feedback, and shows the students that progress has been made thanks to their efforts and use of feedback: "When they then see that this gave good results, I remind the students that they used the feedback I provided. Hopefully, the student understands that this was a favorable strategy that he wants to continue using."

Activating Students as Instructional Resources for One Another

Maria encourages her students to help each other by showing them how to give appropriate help, dramatizing giving or receiving help, and supervising them as they help each other write an instructive text, for example. The whole class is often placed around a table, where experience and knowledge exchange, joint discussions, and cooperation characterize the interaction. During these sessions, Maria talks about the purpose of helping each other, recognizes when the students act as resources for each other, and points out how they have used their own and others' experiences and knowledge: "When you learn together, you use what you already know and what others know." She acknowledges everyone's ideas as important and clarifies that being able to help others is an important future competence at any workplace; "At a job, you need to help each other."

Activating Students as the Owners of Their Own Learning

Maria aims to support her students to develop independence, which she describes as having strategies to solve problems and making use of available resources. In the classroom, she encourages the students to solve problems by themselves, but also to ask for help if needed. Below, we use the two models of SRL – the three-phase cyclical model and the four-level development model (see section "Self-regulated Learning") – to show how Maria uses the fifth key strategy of formative assessment and also to clarify how the use of the first four key strategies enables students to regulate their learning.

Forethought: Task Analysis, Goal Setting, Strategic Planning and Developing Motivational Beliefs

By clarifying the learning goals and success criteria and referring to these in her feedback, Maria helps the students understand what they are aiming for. Maria sets the learning goal, but the students can influence the plan for reaching the goal within the frames Maria has set up and communicated. For example, during trainee placement periods she occasionally asks students to identify learning goals they would like to start working with after the period. For example, they might identify a situation where an instructive text is needed, such as instructions for closing a cash register. Maria uses feedback questions linking back to previous experiences from planning, time scheduling, a good learning environment, and so on. She uses questions such as "What needs to be done?", "What equipment do you need?", "How many lessons are available for this?", or "How can I get there in the best, smartest, and maybe also in the most enjoyable way?" Such questions support planning but also motivational beliefs because students can perceive their previous successes and opportunities for development. Students' motivation may also increase because Maria shows that she believes in and expects the students to make plans and solve problems.

Performance: Working and Monitoring Progress Toward Goals

By letting the students solve problems themselves – while still providing tools, structures, and feedback – Maria supports them in the performance phase. Because she has identified students' learning needs, for example, in their instructive texts, she can

provide targeted feedback that fits those needs. Moreover, she provides feedback that leaves the active agency with the students. In her feedback, Maria uses hints (e.g., What if . . .?) and questions (e.g., What is in the plan?, What can you do to solve this?, If you don't know, how do you proceed?) that support students' monitoring and reflection on the plan, the process, and their progress. She also introduces useful questions such as "Is this reasonable?" and provides references to relate to when assessing whether something is reasonable. Furthermore, she helps the students develop "smart thinking" by talking with them about the best way of learning and about useful strategies. For example, she can tell a student to ask a peer to read the instructive text and respond if they make sense. Sometimes Maria uses worksheets questioning with the headings: "What I do well, What is hard, What I need help with."

Self-reflection: Self-evaluation and If Necessary Adapting Learning Strategies

Maria helps students take experiences with them, make good attributions to success, and develop a dynamic mindset when they are in the evaluation and planning phase in a new SRL cycle. More specifically, Maria makes students notice and link what they have learned in one situation to benefit the next situation. For example, they could look at a previous instructional text about closing a cash register when about to write instructions for unpacking goods. She helps the students link progress and success to their efforts, work, and strategies. For example, in a home and consumer studies lesson, she says: "Do you notice that you are doing this and that [. . .] by training to cut cucumbers in slices, you now [know how to do it]," or "Now, instead of just pressing the knife as you did at the beginning, you sawed [the bread] and did better. You are now using what you have learned. Look at how well it works." Maria wants her students to perceive that they can influence the result by using experiences, successful strategies, and their efforts.

Four Levels of Self-Regulated Learning Development

In this section, we use conceptions from section "Self-regulated Learning" (in italics) to illustrate the strategies Maria uses to support her students as they move toward and higher levels of SRL. For Maria, developing SRL competence means solving problems more independently and effectively. This includes having strategies and using available resources, for example, a classmate. On level one [observation, as described earlier (6.1.1)], Maria demonstrates, by role-playing a student, how to use earlier written instructive texts to observe the quality of a new text. Maria furthermore *models* how to solve a problem by, for example, asking a classmate for help. She role-plays the situation and *verbalizes her thoughts*: "I changed my mind and will ask a classmate for help. [. . .] How do I do this?"

To help students move to level two (emulation) and three (self-control), Maria provides *opportunities for the students to practice* solving problems *by themselves*; that means that they get an opportunity to emulate the strategies for independent problem solving that Maria has modeled. In her feedback, she activates the students and supports their use of strategies, for example, looking at previous experiences of writing an instructional text.

To motivate students to emulate independent problem solving, Maria explains to the students that they will need to solve problems by themselves in the future. To provide *social support* for this, she describes how to use the SRL skills, for example, “If you can’t solve the problem or complete the task, you ask for help,” or “If you make a mistake, you can change strategy and try again.” Maria also helps the students give feedback to themselves, such as by writing tips on a cooking recipe for what to do next time, and she has them reflect on their strategies with the help of questions such as “What if.?”, “Why can’t we take.?”, “Wow did you know?”, “What can you do to . . .?”, and “What does it matter?” The students can *use the SRL skills supported by structured circumstances*. Maria describes how she challenges each student in the zone of proximal development, not solving a problem whenever the student can do this by themselves. The *clear expectations and support structures* in Maria’s teaching help the students solve the problems they are facing. For example, Maria sets frames for how, where, when, with whom, for how long, what to do when the task is finished and more. She provides *non-social support* such as worksheets to monitor progress by marking what is completed or what elements are used. Such materials also help the students notice the beginning and end of an assignment, which Maria sees as important for developing their independence.

During the observed lessons, it was noted that the students acted as independent problem solvers, for example, students who state that they want to try themselves when the class assistant offers help. Moreover, students show an awareness of what they should learn, for example, what language skills they should develop when writing a text. They also show engagement in planning the activities for how to achieve learning goals, for example, by proposing learning activities and then voting for the best alternative. Neither the observations nor Maria herself gives any example of students who have reached level four (self-regulation). However, Maria has noticed that the students have learned to know themselves better and become more aware of what they need to develop. Both the observations and Maria’s telling provide examples of moments of peer feedback that occur spontaneously, which she believes are due to students experiencing that they can do better by helping each other. Maria talks with her students about reaching level four, often in the future workplace scenario where the students as employees need to solve problems by themselves and continuously learn new things.

Julia’s Classroom Practice

The present study focuses on Julia’s teaching of eight students, 18–19 years old, in their last year in upper secondary school. None of the students have any additional disabilities, and they all have basic skills in reading, writing, and maths. Julia’s work is carried out in a practice kitchen, teaching students the work skills needed for preparing food in eateries. Julia has a profound goal for her teaching: to train her students to become self-regulated and uses formative assessment to support them to develop their self-regulated skills. The following will describe Julia’s way of promoting her students to become self-regulated learners engaging in Zimmerman’s three

phases: forethought, performance, and reflection. Her formative classroom practice supporting her students’ self-regulation skills is also accounted for.

The Forethought Phase – The Goal, Acting as Pilots

Julia describes her long-term goal: to support her students to become self-regulated adults. She wants them to have a job and be able to, as far as possible, live an independent life. As an important short-term goal, she aims to support them to become more self-regulated during her lessons. Julia points out:

They need tools to be independent in the kitchen (during lessons).
They need strategies they can use at their future workplace.
Working at an eatery, they may have co-workers to ask for advice, but no one that will “hover over them,” constantly telling them what to do. They need to be professionals.

Julia describes her students as slowly becoming aware of the fact that “school is not forever” and they need to prepare for, but also to look forward to, their adulthood. She points out, however, that it is not easy for her students to understand “adulthood” and what it takes to become self-regulated. She has therefore introduced a metaphor of pilots and passengers to discuss, practice, and evaluate their self-regulation, which she describes as follows:

We need a concrete way of talking about being an adult, and being able to self-regulate. I encourage them to become “pilots” of their own lives, not “passengers.” We talked a lot about the importance of being in charge, of making decisions and solving problems that arise, just like pilots do . . . and the fact that they cannot always rely on someone else to work things out, like passengers do.

Julia’s way of using pilots and passengers as notions of self-regulation is well integrated in her teaching. During the observations it was for example noted that she continuously discussed goal setting together with her student (key strategy 1) not merely in terms of “baking bread,” but rather as “baking bread as a pilot.” Her way of using the metaphor to describe learning goals was also used by students who were observed to often describe their actions in terms of – setting the table, frying, cleaning – as pilots. Furthermore, in the performance phase, she introduced activities involving strategies to act as pilots.

The Performance Phase – Strategies to Act as a Pilot

The activities Julia introduces in the kitchen consist of three steps: to observe a professional, to imitate a professional, and to become a professional. She aims for the students to become professionals, pilots in the kitchen, practicing their self-regulation skills. During the lessons, she gathers information about her students’ accomplishment to prepare food as well as their ability to act as pilots doing so (key strategy 2). Based on that information she provides feedback to improve their cooking using self-regulatory strategies (key strategy 3). Some examples are presented below.

How to Organize Work – As Pilots. Julia has a large whiteboard to support her aim of developing students’ self-regulation skills. She introduced the whiteboard as a tool for planning their work as it is a common way of organizing work at an eatery. Julia began by showing the students how a professional makes a plan.

“I started by telling them why a whiteboard is an important tool to organize the work in a kitchen and I told them: ‘This is what you need to do as pilots – I will show you.’” She showed her students that to prepare a lunch, for example, there is lots of work to do and there is a need to divide the work between the staff (students). She listed all tasks in a table together with the name of the student assigned to perform each task. She told her students that she divided the work based on her insights on what specific students needed to practice, for example, boiling potatoes, frying fish, laying the table, etc.

Her next step was to invite the students to write on the board, imitating her as a professional. “After a couple of months I took the next step, telling them: ‘Now the whiteboard is yours; act as professionals, as pilots. What do you need to write down on the board to make lunch? Try to do as I did before.’” She added the table with several of the cells empty and no names. The students worked together to add the missing tasks and chose tasks by adding their names. When Julia noticed that the students chose tasks they were already good at, she challenged them: “Okay you chose boiling pasta; is this a good choice for you? You already know how to do that – are you the pilot of your learning now?” As the final step, Julia merely wrote, for example, “Fish and potatoes” on the whiteboard and said, “Now you are pilots; work as professionals and plan your work.” During the last observation, it was noted that Julia afterward left the room to leave the responsibility to her students, whereupon the students initiated a collaborative work to identify tasks and divide them among themselves. After a while, the whiteboard was filled with tasks, with the name of a student beside each one. When asked about her students’ ability to plan their work, Julia responded, “It has taken some time to support them to become ‘planning-pilots.’ But now I merely write the dishes that they need to prepare and then I leave them to plan their work.”

How to Prepare Ingredients – As Pilots. Julia described preparing ingredients such as potatoes, onions, etc. as challenging. For example, besides peeling the potatoes, the students need to slice them to go into a specific dish, such as a gratin. She described how, earlier, she had had them observe her slicing potatoes while discussing strategies for deciding on a size suitable for a gratin. These included comparing the thickness of the potato slice with the thickness of their cellphone or with a picture in the recipe, or by asking a friend. During the observation, Julia had moved on to the imitation step, and she had her students slice their potatoes together with her, using her strategies of making the slices moderately thick. The students were observed to aim for making slices the same way as their teacher did, but also to make use of the strategy to compare thickness with their cellphones. After the observation, Julia pointed out that her students now knew how to chop onions without any support: “We have been practicing chopping onions for a long time, and now all eight of them have strategies for how to do that as pilots.”

How to Make Things Tasty – As Pilots. Cooking involves several operations, where adding spices and salt to make something taste good is essential. Julia pointed out that it is challenging to know what to add and estimate how much. The strategy Julia introduced was articulated as “add a little, stir, and taste.” This

was implemented following the three steps described earlier. The students observed and imitated, and eventually most of them were able to take initiative on their own to add spices. As Julia pointed out:

I would say that this difficulty is partly due to their low self-esteem. They do not trust themselves to determine whether the taste of the soup is fine. I still have students who want me to taste and decide, and my answer is consistently that they should rely on themselves or ask a classmate.

During the observations, it was noted that Julia did always answer questions regarding spices by telling the students to trust themselves, whereupon the students chose the strategy – add a little, stir, and taste – or ask a classmate to taste.

Working as a Team, Co-pilots. Julia said that working as a team during the lessons was one way of providing students with a strategy to practice their self-regulation and preparing them for future collaborative work in a kitchen. Julia described how she introduced teamwork by acting as their colleague (classmate), showing how collaboration might work. That entailed asking and supporting each other and sharing the responsibility to prepare lunch (key strategy 4). During their training, the students moved on to imitate her, still as their colleague, and at the end of their training, at the time of the observation, Julia pointed out that now her students were able to share and take responsibility for their work mainly without the teacher telling them to. For example, as earlier described, when her students used the whiteboard to make plans together.

Julia’s examples of teaching students to prepare food and providing them with strategies to handle emerging problems are all conducted in steps. As the narrative shows, her students gained skills in both self-regulation and food preparation at Zimmerman’s third level. The skills include using the whiteboard for planning, asking each other for help, chopping vegetables, and so forth.

The Reflection Phase – Are You Acting as a Pilot?

Julia evaluates her students’ self-regulation constantly while they are working in the kitchen. By observing and interacting with them, she gathers information about their practicing of self-regulation as well as kitchen skills (key strategy 2), and she provides immediate feedback accordingly (key strategy 3). She says:

My students need to get feedback in close relation to their actions. To gather information now and provide feedback during the next lesson is not very beneficial. It is not very likely that they will remember the situation 1 week later . . . everything has to be “now and never later.”

Julia says that when her students are preparing lunch, for example, and they turn to her asking questions such as “How thin should I chop the carrots?” or “How much salt should I add?”, she always takes the opportunity to promote their self-regulation by providing feedback, such as “Don’t forget that you are the pilot; how thin do you want them to be?” or “How do you know how much salt you need?” She explains that she tells them that she will not answer their questions by telling them what to do, that

it is more important that they rely on their own ability to use strategies to solve problems in the kitchen than it is to make a perfect soup. Only when things get really out of hand, with food almost being burnt, etc., does she interfere and take over. Julia points out that she aims to be observant when the students practice their self-regulation so she can give them continuous affirmative feedback:

When they, of their own accord, choose strategies to add spices and check the outcome by tasting, I give them feedback like: “Great, that is a good strategy, to taste and check whether the sauce tastes the way you like – now you are a pilot!”

At the end of each lesson, Julia asks each of her students whether they believe that they acted as pilots during the lesson. Thereafter, she provides feedback accordingly. Julia exemplifies with students’ responses: “Yes, I have been a pilot. I chose to deal with the garbage sorting today. It is difficult, but my classmate helped me.” Whereupon Julia might respond, “Yes, that was good pilot work; you chose something you need to practice, and a strategy, asking a friend for help.” Or when a student is not entirely satisfied: “Oh no, I chose to make two kinds of toppings, which was not good. I ran out of time.” Julia describes how she then usually provides feedback, such as:

Yes, you are right; I needed to help you more than you wanted me to, and you became my passenger. But that is fine. Next time, you’ll know that you need to look at the clock before planning what to do. You know, even pilots have a timetable to consider.

This type of interaction was also noted during the observations as her students describe how and why they acted, or alternatively did not act as pilots during the lesson. However, when students respond “I don’t know,” Julia gives feedback to help them identify their accomplishments:

I think you were acting as a pilot. You did not know if you used enough salt, and when I did not want you to become a passenger by telling you, you solved the problem by tasting the soup. That is great pilot work.

This way of continually supporting students to simultaneously develop their kitchen and self-regulating skills, such as baking bread as pilots, is Julia’s overall teaching design. She states that, even though self-regulation is challenging, in the end of their training most of her students are acting as pilots in the kitchen. Her statement is in line with the observer’s notes, which describe a group of students who make most of their decisions about “how to act,” using self-regulatory strategies. But, as Julia concludes, supporting students to move from “observing a professional” to “being a professional” takes time and hard work.

Challenges and How the Teachers Address Them

Analyzing interviews and the teachers’ teaching descriptions, a variety of challenges using formative assessment and implementing self-regulated learning emerged. These were categorized into three themes: Low expectations and caretaking, Experiences of shortcomings, and Learning difficulties. Julia and Maria also described how their teaching context provides

opportunities to meet these challenges, and these experiences are accounted for in the following as well.

Low Expectation and Caretaking

Maria and Julia indicate that, generally, there are low expectations about what knowledge and skills children with severe learning difficulties can achieve. Caretaking has therefore been in focus in compulsory special schools’ curricula for a fairly long time. Hence, by the time students with ID enroll in the upper secondary school at the age of 16, they have long been taken care of by loving parents, relatives, teachers, and assistants and are used to having adults nearby taking full responsibility for all practicalities. As Maria observes, “We tend to become “helicopter teachers,” telling them [the students] and ourselves that they can’t solve problems that arise; the teacher even pulls up their jacket zipper . . . the students do not have to try on their own.” Julia states: “They are passengers in their own lives . . . during the first semester they tend to expect that I am going to handle everything, even before they ask.”

The caretaking paradigm and low expectations from the adults, and likely from the students themselves, allow few opportunities to enhance the students’ independence. Maria states that there is a risk that “we, while caring for our students, visualize, reinforce, and thereby manifest their disabilities . . . and with low expectations, the students will not be challenged to learn in the zone of proximal development.” Julia concurs:

Students see themselves as passengers, as special school students, not as future adults . . . It becomes a challenge to convince them to believe that they have the ability to become adults, to self-regulate . . . and actually, even that becoming a pilot is a desirable goal.

These circumstances constitute a challenge when it comes to supporting the students to engage in any of the three phases of self-regulation. The caretaking paradigm is furthermore described as hampering the students’ ability to collaborate, to ask each other for help, and to trust themselves and each other to be resources for one another. Julia points out, “They have always been surrounded by professional caregivers, looking out for their best interests, but on the back of the coin, the students have never needed to ask each other for help.” The caretaking paradigm may also hamper students from developing strategies for starting and ending an activity, since there has always been an adult present making these decisions.

Experiences of Shortcomings

Maria and Julia both point out that their students suffer from lifelong experiences of shortcomings. Julia says, “My students have been tested, diagnosed, and compared to children without learning disabilities so many times . . . They suffer from low self-esteem, a feeling of not being good enough.” Maria points out, “They are vulnerable due to their experiences of failure when they [in contexts other than special school] have met too-high demands and they have compared themselves and their achievements with those of peers without ID.” The teachers describe how their students have developed strategies to disguise their shortcomings, for example, by interpreting the teacher’s

facial expression and changing their answers or adapting their behavior until the right expression appears. As Julia says:

When they don't understand the symbols on the stove knobs, they do not ask, but turn the knobs until they think I look satisfied . . . But even when they ask for help they are sometimes not willing to expose their lack of knowledge or skills. They ask but expect me to take control and make things right, however without really knowing what the problem is.

These circumstances constitute a challenge when it comes to using formative assessment to enhance students' learning of subject knowledge as well as self-regulating skills. Students' unwillingness to share their knowledge as well as their shortcomings might hamper the teachers' ability to understand their needs and provide useful feedback. However, Julia and Maria both point out the advantages of having few students in their groups and teaching in a kitchen. These circumstances make it easier to continuously gather information about their students' learning by observing and interacting with them. Moreover, they have time to challenge their students when they aim to hide their difficulties, and time to provide instant feedback, which is necessary to develop their students' subject knowledge and self-regulating skills. Furthermore, besides being unused to asking each other for help, the students' low self-esteem and their unwillingness to show their difficulties to one another prevent them from using each other as resources for learning. However, as Julia and Maria indicated, working in a kitchen and aiming for future work at an eatery, where collaboration and division of work are needed, forces their students to work together and to depend on each other as they prepare meals for customers.

Learning Difficulties

In addition to their students' individual difficulties, such as language disorders or hearing impairments, Maria and Julia also describe the students' learning challenges in more general terms, especially pointing out the challenges of remembering things, distinguishing learning from doing, and engaging in reflection.

Difficulties in remembering makes learning from teaching and experiences harder. For example, it takes a fair amount of time and many repetitions for the students to move from observing the teacher to performing the same task on their own. Julia explains: "They appreciate and mimic tools or strategies I show, chopping potatoes, for example. During the next lesson, however, this might have been forgotten. It generally takes a long time for my students to take on skills as their own." To support their students, Maria and Julia design their teaching to involve repetition and feedback in close relation to successful or problematic situations. As Julia says, "Feedback needs to be now and never later."

Difficulties in distinguishing between "I have done" and "I have learned" make students believe they have learned something after one lesson. Julia describes this as especially challenging in teaching kitchen skills since the students need to learn by doing. Julia describes the challenge of convincing them to practice several times to become really good at making soup, baking bread, and so forth.

When I suggest that a student might need to practice baking bread, they could argue that they already know how, since they baked bread earlier this semester . . . What is done is already

learned . . . I need to be very persistent in saying that "the more you bake, the better the bread will be."

An additional challenge concerns the students' tendency to mistake "I can imitate" for "I can do." As Julia explains, "These circumstances constitute a challenge when it comes to supporting the students to move from the imitating step to work more on their own to repeatedly practice, for example, baking bread." Maria suggests that these circumstances might emerge from the culture of special schools that tend to focus on the activities or the product rather than on the learning goals and the process of reaching them.

Without reflection, the relation between efforts, choice of strategy, or way of using a tool and a successful or unsuccessful outcome is less evident. Maria explains: "It is difficult for them to bring experiences of success or mistakes to a new situation." This has to be pointed out to them repeatedly, as Julia says, "You need to make them see that their success could be related to their effort, their choice of strategy and so forth . . . and you need to do that over and over again." A similar challenge appears when students are required to reflect on their own learning. Reflecting on the best way of learning what strategy to use or not use depending on earlier experiences is an advanced cognitive process. As Maria says, "Seeing that this was good and that I should continue what I am doing can be a big step." Maria points out that she is careful to avoid putting students in too-demanding situations, where they risk feeling stupid, for example, by asking overly broad questions such as "How can you learn this?"

Addressing the Research Questions

These teachers' approaches to promote the students' SRL can be seen as two examples of supporting students to gain self-regulating skills using formative assessment. As an articulated learning goal and the implementation of formative assessment to support student to develop SRL (Julia), or to use the fifth key strategy of formative assessment – Activating students as the owners of their own learning – to promote students' SRL (Maria). The result however shows that both approaches gave the students the opportunity to gain SRL-skills, and that the teachers came across similar challenges while using formative assessment to support SRL.

How Formative Assessment Is Used to Support Students to Develop Self-Regulated Learning

Both teachers promote their students' self-regulation with the support of an extensive formative classroom practice. The first key strategy of formative assessment, to agree on learning goals, is well in line with the forethought phase, which includes setting goals and planning how to reach them. Even though having different approaches and articulated learning goals, both teachers express their wish to support their students to gain subject skills and to develop SRL competence; that is, to become "independent" (Maria), to "act as pilots" (Julia), and to own their own learning. Both teachers provide their students with strategies to perform SRL, and both engage their students in assessing their learning in relation to the goals. They scaffold learning and independence by using feedback to guide students to develop their SRL skills. Moreover, they create a learning community

where students can use each other as resources for learning and for developing SRL competence.

Challenges and How the Teachers Address Them

Besides students' learning difficulties, such as language disorders or trouble remembering and reflecting, some of the perceived challenges emerge from the students' earlier experiences of shortcomings and a contextual caretaking paradigm, together resulting in low self-esteem, low expectations, and a habit of relying on others to handle situations. These circumstances all contribute to the challenge of developing SRL skills. To address these challenges, a teaching design based on continuity, repetition, trust, and scaffolding feedback is used. The teachers show that they expect the students to succeed, and they help the students believe in themselves. They clarify the learning goals, gather information concerning students' learning, help the students track their progress, and provide timely feedback pointing out students' accomplishments as a result of their hard work and good strategy choices.

DISCUSSION

There are strong arguments for designing teaching that supports students with ID to develop their capacity for SRL and lifelong learning (e.g., Test et al., 2009; Shogren et al., 2012; Wehmeyer, 2015). The present study suggests that a formative assessment practice could be one way of supporting students with ID to develop SRL competence. That is, the model of formative assessment, developed and used in regular schools as a way of empowering students to take charge of their own learning (e.g., Black and Wiliam, 2009; Clark, 2012; Panadero et al., 2018), is applicable in special schools as well. We propose that a formative assessment practice provides principles for how to support students with ID to engage in and move between the self-regulation phases described by Zimmerman (2000). In the following, we discuss how this classroom practice empowers students to become more self-regulated problem-solvers when faced with challenges.

Using Formative Assessment to Promote Self-Regulated Learning Among Students With Intellectual Disabilities

A formative assessment practice designed to support students to develop their self-regulation skills will emphasize two learning goals, the subject learning goal and the goal of developing self-regulated learning (Clark, 2012). These learning goals are interdependent since students who assess their learning in relation to subject learning goals will, at the same time, develop SRL competence (Clark, 2012). To address these goals, the teacher needs to help the students become aware of the learning goals and what constitutes quality and progress (Sadler, 1989; Shepard, 2000) and provide opportunities for students to monitor their own learning to make self-adjustments (Zimmerman, 2000; Schunk and Zimmerman, 2013). The present study provides two examples of teaching designs supporting students' SRL using formative assessment: those used by Maria, who handles the two

learning goals *in parallel*, and Julia, who aims to address the goals as *integrated*.

The teaching design that addresses the learning goals in *parallel* and sees SRL as an ability to solve problems entails the teacher providing the students with experiences of independent problem solving. Using formative assessment, the teacher provides targeting feedback that supports the students to find strategies and routines to develop their problem-solving ability. This design, furthermore, helps the students develop a dynamic mindset. To promote students' SRL it is also important not to provide more support than needed. However, withholding support seems to be extra-delicate in the special school context, but indispensable for the students to become more independent when they move from externally initiated social support to internally initiated support (see Zimmerman, 2000; Schunk and Zimmerman, 2013). As exemplified by Maria, the formative assessment strategies can be used to engineer scaffolding routines and structures for the students to move to the next level of SRL.

Integrating the subject learning goals (e.g., baking bread) and the goal of developing self-regulation skills (acting as a pilot) became one goal: "baking bread as a pilot." Emphasizing these goals as one requires the teacher to share with her students the goal of self-regulation, acting as a pilot baking bread, and criteria for success, what it means to successfully bake bread as a pilot. Furthermore, integrating the goals requires that the students have tools to assess their achievement of the integrated goal in the performance phase. But also, in the self-reflection phase, students must search for strategies on how to develop bread-baking skills with increasing self-regulation. Finally, integrating the goals requires the teacher to provide, and the students to acquire, strategies for solving problems encountered when baking. The teacher thus needs to observe the students using the strategies, give feedback accordingly, and persuade the students to evaluate their skills to solve problems as self-regulated learners. As exemplified by Julia, formative assessment may be used to support students in all three phases of the SRL cycle for both learning goals.

Maria's and Julia's classroom practices show overlap with the previous model of instruction developed and used among students with ID (the SDLMI, see section "How to Support Students With Intellectual Disabilities to Become Self-regulated/Self-determined"). The SDLMI positions the students in a self-regulated problem-solving process of setting educational goals, developing plans to reach the goals, self-monitoring, self-evaluation, and making decisions about eventual adjustments. Maria's and Julia's classroom practices are aligned with these characteristics as well as the meaning of independence in that process. In their practices, independence means striving to have agency and to be in charge in situations, and it means perceiving other people as resources when support is needed to solve a problem. A difference between SDLMI and formative assessment is that SDLMI applies to defined assignments whereas formative assessment works as a unit of strategies building up an ongoing classroom practice. As such, the model of formative assessment used in the present study does not provide as detailed guidance as the SDLMI does. In Maria's and Julia's cases it is implied that routines and structures are crucial for students to handle

problem solving. However, the routines and structures need a certain design to actually provide opportunities for students' agency and not hamper the development of SRL competence. Thus, using formative assessment can be seen as an alternative or complement to the SDLMI practice that to date has proven successful for students with ID (e.g., Shogren et al., 2019, 2020). There are other encouraging examples of using formative assessment in special schools (Anderson and Östlund, 2017; Östlund, 2019), yet the effects of using it to support SRL among students with ID need further investigation.

Challenges and Dealing With Them

The challenges Maria and Julia experienced when using formative assessment to promote students' SRL competence were: Low expectations and caretaking, Experiences of shortcomings, and Learning difficulties. The challenges identified in the present study are similar to those presented in the study by Anderson and Östlund (2017) and seem to be associated with common issues in Swedish education for students with ID (Östlund, 2015; Licardo and Schmidt Krajnc, 2016; Hanreddy and Östlund, 2020). These challenges and how they can be addressed will be further discussed below.

Putting students in charge of their learning – and dealing with challenges that may arise – requires that teachers have incentives for SRL development (Butler and Schnellert, 2015; Wehmeyer, 2015), expect their students to be able to develop such skills (Wehmeyer, 2005), and at the same time not take SRL skills among the students for granted. The teachers in the present study share such beliefs and aim to empower their students and to counteract students' previous experiences of low expectations and excessive care that made them view themselves “as passengers.” Furthermore, they offer the students opportunities to be problem solvers and to reflect on the problem-solver identity, in Julia's case in terms of “being a pilot.” Using formative assessment for such empowerment may increase students' independence and capacity for self-regulated learning.

Maria and Julia counteract students' previous experiences of shortcomings by providing them with experiences of successfully using problem-solving strategies such as helping each other. Low self-esteem and unwillingness to show difficulties lead to unproductive strategies, such as when students hide what they do not know and do not seek help. Formative assessment, which builds on making learning visible and on feedback shared in the classroom, requires students to visualize their learning to uncover the next step in learning, by themselves or with assistance of the teacher and/or peers.

Finally, Maria and Julia are aware that giving and receiving feedback are challenging for students with ID, and they handle this challenge by providing timely feedback and by supporting the students to practice how to give and receive feedback. Reflection includes cognition and metacognition, inherent aspects of SRL; however, it is demanding for students with intellectual disabilities. Therefore, the metaphor of being a pilot provides the students with a concrete tool to reflect, asking themselves if they are working as passengers or pilots. That is, they move from externally initiated social support to internally initiated support (see Zimmerman, 2000; Schunk and Zimmerman, 2013). Moreover, the teachers' use of feedback designed to address the

needs of this group of students; they are given opportunities to use the feedback and provided with experiences of usefulness and knowledge of what to do next.

A disability diagnosis may explain specific challenges students experience in regulating their own learning (Butler and Schnellert, 2015; Licardo and Schmidt Krajnc, 2016). Yet possibilities for development are proven (Shogren et al., 2019, 2020), and the opportunities provided for such development in the environment appear crucial (Wehmeyer et al., 2007), with strong incentives for education creating opportunities for such development (Butler and Schnellert, 2015; Wehmeyer, 2015). The teachers in this study have taken on this challenge, which to some extent entails leaving what Shogren et al. (2020) call a teacher-directed approach in favor of a student-directed approach. As previously noted, Maria's and Julia's ways of using formative assessment to promote SRL coincide with the problem-solving aspect in the SDLMI. Solving problems is considered challenging for students with ID, yet it is important since situations that require problem solving arise in everyone's lives. Thus, teaching problem-solving gives students opportunities to develop a lifelong learning competence (Raley et al., 2020). The present study suggests that a formative classroom practice might support students with ID to develop their self-regulation and problem-solving abilities, which will be useful in adult life.

CONCLUSION

Even though the special school curriculum includes goals concerning lifelong learning and addresses students' desire and possibility to become independent adults, students with ID are found to be less self-determined and have less developed self-regulatory strategies in problem-solving than non-disabled students. Challenges such as weak executive functions, metacognitive knowledge and, as this study showed, low expectation, a tradition of caretaking and students' experiences of shortcomings have been reported. With that as a background, and with the goal of helping students with ID to develop their independence, we suggest that a teaching design based on SRL and FA can be seen as a possible way to go. SRL does not refer to students' mental ability or academic skills but to provide strategies to be able to become more self-regulated, and FA brings teachers to adapt teaching and feedback based on elicited information about each student's needs. The present study showed two teaching designs, including SRL integrated with FA that brought students to gain self-regulating strategies to act as pilots and problem-solvers. Furthermore, encountered challenges can be managed by consequently trusting the students to be able to self-regulate, to introduce – and repeat – SRL-strategies in steps and to use FA to consequently adjust teaching and feedback to be in time and to target each student's needs.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusion of this article will be made available by the authors, without undue reservation.

AUTHOR CONTRIBUTIONS

Both authors have contributed equally to data collection, analysis, and writing the article, with the first author responsible for the process.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/feduc.2022.845208/full#supplementary-material>

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