



Full length article

Interacting with those who need it most? Teachers' attention and support to students with different self-regulated learning profiles in the classroom

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ARTICLE INFO

Keywords:

Self-regulated learning
Support adaptation
Co-regulation
Mobile eye tracking
Teacher attention

ABSTRACT

Teachers can help students to develop self-regulated learning (SRL) skills by co-regulating the learning process, as SRL is associated with higher achievement and motivation for learning. Individual differences in student SRL suggest that teachers need to adapt instruction accordingly, aiming for growth of every student. Applying the conceptual framework of teacher professional vision for student SRL, this multiple case-study investigated whether and how teachers implement such adaptation in the classroom at a fine-grained level. Participants were three high school teachers and their students in the 9th and 10th grade. Teacher visual attention distribution to students, teachers' explanations of their own attention and instructional intention, as well as variations in interactions with students were investigated with analyses of process-based classroom data (lesson recording, teacher mobile eye tracking and think-aloud). The findings suggest that the three teachers did adapt instructional support to students. On the one hand, all teachers initiated interactions with lower-SRL students to ensure progress on tasks. On the other hand, there were between-teacher differences in terms of visual attention distribution, support intentions, and interactions with students. These were conceptualised as Regulating, Responding, and Proactive support patterns. The individual teacher patterns highlight that although teachers consider student characteristics when co-regulating learning in the classroom, they emphasise varying priorities.

1. Introduction

Adapting instruction to individual needs of students is one of the key aspects in teaching (Brühwiler & Vogt, 2020). Differentiated instruction is usually based on student knowledge level, preferences, and interests (Smale-Jacobse et al., 2019). However, the extent to which students can regulate own learning is an important factor in benefiting from teacher instruction. Therefore, it is crucial for teachers to recognise student self-regulated learning (SRL) cues to structure their instruction in the lesson and provide support to students optimally. Greene (2021) proposed including teacher's skill to recognise student difficulties related to SRL in addition to subject understanding difficulties as part of teaching competence. Still, there is a gap in research on whether and how teachers consider

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<https://doi.org/10.1016/j.lcsi.2026.100994>

Received 7 February 2025; Received in revised form 19 January 2026; Accepted 18 February 2026

Available online 18 March 2026

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student SRL-related characteristics in the process of instruction and how teachers adapt instruction based on student SRL needs. Teachers spend time with students in the classroom daily, observe students' engagement with tasks, learning preferences, learning strategy use, and help-seeking behaviours, which are overt cues of SRL (Paris & Paris, 2001; Zimmerman, 2015). The competence to notice these cues, to interpret them in view of one's professional knowledge, and to adapt one's instruction to the identified long-term and immediate student learning needs is a basis for adaptive teaching (Corno, 2008) and a crucial process in the concept of teacher professional vision (van Es & Sherin, 2002). The timeliness and quality of teacher support among other things depend on how teachers apply their situation-specific skills, such as noticing of student understanding (Blömeke et al., 2015). In addition, as students vary in SRL, teachers would gauge the degree of support on the meta level (Molenaar et al., 2011), matching the students' need for more or less of external (co-)regulation of learning. This study aims to identify teacher patterns of learning and SRL support adaptation to different student SRL groups.

In the following literature review, first, the concept of SRL is presented along with student learning behaviours associated with it. Second, the concept of teacher professional vision is introduced as a lens of understanding teacher perception in the classroom. More specifically, a framework of teacher professional vision for supporting student SRL is outlined. This framework incorporates teacher noticing, knowledge-based reasoning, and pedagogical approaches for supporting student SRL. Third, co-regulation as one of the teaching approaches to situationally support student SRL is elaborated. Then, a multiple case-study with three teachers investigates and illustrates teacher patterns to adaptively support student learning in the lesson with regard to the perceived student SRL.

1.1. Self-regulated learning and student individual differences

Self-regulated learning (SRL) refers to learners' systematic effort to regulate own cognition, metacognition, affect, and behaviour to reach academic goals (Schunk & Greene, 2018). According to Zimmerman's model, self-regulated students steer own learning process via the phases of forethought, task performance, and self-evaluation with help of learning strategies (Zimmerman, 2002). Students differ in their skill to regulate own learning (Dijkstra et al., 2023; Heirweg et al., 2019; Lehtinen et al., 1995; Vermunt & Vermetten, 2004). Self-regulated students show high degree of motivation and apply different strategies to steer own learning (Zimmerman & Kitsantas, 2007). In practice, on the cognitive level, this means that students can recognise task prerequisites, important points in the content, and integrate the new information with the existing knowledge (Winne, 2018). On the behavioural level, students maintain focus on the lesson, keep track of their notes, and recognise the need for external help when it arises (Cleary, 2006). Conversely, students who lack academic self-regulation skills may not apply learning strategies or even engage in self-handicapping behaviours (Bembenutty, 2011). Thus, there is a degree of congruence between student level of SRL and the amount of detail and regulation in teachers' instruction required (Vermunt & Verloop, 1999). Self-regulated students are less dependent on how the study material is presented and can adapt to different teaching styles (Bolkan et al., 2017). Moreover, self-regulated students are shown to have higher self-efficacy (Bakhtiar & Hadwin, 2022) that may help them overcome fear of failure in the class and participate in the lesson actively. However, students with lacking self-regulation skills may get confused with tasks already at the forethought phase (Zimmerman, 2015) or over-rely on social support and avoid independent work (Lehtinen et al., 1995).

Teachers can perceive student SRL in different ways. In research, SRL is typically assessed with one of the two approaches: (1) SRL as a student trait, assessed at a single point, e.g., via questionnaires, or (2) SRL as a process, by directly tracking the learning process over time, such as through think-aloud protocols (Panadero et al., 2016; Winne & Perry, 2000). Correspondingly, teachers can make judgements about their students' SRL as a trait in a long-term perspective, captured with teacher ratings of student SRL behaviours (Zimmerman & Martinez-Pons, 1988). Teachers can also observe student SRL as a process based on student learning cues in the classroom (Klug et al., 2013). Both assessment approaches are important for teachers, as teachers' long-term perceptions about student learning behaviours become part of their knowledge (Karlen et al., 2024), and the daily observations in the classrooms allow teachers to recognise and potentially respond to specific student needs.

Research on differences in student SRL profiles implies that it would be beneficial to adapt instruction accordingly (Dijkstra et al., 2023). Still, differentiating instruction based on how students apply learning strategies is scarce in the educational practice. Teachers differ in how they understand the concept of SRL and diagnose SRL of their students (Dignath & Sprenger, 2020). Moreover, when differentiated instruction based on student SRL does happen, its quality and improvement in students' strategy use varies between teachers (Haelermans, 2022). Therefore, we need insights into how teachers carry out the potential adaptation to students' SRL, and how it is connected to teachers' perception of their students.

1.2. Teacher professional vision in supporting student self-regulated learning

Teacher perception of the classroom has been studied as part of teacher professional vision, that is how teachers notice, interpret, and respond to events in the classroom to promote student learning (van Es & Sherin, 2002). The concept originated from Goodwin (1994) work on the culturally, socially, and professionally situated perception in the professional settings. While there are different models of teacher professional vision, we adopt that of Scheiner (2021) that includes teacher attention and noticing of classroom events, teacher knowledge-based interpretation of classroom events, and teachers' actions to shape the classroom interactions.

Teacher professional vision can serve as a conceptual lens for studying teacher support of student SRL in the classroom (Greene, 2021; Michalsky, 2014). It brings teachers' focus on analysing student behaviours and cognition, which is critical for developing teachers' capacity to foster student SRL skills (Michalsky, 2021). We suggest a framework of teacher professional vision in supporting student SRL that connects components of teacher professional vision (Scheiner, 2021) to teacher-related factors important for promoting student SRL: knowledge about SRL and students, assessing student situational SRL, and using teaching approaches to support

student SRL (Fig. 1).

Teacher knowledge encompasses different domains of professional knowledge (Shulman, 1987), which includes conceptions about students and their SRL (Karlen et al., 2020). Without knowledge about students and recognising individual needs and interests, teachers would not be able to present the subject content in an accessible and engaging way. Specifically, pedagogical content knowledge for SRL (Karlen et al., 2024, 2020) refers to knowing how to foster SRL in the classroom, including diagnosing and assessing students' SRL. Thus, teacher knowledge incorporates formed judgements of student SRL as a trait (Winne & Perry, 2000). However, conceptions about students may prevent teachers from noticing or lead to misinterpreting the cues from the students in the real time (Salonen et al., 2005). Still, teachers need to constantly monitor the students and assess student learning and behaviours. According to Wolff et al. (2021) teachers can act in relation to classroom events reactively, by acknowledging the event and addressing its consequences, or proactively by responding to antecedents of events. Teachers' conceptions about their students are part of framing for attending to students and the classroom (van Es & Sherin, 2002; Wolff et al., 2021).

Noticing, as a professional vision component, refers to teachers' selective attention to noteworthy classroom occurrences, for instance, students' utterances and participation (Sherin, 2007). This implies that teachers may pay attention to student behaviours and learning cues to judge student behavioural and cognitive engagement (Schnitzler et al., 2020). Such judgment is close to in-the-moment assessment of student SRL as a process (Winne & Perry, 2000). Recent studies on teacher professional vision have focused on teachers' visual attention within perception and noticing processes. The mobile eye-tracking technology enabled capturing teachers' attention distribution through registering their eye movement as a low-inference online measure (Cortina et al., 2015). In the study by Chaudhuri et al. (2022), teachers' distribution of visual attention varied depending on how much individual support they provided to students, and more attention went to students with lower levels of math and literacy skills. Overall, the classroom studies indicate that teachers attend more to students who have support needs (Chaudhuri et al., 2022), with variation between teachers (Dessus et al., 2016; Smidekova et al., 2020). However, a deeper understanding of the support needs teachers notice during classroom interactions and the role of the needs related to SRL is required.

Teachers' decisions and actions in the classroom may incorporate SRL support of students. The different SRL support approaches can be categorised under the umbrella of direct and indirect support (Dignath & Veenman, 2021), underpinned by a co-regulatory interaction (Hadwin & Oshige, 2011; Perry et al., 2020). Direct support stands for teaching students learning strategies, while indirect support refers to organisation of a constructivist classroom environment via the task design, routines, or communication rules (Dignath & Veenman, 2021; Perry et al., 2020). Co-regulatory classroom interactions are essential for helping students practice SRL (Perry et al., 2020), which is elaborated next.

1.3. Co-regulation as teacher's support of student self-regulated learning

Teachers play a crucial role in supporting student SRL (Alvi & Gillies, 2015; Dignath & Veenman, 2021; Perry et al., 2020). Teachers' pre-planned support structures provide overarching support across multiple tasks, offering strategies and structures aimed at facilitating learning in long-term. Also, teachers give immediate specific assistance to learners during activities to scaffold learning (Bae et al., 2021; Kajamies, 2017; Prediger & Pöhler, 2015; van de Pol et al., 2010). Such interaction is co-regulatory. The theory of co-regulation emphasises the interactive and dynamic processes by which social environments influence and facilitate learning together (Hadwin et al., 2017). Co-regulation requires at least two agents who contribute to the regulation of learning. In the teacher-student dyad, the interaction may start with initial teacher regulation till students gradually gain competence in the task to start relying on internal self-regulation and motivational beliefs. The process in between can be described as co-regulatory interaction. Following Hadwin et al. (2005), we operationalise co-regulation as "instances when teachers guide or prompt students to do the regulating themselves, or students request, or prompt teachers to show them how to self-regulate" (p. 420). Here, teachers move away from the direct regulation by modelling and explaining to indirect prompting, reminding, or requesting. Students, in their turn, may involve in indirect regulation by requesting support from the teacher on the way to gaining control over the task.

In this study, considering teachers' long-term instructional goals was important for teachers' interpretation of the lesson events, while the detailed analyses were focused on teachers' immediate support to specific students.

To summarise, in the present study, student SRL profiles refer to students' individual differences in the ability to manage and adjust their own learning, reflected in their learning behaviours. Teachers' long-term perceptions of students' SRL become part of teachers' professional knowledge, while daily classroom observations help teachers identify and respond to specific student needs related to SRL support. To examine whether and how teachers adapt instructional support in relation to perceived student SRL profiles in the classroom, the lens of teacher professional vision is adopted. The proposed framework incorporates teacher noticing in the lesson, reasoning based on professional knowledge, and acting in accordance with situations. The latter includes teachers' approaches to support student SRL. One of the ways to support student SRL situationally is co-regulation, where a teacher acts as the co-regulator or a more knowledgeable other and helps a student to perform a learning task in a self-regulated way.

1.4. The present study

This study aims to examine whether and how teachers adapt instructional support in relation to perceived student SRL profiles in the classroom. The proposed conceptual framework of teacher professional vision in supporting student SRL (Fig. 1) acknowledges the interplay between teachers' attention allocation, application of knowledge, and actions to promote student SRL as a situation specific activity that contributes to adaptation of instruction. It can guide the examination of teacher practices that foster SRL in a comprehensive manner. The case study connects the elements of teacher professional vision on a fine-grained analyses level. For this, we

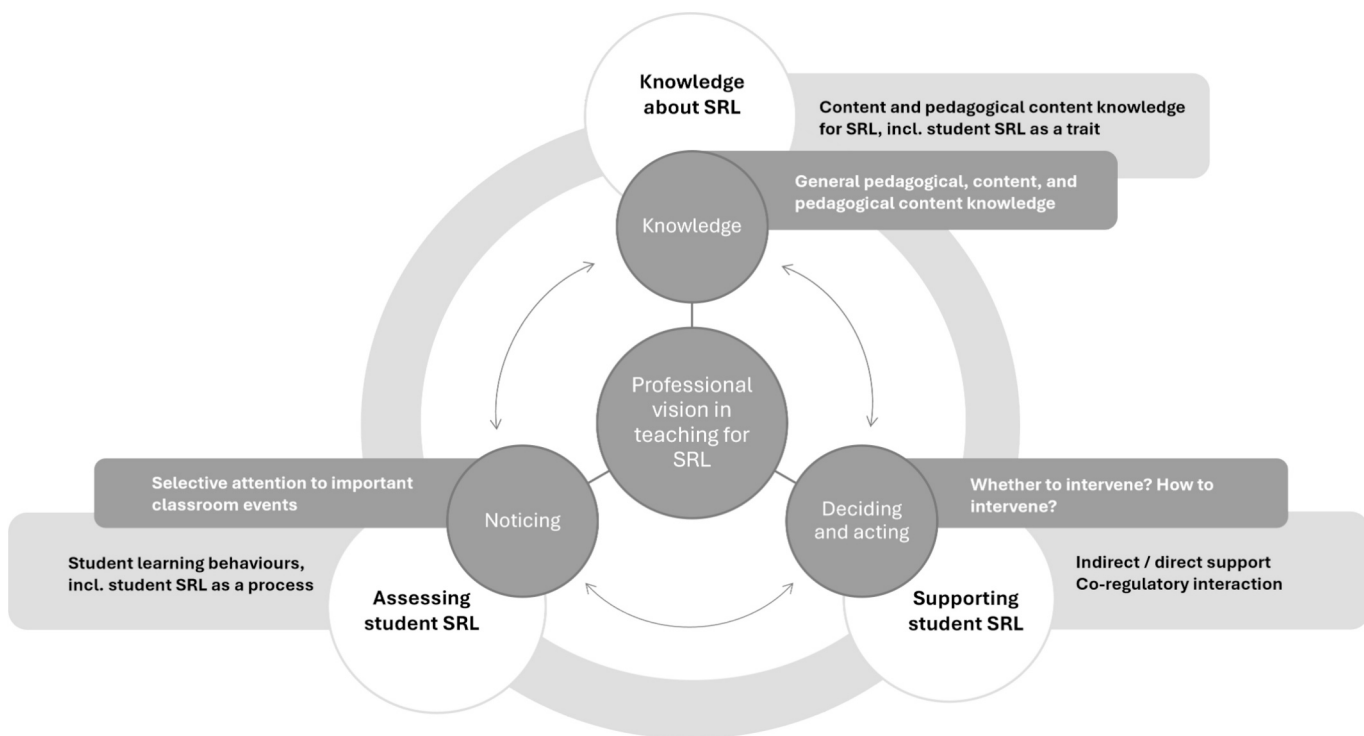


Fig. 1. Teacher professional vision in supporting student self-regulated learning.

scrutinise the interrelation between teacher visual attention allocation to students, description of intention to support student learning, and characteristics of support interactions with students in terms of co-regulation. This is addressed by the main research question:

1. What are the potential patterns of teacher's adaptive SRL support in the lesson in relation to the perceived student SRL profile?

To facilitate the formulation of the support patterns, supporting research questions were formulated to connect different components of teacher professional vision:

- 1.1 How is the amount of teacher visual attention to students in the lesson associated with the perceived student SRL profile?
- 1.2 How do teachers explain instructional intention in relation to supporting student learning and SRL?
- 1.3 How do teacher support interactions with students vary in co-regulation depending on the perceived student SRL profile?

2. Method

2.1. Participants

Three teachers and their respective 9th and 10th grade students took part in the study. The three teachers are referred to as Amelie, Diana, and Jonas. Amelie taught a lesson in English, Diana and Jonas in physics and mathematics respectively. Teachers' work experience varied between 2 and 5 years. Teachers selected one of their classes to participate, with student age being 15–16 years. No instructions were given to the teachers and students, they were asked to participate in the lesson as usual. Teachers, students, and students' guardians provided a written consent to participate in the research prior to data collection.

2.2. Research design

This study followed a multiple case study research design with mixed methods (Yin, 2003). This design is useful to “bring out the details from the viewpoint of the participants by using multiple sources of data” (Tellis, 1997, p. 3). Mixed methods research integrates qualitative and quantitative approaches to data collection, analysis, or interpretation to achieve goals beyond what either method could help to accomplish on its own (Bazeley & Kemp, 2012; Creamer, 2016). Mixed-methods research acknowledges epistemological and methodological pluralism (Johnson & Onwuegbuzie, 2004). The key features of mixed methods research involve the orientation to research question and integration of qualitative and quantitative findings (Johnson & Onwuegbuzie, 2004; Tashakkori et al., 2021). In this study, the three sub-questions are formulated to produce quantitative and qualitative results of the analysis of the teaching practice, while the main research question calls for an integration of those findings into a pattern.

The three teachers were selected for in-depth analyses from a larger data collection that included ten teachers for a research project on teachers' SRL support in the classroom. These three teachers had opposing trends in visual attention on students and could be considered diverse cases (Seawright, 2016; Seawright & Gerrig, 2008). Case selection is part of mixed methods research, where qualitative analyses of selected cases deepen the quantitative results.

All teachers were asked to teach as usual and wear a mobile eye tracker (Tobii Glasses 3, Tobii Pro AB, 2021). The study took place in one lesson of each teacher. Each lesson had similar phases: the teacher introduced a new topic to the whole class, followed by individual seatwork during which the teacher provided support. The eye tracker recorded a first-person video of the teacher's perspective, audio, and eye movements. Afterward, teachers reviewed the video with the first author, thinking aloud on their teaching. Then, lesson recordings were coded for specific interaction episodes with students. Analyses focused on teacher eye movement and retrospective reflections for the whole lesson, while support episodes centred on specific teacher-student interactions during the seatwork. See Fig. 2 for an overview of the analysis process.

2.3. Measures and data analysis

2.3.1. Teacher questionnaire

The teachers filled in Self-Regulation Strategy Inventory – Teacher Rating Scale (SRSI-TR; Cleary & Callan, 2014) about each student. The initial questionnaire had 13 items, excluding one about students attending additional consultation sessions with teachers, as this was not practiced in participants' schools. The questionnaire used 5-point Likert scale (Almost never – Almost always), $\alpha = 0.93$. To form the student SRL profile, the mean score of the rating for each student was used (Table 1). A notable variation in three teachers' ratings of student SRL can be observed, which reflects differences in student characteristics as perceived by the teachers.

In each classroom, students were divided into three groups based on the standardised scores of the SRL rating: standardised scores below -1 SD (Low), scores within $+/- 1$ SD (Average), and above 1 SD (High), as presented in Table 2.

2.3.2. Teacher visual attention

The recordings from the eye tracker were analysed in Tobii Pro Lab software (version 1.194, Tobii AB, 2022) with Tobii I-VT Attention Filter. Fixations were coded for each individual student and their learning material as area of interest (AOI). The metric *visit count* was used as indicator of teacher attention, calculated based on the coded fixations per AOI (Tobii AB, 2022), see Table 3 for descriptives.

Pearson correlations were carried out in SPSS (v. 28.0) to measure the association between teachers' rating of student SRL and

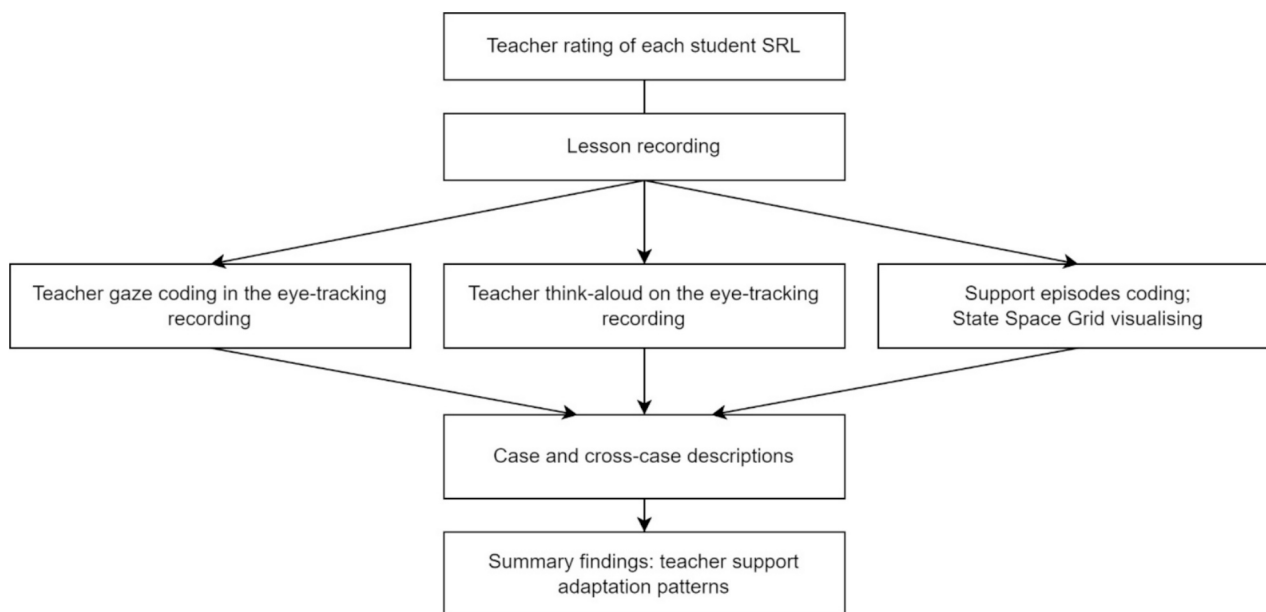


Fig. 2. Overview of the analysis process.

Table 1
Student SRL ratings.

	Students in class		Student SRL rating		
	N	M(SD)	Min.	Max.	Range
Amelie	12	3.54(0.60)	2.58	4.33	1.75
Diana	18	2.63(1.38)	1	4.92	3.92
Jonas	23	4.14(0.69)	2.83	5.00	2.17

Table 2
Student SRL groups per classroom.

	Student SRL groups					
	Lower		Average		Higher	
	N	SRL rating	N	SRL rating	N	SRL rating
Amelie	2	2.58	9	3.67	1	4.33
Diana	4	1.06	11	2.63	3	4.69
Jonas	5	3.17	13	4.23	5	4.88

Table 3
Teacher visual attention allocation to students.

	Students in class		Total gaze visit count per student in the lesson		
	N	M(SD)	Min.	Max.	Range
Amelie	12	166.0 (47.16)	106	247	141
Diana	18	103.9 (69.1)	25	240	215
Jonas	23	63.2 (26.5)	20	129	109

teachers' number of gaze visits per student in the lesson.

2.3.3. Retrospective think-aloud sessions and thematic analysis

After the lesson, teachers took part in the retrospective think-aloud (RTA) interview. RTA is used to verbalise thoughts and actions for accessing cognitive processes on performed tasks (van den Haak et al., 2003). This method is often used as complementary to eye tracking (Muhonen et al., 2023; Wolff et al., 2016). Teachers were asked to watch own first-person lesson recording with gaze overlay and comment on their actions, instructional intentions, and attention in the act of teaching. The teachers could pause if needed. If the teacher stayed silent for several minutes, the researcher encouraged them to continue. In RTA sessions, teachers commented on own attention, thoughts, and actions during teaching. Teachers made references to the classroom context, their subject matter knowledge, and knowledge about their students. Teachers' utterances about students included both in-the-moment observations and long-term observations. Teachers' observations and comments about students were not explicitly SRL-related but could be interpreted in SRL-related terms. This was done with help of qualitative analyses. The audiotaped RTAs were transcribed and synchronised with the lesson recording, then analysed inductively with reflexive thematic analysis (Braun & Clarke, 2021). The analysis followed the main steps of the thematic analysis procedure (Nowell et al., 2017): segmenting the data into excerpts, coding the excerpts inductively to

Table 4
Support episodes coding scheme.

Teacher	Level	Student
<i>Task clarification:</i> Teacher provides explanation, requests additional information, interprets, elaborates.	1	<i>Task clarification + reaction:</i> Student elaborates, provides information on actions; reports, facts, unspecified difficulty; passive/non-informative answer; agrees, non-verbal response.
<i>Direct regulation:</i> Teacher focuses student attention; sets goal; makes reasoning/monitoring explicit; summarises or confirms steps; indicates/corrects error; starts a sentence; evaluates task performance; directs student actions; refers to resources; reminds.	2	<i>Indirect regulation:</i> Student requests additional, conceptual/factual information; evaluation of goal, understanding, strategy evaluation; confirmation, explanation; indicates difficulty in an elaborated or justified way.
<i>Indirect regulation:</i> Teacher requests or prompts planning/evaluation information, interpretation factual information or explanation; alerts the student.	3	<i>Direct regulation:</i> Student provides explanation, makes task monitoring/ reasoning explicit; evaluates task performance; self-talk; provides an example, relevant factual/conceptual information; corrects error.
<i>Minimising support:</i> Teacher confirms; gradually withdraws.	4	<i>Task performance:</i> Student signals understanding; performs task.

capture the main idea, collating the codes with shared meaning to form the initial themes, reviewing and defining the final themes. Themes were formulated for each teacher and compared across the three cases.

2.3.4. Support episodes

The lesson recordings were viewed to identify episodes where teachers provided individual guidance to students during seatwork. The goal was to capture episodes of teacher interaction with individual students about a learning task with at least one teacher turn and one student turn. In total, 38 episodes were selected for analysis, lasting from 4.5 s to 2.6 min. One student could be part of more than one episode, these were counted separately.

In the first step, the support process in the selected episodes was coded according to the coding scheme adapted from Karasavvidis et al. (2000) and Hadwin et al. (2005). This scheme has a direct link to the phases of SRL cycle (Zimmerman, 2002) and follows operationalisation of co-regulation by Hadwin et al. (2005). Coding was based on verbal communication and visible non-verbal signals in the conversation, such as students pointing to their notebooks in response to the teacher's question. Interaction sequences with one teacher turn and one student turn were assigned one teacher code and one student code (Table 4). Teachers and students would ideally progress from clarifying the task details (Level 1) to indirect regulation (i.e., request for regulation from either teacher or student, Levels 2 and 3), then the student gradually taking on regulation for own learning (Level 3) and proceeding to independent task performance where teacher minimises support (Level 4). Thus, teacher and student perspectives can match, i.e., when student requests regulation, teacher provides it, or when teacher requests regulation, student demonstrates it.

In the second step, the coded interaction sequences were exported to GridWare software (Lamey et al., 2004) for building trajectories with State Space Grid technique (Hollenstein, 2007). The moment-to-moment interactions between the teacher and a student are called states, and the scope of all possible states encompasses a state space. The range of teacher interaction codes is plotted at x-axis, and respective student interaction codes are placed at y-axis. Their interactions are coded as one event depicted as a node on the grid. Placing the event node on the corresponding square on the grid is a way to identify to what extent participants are in synchrony, potentially co-regulating. All the nodes in one interaction episode are connected by lines. In the present study, the synchrony of teacher and student co-regulatory process is represented as co-regulation zone on the grid, going up diagonally from matched teacher-student sequences at Level 1 to Level 4. In an ideal scenario, teacher and student would proceed through the stages within the co-regulation zone (Fig. 3).

Alongside the grid visualisations, two numeric measures characterised the interaction: mean number of events in the region and cell range. Mean number of events represents the mean number of interactional sequences (nodes on the grid) in a region (Lamey et al., 2004), used here to compare sequences within and outside the co-regulation zone. Cell range shows interaction dispersion, from fewer to more cells entered during the interaction.

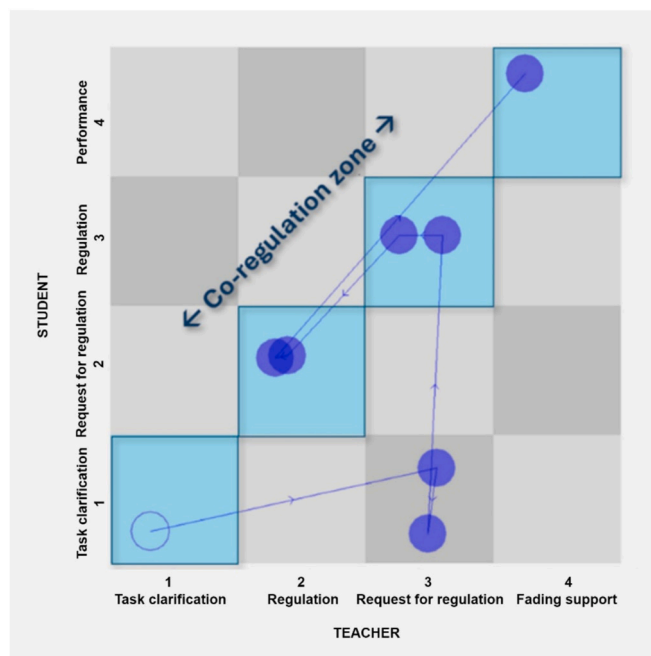


Fig. 3. State Space Grid template used for analysis of teacher-student interaction

Note: The empty nod indicates the first sequence in the interaction.

3. Results

3.1. Association between teacher visual attention to students and student SRL

The Pearson correlation analyses showed that the three teachers had different trends in the association between the amount of attention per student and student SRL rating. Amelie showed no association ($r = -0.06$, $p = 0.84$), Diana had a strong positive correlation ($r = 0.77$, $p < 0.001$), while Jonas had a moderate negative correlation ($r = -0.25$, $p = 0.25$). Thus, Amelie had a rather balanced visual attention distribution between the students. The higher amount of visual attention from Diana was associated with higher-SRL students. For Jonas, there was a moderate tendency to attend more to the lower-SRL students.

For an insight into teachers' attentional patterns, each teacher's gaze visit count per student was plotted in relation to student's SRL rating (Fig. 4). Visual examination of each teacher's attention distribution plots supports the trends shown by the correlation analyses. Moreover, it reveals the variation of teacher attention allocation to students within each SRL group. Amelie had only two lower-SRL students in the class, and one of them received the highest amount of visual attention in this lesson. Diana had a clear focus on some of the higher-SRL students. Jonas tended to provide support to lower SRL students, while still having spent the highest amount of attention on one average-SRL student who received teacher support.

3.2. Teacher explanations of own attention and intention for supporting student learning and self-regulated learning

The analysis of teacher RTA revealed teachers' overlapping patterns in referring to own attention and support to students but different key foci: while Amelie focused on teacher-regulation for the whole lesson duration and student engagement, Diana requested student regulation and responded to students, and Jonas focused on teacher-regulation in the teacher-led phase and varied support to students during individual guidance. The main thematic analyses findings are presented in Table 5, followed by a brief narrative for each teacher.

3.2.1. Amelie

3.2.1.1. Regulating learning when explaining in whole class and in seatwork phases. Amelie was regulating learning both in the whole class and seatwork phases. When providing whole class explanations, she did this by including in her talk reminders about the purposes of activities, connecting smaller tasks to overarching learning objectives, highlighting connections between different topics, and acknowledging all student contributions. Amelie emphasised her own effort in maintaining student engagement by actively monitoring students for signs of getting distracted with the goal to re-engage them: "I can see that I keep looking at everyone, like monitoring what are they doing, where is the attention, are they listening... If I could see them dozing off, that's when I would ask them a question, 'Did you understand?'" Also in the seatwork phase, Amelie continued with learning regulation, as she was monitoring student faces for signs of confusion and gave reminders about how to proceed with the task:

Like it was a very brief moment they were still thinking about it and I just wanted to remind them that it's okay to be stuck at this, because you can just rush out, write it, and then revise it, or you can revise it, plan it carefully, and then write it.

Hence, the teacher was performing not only monitoring of student behavioural engagement, but also metacognitive monitoring and control as part of learning regulation, expressed in teacher talk.

3.2.1.2. Actively monitoring students to decide whom to support. Amelie's active visual and metacognitive monitoring allowed to decide which students required further support, either based on communications from them, or based on the observed cues: "Whenever they are doing something I will come around, I will check where they are, how much they have written down, or if they are done [...]. I am seeing if anyone needs help." Additionally, it was a way for Amelie to be accessible to those students who tend to avoid seeking help in whole-class settings: "The girls are not confident with the hands up, they are a bit shy, so sometimes I'd notice that if I start walking around, they are more confident to put the hand up for me to come." Here, the teacher's monitoring reflected the intentional observation for student support needs.

3.2.1.3. Keeping students engaged throughout the lesson. As mentioned, Amelie emphasised keeping students engaged. This was the goal in the whole class explanation, but also during her individual guidance of students in the seatwork phase. Amelie provided support to students but adjusted it with the goal to encourage students to continue practicing:

I try to give as much individual feedback as possible, however, if I spend like half an hour [...] I have to keep the comments very short and snappy, because then others are still waiting while others are receiving feedback, and it becomes... I don't want it to get distracted, so then we sometimes move on to the next task [...].

Moving from student to student and keeping the comments short was a strategy to maintain student concentration: "So it's making sure that they have something to do at all points." Thus, even when concentrating on individual students' progress, Amelie maintained awareness of all students' focus on the lesson.

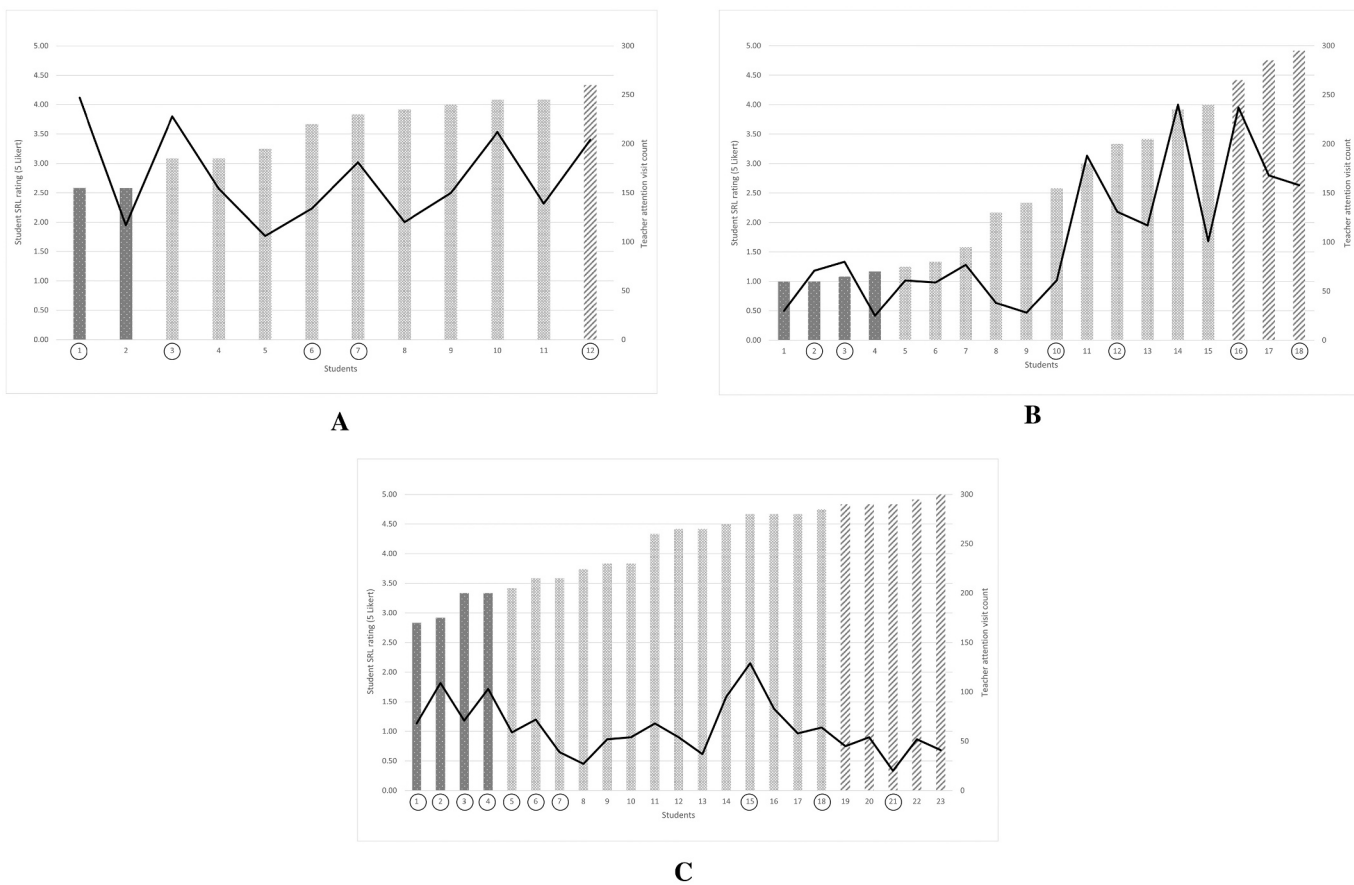


Fig. 4. Teachers' attention distribution between students in the lesson.

Note: The line represents teacher's gaze visit count on each student, numbered bars represent student SRL rating in an ascending order from left to right. Student SRL groups are marked as different fill of the bars. Circles mark students who received individual support from the teacher in the lesson.

Table 5
Summary of teachers' themes from RTA.

	Main themes
Amelie	- Regulating learning when explaining in whole class and in seatwork phases - Actively monitoring students to decide whom to support - Keeping students engaged throughout the lesson
Diana	- Requesting student regulation in whole class explanations - Providing support based on student initiatives from immediate support needs - Maintaining classroom awareness at cost of individual support
Jonas	- Regulating learning when giving explanations in whole class - Deciding which students to support based on potential support needs - Relying on SRL of high-achievers
Cross-case	- Relating the content topic to student level and potential mistakes - Being aware of the need to adapt support

3.2.2. Diana

3.2.2.1. Requesting student regulation in whole class explanations. As part of presenting a new topic to students, Diana instructed them to do an inquiry-based activity to spark interest:

We had a similar model of the lesson where we started an experiment and they see something, it gets them really interested, they ask questions the whole lesson after seeing something interesting. That's why we started just a short experiment.

Afterwards, she moved on to debriefing the task. Here, Diana did not provide all the explanations about the new concept at once but asked prompting questions to guide students' thinking towards the main concept in the lesson. In Diana's words, this approach was "to make sure that their understanding is not based on what is said only, but to lead them to conclude, to understand and remember." This results in teacher's conversation with the whole class, where the teacher asked leading questions to guide students to name the concept. Diana described this process as "going around in circles until they arrive to the [expected] vocabulary." By doing so, Diana requested some degree of student learning regulation already in the whole class phase, through the activity type and the discussion afterwards.

3.2.2.2. Providing support based on student initiatives from immediate support needs. When moving to the seatwork phase, where students worked on an individual quiz, Diana walked around and offered help. Sometimes, the support interactions with students started because of Diana's observation of a student activity: "I noticed that he got a question incorrectly." However, more often they were requested by students, and the teacher would stay to answer their questions or ask prompting questions to help them overcome difficulties. Diana articulated her strategy to rely on the student involvement: "If they don't show interest and if they are not getting it, I am not pushing it, because it is [a] complicated [topic]." Thus, with this approach, the teacher aimed to address students' support needs but still depended on students to take the initiative in seeking help.

3.2.2.3. Maintaining classroom awareness at cost of individual support. In the seatwork phase, Diana would proceed to the next student before ensuring the current student had fully grasped the explanation:

[This student] got it but still has a problem with it and I need to check on other students.
[This student] said that [they] don't know how to do calculations and I was going to help [them] but before I could talk [them] through the calculations, another student was asking something, so I just gave [them] a little hint where to begin and I move on to help the next student.

On the one hand, this allowed to maintain classroom awareness. On the other hand, the supported students might not have received the sufficient support to continue with the task. Thus, this dynamic of Diana's support interactions had a tension with the need to maintain awareness of the learning situation in the classroom, sometimes at cost of individual support.

3.2.3. Jonas

3.2.3.1. Regulating learning when giving explanations in whole class. In the whole class phase, Jonas made theoretical explanations of mathematical problems to "guide [students] a bit more through the mental process". The teacher adjusted the pace of explanation based on expected student pace and slowed down the explanation in places that required more student thinking:

I am talking here with purpose, it might not have much meaning in itself, but in that way, I give them some time. For example, I can see that some students are still copying down the first example, so this gives them time to write everything down nicely if they want to. And for those who are more, let's say, philosophical thinkers, I use that moment to say something more meaningful or useful to them.

This suggests regulation of the learning process by modelling the cognitive strategy of making the reasoning explicit and adjusting to students' pace, while providing extra input for those who need it. Furthermore, the teacher also monitored student engagement and considered when to intervene if some students became distracted. Jonas described doing this by observing students' facial expressions

and activity levels, assessing whether their reactions aligned with his own expectations:

I look around the class to see if there are any agitated faces, but I expect that the first example should be understood by everyone. I feel that they understand because they did something similar not so long ago.

In this phase, Jonas admitted that some students may not be listening to the explanations if they do not find the topic challenging: “I know that better students probably don’t listen much to my theories [explanations], because it was clear enough what we were going to do here.” Hence, the teacher regulated student learning through modelling, as well as metacognitive and visual monitoring.

3.2.3.2. Deciding which students to support based on potential support needs. This monitoring continued when moving to the seatwork phase, as here Jonas considered which students would require support based on his own knowledge about the students:

There is one student in the rightmost row, I know that [this student] is having a little more difficulty, so I will come here, as I know that there might be some [mistakes]. And for others [here], I don’t really plan to approach if they don’t raise their hands.

Then Jonas provided context about students’ learning situations, whether they were prone to making mistakes early on in assignments, were trying to improve their results, or missed lessons and needed additional guidance. While the teacher kept monitoring the work of all students or responded to raised hands, his attention and comments focused on students with potential support needs.

3.2.3.3. Relying on SRL of high-achievers. Jonas referred to some students as those “who can do” the task and “have the motivation”, while also being sure that they would ask for help when needed. This suggests that the teacher judged these students as having sufficient SRL skills. Notably, Jonas was not planning to monitor these students either. Some students were described as usually helping or “consulting” each other, and that the teacher could rely on them to provide help to their peers: “I know that Valdas knows how to explain very well. Although the student next to him may have questions, I know that Valdas will explain well.” Thus, Jonas drew on his knowledge about students to leverage student SRL to enable their progress on the task.

3.2.4. Cross-case themes

3.2.4.1. Relating the content topic to student level and potential mistakes. The three teachers elaborated about the nature and difficulty of the content topic presented in the lesson and related it to student knowledge level and the potential difficulties students have. For Amelie, it was important to communicate to the students that the current topic was a building block of the major unit on essay writing and that students needed to reflect on the previous lessons and apply what they already knew. Amelie noted that the current group had a good general skill level, so that the advanced vocabulary could be presented. Diana stated that the topic was difficult and involved a hands-on activity that students did not have much experience with. Therefore, Diana carefully observed students to prevent them from misunderstanding. Jonas referred to the topic as a continuation of the previous lesson and thus being relatively easy, therefore there was an expectation for some students to grasp it fast and work at their own pace. Still, this teacher drew attention of all students to the critical moments in the topic.

3.2.4.2. Being aware of the need to adapt support. All teachers referred to their teaching experience to formulate the need to adapt instruction to different students. Jonas mentioned noticing student preferences of teacher support:

I need to consider how everyone understands. Some, when you ask a question after a question, they like that they can find the answer themselves. Others don’t like it, they say, ‘I don’t understand, and here teacher comes and asks another question.’ (Jonas).

Students’ level of understanding of the topic was also a point for differentiation or adapting tasks and explanations:

I give a simpler paragraph to the ones that are maybe capable just achieving the basic one, and then for the ones who want to advance it, then they have a choice for the more difficult one. (Amelie)

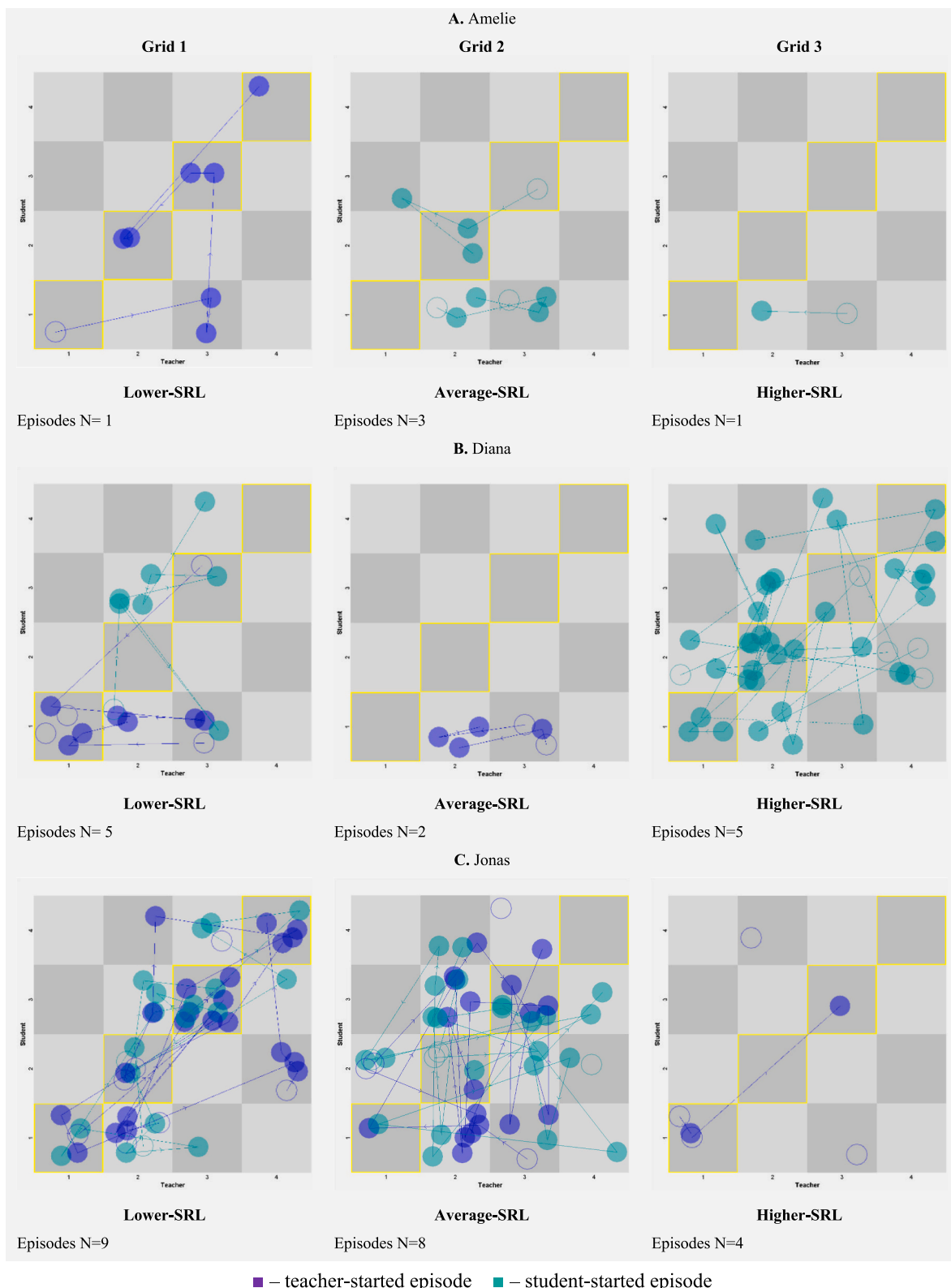
You have to adjust with each student the steps you use. With a student like Laura, you can take big chunks and skip a couple of steps in between, and it will be fine. With others you take as small steps as you can. (Diana)

This shows that all teachers were aware that support needed to be adapted for students.

3.3. Variation in teacher support interactions with students of different SRL profiles

The State Space Grids analysis relied on three aspects: whether a support interaction was teacher-initiated or student-initiated, the SRL profile of the student, and whether the interaction entered the co-regulation zone. Fig. 5 illustrates each teacher’s State Space Grids support episodes with each student profile, with descriptive numerical information in Table 6.

In Amelie’s case, students were asked to write a short text and inform the teacher when finished. Amelie had five individual support episodes with five students. The State Space Grids of Amelie’s support interactions show that the teacher-started interaction with the lower-SRL student progressed from the task-level and reached the stage of minimised support from the teacher and student independent performance (Grid 1 in Fig. 5 A). In this support episode, 75% of dialogic turns were within the co-regulation zone (Table 6). The student-started interactions with average- and higher-SRL were less diverse: while the teacher started regulating learning and



Grid levels: Teacher: 1 – Task clarification, 2 – Direct regulation, 3 – Indirect regulation, 4 – Minimising support.

Student: 1 – Task clarification + reaction, 2 – Indirect regulation, 3 – Direct regulation, 4 – Task performance, see Table 4.

Cells marked with yellow: Co-regulation zone

(caption on next page)

Fig. 5. Support episodes of the three teachers.

Table 6

Descriptive information on support episodes of each teacher in the lesson.

Teacher	Student group	N of interaction episodes			Mean number of events ^a		Cell range (whole grid)
		Teacher-initiated	Student -initiated	Total	Co-reg zone	Outside co-reg zone	
Amelie	Lower-SRL	1	–	1	75%	25%	5
	Avg-SRL	–	3	3	30%	70%	5
	Higher-SRL	–	1	1	0%	100%	2
Diana	Lower-SRL	4	1	5	37%	63%	6
	Avg-SRL	2	–	2	0%	100%	2
	Higher-SRL	–	5	5	39%	61%	14
Jonas	Lower-SRL	7	2	9	55%	45%	11
	Avg-SRL	4	4	8	27%	73%	13
	Higher-SRL	4	–	4	67%	33%	4

^a Mean numbers of events for the co-regulation and outside the co-regulation zones were exported as raw values calculated by GridWare, and then transformed to percentages of the grid-wide mean number of events.

requesting regulation, the students provided only reactions, such as agreement. One of the average-SRL students made requests for teacher regulation by asking questions, this interaction progressed to the higher regulation levels (Grid 2 in in Fig. 5 A). Hence, for Amelie, teacher interaction with the lower-SRL student (Grid 1 in Fig. 5 A) showed more progression and variety than interactions with other SRL groups (Grids 2 and 3 in Fig. 5 A). This may be due to feedback-based interactions with the higher-SRL students.

Diana's individual guidance occurred in two parts: first, she guided students during an inquiry-based activity using equipment; then, she assigned a quiz after presenting the main topic. The teacher walked around, offering help and spending more time with students who asked for it. Diana had many student-initiated interactions with higher-SRL students (5 of 12 interactions). State Space Grid visualisations of Diana's interaction with the students (Fig. 5 B) reveal that there was more co-regulatory progress when support episodes were initiated by students, especially higher-SRL ones. This is reflected in more dispersed and progressive student-started trajectories in Grids 1 and 2 in Fig. 5 B. With average-SRL students, interactions were teacher-started and not co-regulatory. Interactions with lower-SRL students were mostly teacher-initiated (4 out of 5 episodes), and 63% of the dialogic turns in them fell out of co-regulation zone (Table 6). Thus, the teacher had a student-driven approach, relying on learners to engage and seek help. Notably, the teacher repeatedly initiated interactions with a lower-SRL student to encourage participation, but these did not reach the intended performance level (Grid 1 in Fig. 5 B).

Jonas presented theoretical examples to students and then let them work individually on the related practical exercises. The teacher walked around the room and monitored the students. With lower-SRL students, Jonas had nine support episodes, both teacher and student-initiated (Grid 1 in Fig. 5 C). In these interactions, 55% of dialogic turns were co-regulatory (Table 6). Interactions with the average-SRL group were more diverse, starting and finishing at different stages (Grid 2 in Fig. 5 C), but mostly non-coregulatory and

Table 7

Summary of teachers' support patterns in relation to student SRL.

	Association between attention and student SRL	Focus of teacher intention to support students	Variation in teacher-student support interactions	Teacher support pattern
Amelie	No direct association	Continuously maintaining student engagement	- Interactions in co-regulation zone with the lower-SRL student, teacher-initiated - Short interactions mostly outside of the co-regulation zone with average- and higher-SRL students	<i>Regulating</i> pattern: focus on involving students, teacher-regulation at all times in the lesson
Diana	Strong positive association, more attention to higher-SRL students	Focus on the learning content Difficult topic, monitoring the high-achievers to understand the content	- Co-regulatory progress mostly in student-initiated interactions - Teacher-initiated interactions with lower-SRL students without progression in co-regulation - Many interactions with higher-SRL students	<i>Responding</i> pattern: Focus on higher-SRL students
Jonas	Slight negative association Attention peaks on some average-SRL and lower-SRL students	Easier topic, so relying on SRL of high-achievers and monitoring those who potentially need support	- Interactions in co-regulation zone with lower-SRL students, both teacher- and student-initiated - Dispersed interactions with average-SRL students outside of co-regulation zone - Short teacher-started interactions with higher-SRL students	<i>Proactive</i> pattern: Focus on support needs of lower-SRL students

less progressive than interactions with the lower-SRL students. Finally, the support interactions with the higher-SRL students were short (Grid 3 in Fig. 5 C), representing teacher's short check-ins with these students.

3.4. Teacher patterns of supporting student SRL

Addressing the main research question, the data from the three sources were triangulated. This juxtaposition of results showed a convergence, thus within-teacher patterns of student SRL support could be identified. We summarise these in Table 7. Amelie's adaptive support pattern can be described as *Regulating* with continuous support and focus on student engagement. Diana's approach can be identified as *Responding* with emphasis on higher-SRL students and student initiatives. Finally, Jonas showed a *Proactive* pattern with planning to support lower-SRL students.

4. Discussion

Students vary in how and to what extent they practice SRL. By applying the conceptual lens of teacher professional vision for student SRL, this study investigated whether and how teachers adapted instructional support to different perceived student SRL profiles in the classroom. Three research sub-questions were explored to draw the patterns of teacher support adaptation in relation to student SRL profiles at three levels: teacher visual attention to students, teacher support intention, and qualities of interactions with individual students. Teachers' attention distribution between students in the whole class to some extent reflected teachers' support intentions. Moreover, for all teachers, interactions with the lower-SRL students were mostly teacher-initiated. Addressing the main research question, three instructional support patterns of the teachers show that teachers use their knowledge about students' learning behaviours to identify and address student needs, but with varying priorities.

For the main question of the study on the potential patterns of teacher's adaptive SRL support, the convergences between the three data sources resulted in identification of teachers' support patterns: *Regulating*, *Responding*, and *Proactive*. In line with Wolff et al. (2021), teachers could rely on their knowledge of students' learning behaviours to guide the noticing and recognising needs of students effectively and in a proactive manner (Proactive profile of Jonas and to some extent *Regulating* profile of Amelie), as well as act on student requests or reactions (Diana's *Responding* pattern, especially in individual guidance episodes). Teachers' patterns of interaction showed adaptation to student SRL profiles. In the *Proactive* pattern, the adaptation entailed identifying potential difficulties, thus approaching lower-SRL students first. *Regulating* pattern entailed providing most of the learning support in the whole class phase, with shorter individual guidance episodes adjusted to the SRL level of the guided student. However, it can also be challenging for teachers to fully engage lower-SRL students in the lesson activity, so they focus on higher-SRL students to ensure that at least some of the students reach the lesson goals (*Responding* pattern). Consistent with adaptive teaching literature (van Geel et al., 2023) and teachers' multiple roles in SRL support (Karlen & Hertel, 2024), teachers may choose between strategies when diagnosing students and differentiating instruction in the lesson. Moreover, underlying variations in the expertise level of the teachers may have influenced the attentional and support patterns observed (Seidel et al., 2021).

Three research sub-questions allowed to consider teacher support adaptation in relation to student SRL profiles at three levels. The first sub-question addressed the association between the amount of teacher visual attention to students and student level of SRL. The findings demonstrate that there is no simple relationship between students' SRL and teachers' attention. For the purposes of this study, it was important to see whether there were differences in teacher visual attention between student SRL groups. Indeed, each teacher had a trend in visual attention distribution – looking rather balanced between students (Amelie) or focusing either on lower-SRL (Jonas) or higher-SRL (Diana) groups of students. Eye-tracking research with teachers states that higher amount of visual attention on individual students can be associated with teacher's increased support to these students (Chaudhuri et al., 2022; Seidel et al., 2021) or students' interactive (Goldberg et al., 2021; Kosel et al., 2023) or disengaged behaviours (Goldberg et al., 2021). The different trends of visual attention of teachers in the current study can be partially explained with the observation that more teacher visual attention went to the groups of students who received teachers' individual support. However, one teacher, Amelie, showed a more balanced visual attention allocation. A possible reason for this was that this teacher had fewer individual support episodes with students compared to the other two teachers. Another explanation of equalised attention allocation between students can be the teacher's effort to monitor the whole classroom even when interacting with individual students (Cortina et al., 2015). Furthermore, previous classroom studies with relatively small samples of 3 and 4 teachers also showed between-teacher variation in teachers' attention to students (Dessus et al., 2016; Smidekova et al., 2020). Our study helps to reveal whether such variation between teachers can be linked to teachers' considerations of student learning characteristics and eventual instructional support. To this end, we asked teachers to elaborate own teaching practice in RTA, addressed by the next research sub-question.

The second sub-question investigated how teachers explained own attention and support intentions towards students. The analyses of teacher RTA showed that the teachers had individual foci of instructional support intention. Amelie focused on monitoring and maintaining student engagement. This approach may indicate teacher's focus on clear routines and structure as SRL support (Callan et al., 2022; Perry et al., 2020). Diana expected students to regulate own learning, as she provided support when it was sought by students. This teacher responded to student requests, while also trying to engage the lower-SRL students. This teacher focused on providing autonomy and expecting help-seeking (Callan et al., 2022) in all students, which might be challenging for lower-SRL students (Vandevelde et al., 2012; Vermunt & Verloop, 1999). In contrast, Jonas continuously decided which students to support based on potential support needs and trusting only high achievers to regulate own learning. This strategy may reflect a knowledge-driven approach (Karlen et al., 2020; König et al., 2022) where a teacher applies the knowledge about students to adapt teaching to the respective needs (Parsons & Vaughn, 2016). Concurrently, all teachers linked the lesson topic difficulty to potential student needs,

interpreting own instructional goals in the context of subject content knowledge. Previous research showed that teachers' interpreting of classroom events correlated with their professional knowledge (König et al., 2022). Recent models focusing on teacher support of student SRL included teacher conceptual and pedagogical knowledge about SRL into the structure of teacher professional knowledge (Karlen et al., 2020). However, in the current study, the participating teachers named only some of the characteristics that relate directly to student SRL, mostly the ability to understand and perform tasks independently, and to seek help. This is in line with research indicating that the concept of SRL and diagnosing SRL of students is usually demanding for teachers (Dignath & Sprenger, 2020).

The third sub-question addressed the teacher-student support interactions in the lesson. All three teachers had support episodes with students from all SRL groups and had interactions within the co-regulation zone. However, the support trajectories differed between the student SRL groups, as well as between the teachers. Amelie and Jonas had longer, more dispersed, and co-regulatory interactions with the lower-SRL students, while Diana had longer progressive interactions initiated by students, mostly from the high-SRL group. Kupers et al. (2015) identified reciprocal influences on student autonomy within the teacher-student instructional interactions, where not only the teacher could support students' autonomy, but also students could elicit more autonomy support from their teachers. Similarly, in the present study, students were shown to contribute to the regulation of learning through the interaction with the teacher. Furthermore, for all teachers, interactions with the lower-SRL students were mostly teacher-initiated; for Amelie and Jonas, these interactions were closer to the co-regulation zone. This aligns with the theoretical assumption that lower-SRL students require more teacher-regulation, while higher-SRL students are more independent (Vermunt & Verloop, 1999). The teachers appeared to be aware of this and approached the students accordingly. Our study also shows that co-regulation might be more straightforward for teachers to implement with the lower-SRL students. As for students with some SRL skills, like in Jonas' example, interactions with average-SRL students were more dispersed, while not continuously in the co-regulation zone. This may indicate agency of the average-SRL students, which manifests in a lack of synchronisation with the teacher. Students might be exploring ways to receive support from the teacher, disagreeing with the teacher, or the teacher might not be able to adjust support to the student immediately.

This study shows that teacher-perceived student SRL level does play a role in the classroom. The contribution of this study is that it emphasised not the degree or content of teachers support to students, but the variations of teacher support to students in light of the connection between teacher visual attention, instructional intention, and co-regulatory qualities of interactions with students. Teachers consider student characteristics in the real time as they teach. The study observed teacher support practices in the immediate authentic settings of the classroom and took into consideration teachers' intentions as a frame for attentional focus on students and support interactions.

4.1. Limitations

This study was not without limitations. First, this study focused on one lesson of each teacher, which did not provide opportunities to characterise the regularity or sustainability of the identified teacher support patterns, which limited the generalisability of the findings. Mobile eye tracking in real classrooms is still a relatively novel and intensive data collection method that requires laborious coding and processing (Jarodzka et al., 2021). Therefore, it is common to have only one lesson recording per teacher in such studies (e.g., Muhonen et al., 2020; Pouta et al., 2021). However, we acknowledge the need to collect more longitudinal data per teacher and method development to better identify teacher individual differences in the relationship between their visual attention behaviour, instructional intention, and qualities of support to students. Furthermore, we relied on measuring student SRL as perceived by the teachers, both as a trait and situationally. Researcher observation and coding of students' immediate learning-related behaviours in the classroom in connection to teachers' visual attention, intention, and support would shed light on the ongoing teacher diagnosis of student needs and its accuracy. Finally, this study did not explicitly address the possible differences in teacher expertise in terms of professional knowledge and teaching experience. This study illustrates the potential of mixed-method small-scale studies to uncover the unique within- and between-teacher patterns of supporting student learning captured with online measures. Such designs can be useful for investigating expert and novice teacher differences in the real-world classrooms.

5. Conclusion and outlook

This multiple case-study investigated whether and how teachers implement instructional adaptation in the classroom at a fine-grained level: the variations of teacher support to students based on the connection between teacher visual attention, instructional intention, and characteristics of interactions with students. This study shows how teaching approaches vary, including those to support student SRL. It illustrates that there is no universal approach to providing support; a method that works well for a student needing significant SRL assistance may not be as effective for a student who requires less support. Teachers appear to recognise this need for adaptation. Helping teachers to develop professional knowledge and competence for supporting student SRL is important. In the future, it may be helpful to create professional development programs on the topic of SRL for teachers linked to teachers' individual contexts. These programmes could build on teachers' existing strategies, helping them recognise how they already support their students and showing them how to incorporate new knowledge about SRL and strategy instruction into the existing practices.

CRedit authorship contribution statement

Kateryna Horlenko: Writing – original draft, Investigation, Formal analysis, Conceptualization. **Lina Kaminskienė:** Writing – review & editing, Supervision, Resources, Conceptualization. **Anu Kajamies:** Writing – review & editing, Conceptualization. **Erno Lehtinen:** Writing – review & editing, Supervision.

Ethical approval

This research was approved by Committee on Research Ethics, Educational Research Institute, Education Academy, Vytautas Magnus University, protocol number SA-EK-22-13 from 2 May 2022.

Declaration of competing interest

There are no competing interests to declare.

Data availability

The authors do not have permission to share data.

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