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Student perception of teacher encouragement of self-regulated learning and its relationship with self-regulation learning strategies

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Introduction: Self-regulated learning significantly impacts academic achievement and learning effectiveness; however, a significant portion of students do not engage in optimal self-regulated learning. Teachers can influence self-regulated learning in various direct and indirect ways, such as teaching students effective learning strategies or structuring the learning environment. Research indicates that teachers moderately encourage self-regulated learning, with direct/explicit teaching methods being underutilized despite their stronger contribution to fostering learning self-regulation. Teachers often overestimate their encouragement of learning self-regulation compared to students' perceptions. There is a scarcity of research on encouraging self-regulated learning in teaching practices, particularly from the students' perspective. Hence, the aim of this study was to examine how students perceive teacher encouragement of self-regulated learning and its association with their own self-regulated learning.

Methods: The research was conducted on a sample of 2,154 students who assessed the teacher's encouragement of self-regulated learning and their own self-regulated learning in a specific subject.

Results: Students perceive that teachers moderately to relatively highly encourage self-regulated learning. Statistically significant moderate correlations were found between students' assessments of learning self-regulation and the encouragement of self-regulated learning. Girls perceive that teachers encourage self-regulated learning to a greater extent, as do secondary school students compared to primary school ones. Teacher encouragement of self-regulated learning explains from 0 to 32% of the variance in self-regulated learning strategies. Defensive self-regulation strategies (avoiding work, self-handicapping, and focusing on minimal demands) are explained to the least extent, while proactive self-regulation strategies (orientation towards acquisition, elaboration, and goal setting) are explained to a considerably greater degree.

Discussion: The research results suggest that students' perception of teacher encouragement of self-regulated learning is a significant predictor of learning self-regulation in students. The data obtained in the research contributes to understanding the encouragement of self-regulated learning from the students' perspective and highlights the importance of students' assessments of encouragement of self-regulated learning.

KEYWORDS

self-regulated learning, teachers' encouragement of self-regulated learning, student perception, relationship, primary and secondary school

1 Introduction

Theories of self-regulated learning emphasize that self-regulated learning (SRL) is a cyclic, multidimensional process involving the interaction of personal (cognitive, metacognitive, motivational, emotional), behavioural, and environmental factors (Panadero, 2017). These factors enable students to better manage their learning. Self-regulated learners are those that are proactive in their efforts to learn; i.e., they plan their learning, set goals, choose task-appropriate strategies, monitor goal attainment and the effectiveness of learning strategies, evaluate what they have learned, which reflects on their motivation and behaviour in the next learning cycle. In recent years, literature and empirical studies have underscored the importance of self-regulated learning when it comes to educational outcomes, and there have been several reasons put forward as to why this seems to be the case. Firstly, students whose learning is self-regulated achieve more positive educational outcomes. It is undeniable that self-regulated learning has a significant impact on academic achievement and learning effectiveness, with numerous studies indicating that self-regulated learning positively associates with academic achievement (Broadbent and Poon, 2015; Hattie, 2013; Richardson et al., 2012; Zimmerman, 1990). Students whose learning is self-regulated become adaptable, lifelong learners, think critically and creatively, solve problems and are able to work and learn independently and in collaboration with others (Perry et al., 2017). However, the learning of a significant portion of students does not appear to be optimally self-regulated (Kramarski and Michalsky, 2009). On the other hand, teachers can influence self-regulated learning in various direct and indirect ways: by teaching students effective learning strategies or structuring the learning environment (Dignath-van Ewijk and van der Werf, 2012; Karlen et al., 2020; Kistner et al., 2010). Moreover, teaching students how to self-regulate their learning and engaging them in a stimulating environment seems to improve their performance (de Boer et al., 2012; Dignath and Büttner, 2008) but also encourages the development of students' metacognition, motivation and strategic action. These fundamental learning competencies improve students' academic, social, emotional and career outcomes (Brenner, 2022; Conesa et al., 2023; Depaeppe et al., 2010). Teachers can promote self-regulated learning directly through teaching learning strategies both implicitly and explicitly. Implicit teaching involves demonstrating certain behaviours, such as modelling strategy use or verbalizing thought processes by the teacher, while explicit teaching entails instruction-based demonstrating on why, how, and when a particular strategy is to be used. In indirect teaching, the teacher creates a learning environment based on constructivist theory: by activating prior knowledge and actively constructing new knowledge (constructivism), enabling student autonomy in SRL (self-determination), fostering social interaction among students (collaboration), embedding learning in authentic situations to encourage transfer (value), developing self-regulation skills (self-direction), encouraging engagement in SRL (expectancy of success), and supporting positive emotions and relationships (student support; De Corte et al., 2004; Dignath et al., 2022).

Most teachers agree that students need assistance in making their learning self-regulated, showing positive beliefs about SRL, but they feel uncertain about how to accomplish this task (Dignath-van Ewijk and van der Werf, 2012). The research also indicates that teachers only moderately encourage SRL, particularly through infrequent use of

direct/explicit instruction, which has been shown to more strongly contribute to the development of learning self-regulation (Bolhuis and Voeten, 2001; de Kock et al., 2005; Dignath and Büttner, 2018; Dignath-van Ewijk and van der Werf, 2012; Karlen et al., 2020; Kistner et al., 2010, 2015; Spruce and Bol, 2015; Šimić Šašić et al., 2023a; Vadevelde et al., 2012; Zimmerman, 2002).

Research shows that differences in SRL encouragement depend on both teacher and student characteristics, including factors such as gender, age, level of education, etc. (De Smul et al., 2018; Hargraves, 2005; Moos and Ringdal, 2012; Šimić Šašić et al., 2023b; Vadevelde et al., 2012). Therefore, it is important to investigate the differences in students' perception of SRL encouragement with regard to student characteristics. It is known that there are differences in teacher behaviour in the classroom depending on the gender of the teacher, as well as differences in student perception of teacher behaviour depending on the gender of the student. Differences in academic achievement and learning self-regulation also seem to exist between male and female students, and the same goes for teacher perception of male and female students. Women, in line with their gender role as "caring teachers," more often utilize student-directed, active, and constructivist teaching approaches, all of which tend to be welcomed by students in general (Chen, 2000). Šimić Šašić et al. (2023a) have determined that female teachers are more inclined to encourage SRL. On the other hand, female students were shown to perceive their teachers as more dominant, positive, and cooperative in comparison to their male colleagues (den Brok et al., 2006), thus establishing closer and less conflictual relationships with them (Baker, 2006), and viewing them as more demanding and responsive, whereas male students perceive a higher level of coercive control from teachers (Slobodzin and Batista, 2021). Female students generally achieve better academic success and demonstrate higher levels of learning self-regulation (Bidjerano, 2005; Lončarić, 2010; Niemivirta, 1997; Šimić Šašić, 2008), and teachers perceive them as such while having lower expectations of male students, whom they perceive as dependent, idle, and unmotivated (Åhslund and Boström, 2018). Research indicates that teachers perceive greater utility in promoting SRL in primary schools (De Smul et al., 2018; Yan, 2018). De Smul et al. (2018) found that teachers in higher grades of primary school (middle school) and in secondary school provide opportunities for learning self-regulation but rarely engage in direct teaching of learning strategies to students. On the other hand, Moos and Ringdal (2012) found that teachers in lower grades of primary school (up to 6th grade) predominantly encourage learning self-regulation. Šimić Šašić et al. (2023a) did not find differences in teacher assessment of SRL promotion based on the type of school where teachers work (primary/secondary school-grammar/vocational school).

Research on SRL encouragement in teaching practice is scarce (Dignath-van Ewijk et al., 2013; Kramarski and Michalsky, 2009), especially from the perspective of students. Most studies have focused on the effectiveness of interventions and teacher training for encouraging SRL. When it comes to research on SRL encouragement by teachers, most studies have relied on teacher self-assessment or observation. In fact, the predictive value of teachers' self-assessment of SRL encouragement in students may be weak due to bias (Winne, 2010; Winne and Perry, 2000). Teachers may report what is appropriate and socially desirable rather than their actual practices, and the terminology in questionnaires may potentially be unfamiliar to them. Using questionnaires is advantageous due to their

practicality with large samples, whereas observation tends to be time-consuming and inconvenient, especially in relation to teachers who may change their behaviour due to awareness of being observed. Nevertheless, observation has the advantage of assessing behaviour rather than someone's opinion, but it also faces sampling and construct visibility issues. We believe that it is preferable to use various sources of information, including the students' opinions. Student perceptions of the learning environment and their teacher behaviour are important sources of information. Unlike observer assessments, students' ratings are based on a larger sample of teacher behaviour over a greater number of teaching hours, and the limitation of observation is that observers themselves may be a potential source of variation in the observed results. The research on different teaching perceptions has shown that students' perceptions determine their behaviour and thus have a greater impact on student learning than external observations (De Jong and Westerhof, 2001). Students' perceptions of the learning conditions are thus considered among the most relevant factors mediating between teaching quality and students' utilization of learning opportunities (Seidel and Prenzel, 2006). Newmann et al. (1996) argue that teaching methods are less important than the quality of students' educational experiences. Generally speaking, the research agrees on the mismatch between the objective environment and subjective perception of the environment, as well as discrepancies between teacher and student assessments. Šimić Šašić et al. (2024) found that students rated teacher encouragement of SRL lower than teachers did, having also found a low but statistically significant correlation between teacher and student assessments of SRL encouragement. The correlation coefficients ranged from 0.21 to 0.32, which was expected, considering that the correlated assessments were based on the average ratings of a larger number of students. Similar results have been reported by Dignath-van Ewijk et al. (2013), who found that there is some agreement in the assessments of teachers, students, and observers regarding teacher encouragement of SRL, and the agreement was higher between teacher and student assessments than those of observers. Additionally, the authors in this study found that student and observer assessments have greater predictive value for student self-regulation than teacher assessments, which is consistent with the view that students are able to provide valuable information about teaching that influences their learning experiences (McCombs et al., 2008).

In this study, we aimed to examine how students perceive teacher encouragement of SRL and explore the association between students' perception of SRL encouragement and SRL itself.

The specific objectives were: (a) to examine students' perception of SRL encouragement, (b) to investigate potential differences in the perception of SRL encouragement based on gender, grade, and type of school attended by students, and (c) to explore the association and contribution of students' perception of SRL encouragement to their learning self-regulation strategies.

Research hypotheses: (a) we anticipate that students will positively evaluate the degree of teacher encouragement of SRL; (b) although we expect female students to rate SRL encouragement more positively, we do not expect differences in students' perception of SRL encouragement based on grade and type of school; and (c) we expect students' perception of SRL encouragement to be associated or contribute to the explanation of students' evaluations of their self-regulated learning in a specific subject.

2 Method

2.1 Sample

The study was conducted on a sample of 2,154 primary and secondary school students across 17 counties in the Republic of Croatia. A request to participate in the research was sent to one primary school and one secondary school in each of Croatia's 21 counties. For each teacher who agreed to participate, the school coordinators agreed to include one of their classes in the research. Of the total number of respondents, there were 1,277 female students (59.29%), while the distribution of students by type of school was as follows: primary schools 50.93%, grammar schools 16.25%, and vocational schools 32.82%. The distribution of students by grades was as follows: 5th grade (8.03%), 6th grade (15.13%), 7th grade (14.53%), 8th grade (13.28%) in primary schools, and 1st grade (10.77%), 2nd grade (17.32%), 3rd grade (10.45%), and 4th grade (10.49%) in secondary schools.

2.2 Measurement instruments

General Data Questionnaire—included questions concerning gender, age, type of school, grade level, and academic performance in the subject taught by a specific teacher for whom the degree of SRL encouragement was assessed.

Self-Regulated Learning Encouragement Scale (Šimić Šašić et al., 2024)—measures the student perception of teacher's encouragement of self-regulated learning across five different areas:

- Encouragement of Learning Planning and Learning Organization Strategies (ELPLO)—assesses the degree of support provided for students' learning planning (setting goals, managing time and learning strategies, organizing the learning environment, encouraging task assessment, identifying causes of success or failure in learning, etc.) and the encouragement of learning organization strategies (breaking down content into smaller meaningful units, identifying key concepts, summarizing, and asking questions). It consists of 15 statements (e.g., *The teacher encourages us to set goals before learning or completing a task*).
- Encouragement of Metacognitive Monitoring of Learning (EMML)—involves encouraging students to direct and sustain their attention during learning, experiment with different ways of learning/problem-solving, and engage in activities when motivation drops and negative emotions arise, such as: supporting interest in learning, investing additional effort, reminding students of task value, etc. It consists of 10 statements (e.g., *The teacher encourages us to maintain focus on the content we are learning/during learning*).
- Encouragement of Elaboration and Evaluation (EEE)—measures the encouragement of explanations/discussions among students, graphical representation of information, application of knowledge/creation, assigning less structured tasks, independent task solving, working in pairs/small groups, involving students in setting evaluation criteria, self-assessment, and evaluating others' work. It consists of 10

statements (e.g., *The teacher encourages us to explain the content we are learning to each other*).

- (d) Encouragement of Understanding (EU)—consists of statements aimed at activating previously acquired knowledge, initiating teaching with intriguing tasks, encouraging drawing conclusions, connecting information from different sources, correcting misunderstandings, and linking information to everyday life situations. It consists of 12 statements (e.g., *The teacher provides us with enough time to explore and gain understanding of new content*).
- (e) Encouragement of Effort Investment (EEI)—statements refer to encouraging students that they can accomplish tasks, motivating their effort investment, attributing success to effort, and emphasizing the value of knowledge. It consists of 4 statements (e.g., *The teacher encourages us to believe that we can learn/complete the task*).

The scale was originally developed to assess teacher encouragement of SRL and was adapted for students. The factor structure in the student sample revealed a four-factor structure and somewhat different distribution of items across factors. However, as the study was conducted as part of a broader project aimed at examining the relationship between teacher and student assessments, factor analyses were performed separately for the subscales (with the number of factors fixed at 1). The items in the student sample showed satisfactory factor loadings and robust coefficient values for internal consistency. Due to high correlations among the factors, it is possible to use the scale as a single-factor scale with a total score indicating overall encouragement of SRL (ESRL).

The scales of self-regulated learning components (Lončarić, 2014) measure motivational and cognitive beliefs and learning strategies. The following subscales were used in this study:

- (a) General belief in control capacity—this scale contains 4 statements (e.g., *I can achieve good success in this subject if I decide to do so*) and measures students' belief in their ability to control situations in learning.
- (b) Motivational beliefs
- Self-efficacy in the learning process—measures motivational beliefs related to the expectation of success in the learning process (4 statements; e.g. *It is easy for me to learn the assigned material for a test or examination*).
 - Goal orientations—represent the value component of motivational beliefs, and include as follows: mastery goal (4 statements; e.g. *It is important for me to acquire and learn as much new knowledge and skills as possible*); competition goal—outperforming others (4 statements; e.g. *I am very satisfied when I perform better than others in this subject*); avoidance goal (4 statements; e.g. *I want to spend as little time as possible on school obligations in this subject*).
- (c) Motivational strategies—measure the motivational component of SRL, and include as follows: goal setting (4 statements; e.g. *When I study, I specify exactly what I want to achieve through learning*); effort regulation (4 statements; e.g. *If I get stuck on difficult material, I encourage myself and say to myself that I can*

solve it); self-handicapping (5 statements; e.g. *I always leave studying for this subject until the last moment*).

- (d) Learning Strategies—refer to cognitive and metacognitive learning strategies, and include as follows: control of learning processes and outcomes—a strategy (metacognitive control) related to the learning process (4 statements; e.g. *After studying in this subject, I check my knowledge and understanding of the material*); organization—strategies related to learning content and involve deep processing (6 statements; e.g. *In this subject, I try to summarize extensive texts and come up with a few important sentences or key points*); elaboration—strategies related to learning content and involving deep processing (4 statements; e.g. *While reading the material from this subject, I try to connect it with what I already know*); setting minimal demands—refers to a low level of cognitive effort investment in learning (4 statements; e.g. *I only learn as much as is necessary to pass the grade*).

2.3 Procedure

The research was conducted using an online questionnaire. The questionnaire link was sent to school coordinators who forwarded it to the students who were then informed about the research objective, purpose, and implementation method, and participation in the research was voluntary and anonymous. Permission for conducting the research was obtained from the Ministry of Science and Education of the Republic of Croatia, the Ethics Committee of the University of Zadar, school principals, and parents of students under 14 years of age. Filling out the questionnaire took about 15 min. Students assessed the encouragement of self-regulated learning by a specific teacher (who also participated in the research) and their own learning self-regulation in the subject taught by the teacher in question.

2.4 Data analysis

The Kolmogorov–Smirnov test determined that the distributions of the results for all variables deviated from the normal distribution. The values shifted towards the higher end, indicating a negatively asymmetric distribution. However, the skewness and kurtosis indices remained within the expected indices for a normal distribution (skewness index <3, kurtosis index <8; Kline, 2005, Table 1). Levene's test was used to check the homogeneity of variances between groups. In case the condition of homogeneity was violated, the Welch test was additionally calculated. A t-test was used to test gender differences. Given that inhomogeneous variance among groups with regard to school and grade was determined for most subscales, Welch tests were performed in addition to ANOVA. In order to assess the relationships between variables, Pearson's correlation coefficient and regression analysis were performed.

3 Results

Table 1 presents descriptive statistics for students' evaluations of teacher encouragement of self-regulated learning (SRL) and their

TABLE 1 Descriptive statistics, internal consistency coefficients, and skewness and kurtosis indices.

	M	SD	Range	α	Skewness	Kurtosis
ELPLO	3.40	0.90	1–5	0.93	–0.34	–0.37
EMML	3.92	0.93	1–5	0.93	–0.92	0.35
EEE	3.31	0.83	1–5	0.84	–0.15	–0.36
EU	3.79	0.83	1–5	0.91	–0.76	0.39
EEL	4.13	0.89	1–5	0.82	–1.24	1.20
ESRL	3.63	0.79	1–5	0.97	–0.59	0.17
Control	4.33	0.82	1–5	0.89	–1.31	1.33
Self-efficacy	3.77	0.92	1–5	0.83	–0.47	–0.29
Mastery goal	3.99	0.91	1–5	0.88	–0.86	0.47
Competition goal	3.34	1.13	1–5	0.90	–0.32	–0.68
Avoidance goal	2.98	1.07	1–5	0.86	0.06	–0.60
Goal setting	3.80	0.95	1–5	0.89	–0.57	–0.04
Effort regulation	3.64	0.99	1–5	0.89	–0.43	–0.36
Self-handicapping	2.69	1.06	1–5	0.89	0.31	–0.58
Control of learning processes and outcomes	3.84	0.92	1–5	0.86	–0.58	0.02
Organization	3.83	0.91	1–5	0.89	–0.51	0.02
Elaboration	3.70	0.93	1–5	0.90	–0.56	0.07
Setting minimal demands	2.83	1.1	1–5	0.84	0.13	–0.77
Academic achievement	4.06	1.01	1–5		–0.87	–0.02

ELPLO, encouragement of learning planning and learning organization strategies; EMML, encouragement of metacognitive monitoring of learning; EEE, encouragement of elaboration and evaluation, EU, encouragement of understanding; EEL, encouragement of effort investment; ESRL, overall encouragement of SRL.

assessments of their own learning self-regulation in the subject taught by the teacher in question.

Students assess that teachers moderately to relatively highly encourage self-regulated learning. They believe that teachers mostly encourage effort investment, followed by metacognitive monitoring of learning, understanding, learning planning, and organizational strategy, while elaboration and evaluation of learning are perceived as least encouraged. Additionally, students rate proactive self-regulation strategies relatively highly: general beliefs about control, goal adoption orientation, goal setting, effort regulation, monitoring the course and outcomes of learning, organization, and elaboration, while they rate defensive self-regulation strategies lower: orientation toward avoiding effort, self-handicapping, and setting minimal demands. Academic achievement is very good (Table 1).

A statistically significant difference was found in the encouragement of metacognitive monitoring of learning, encouragement of understanding, encouragement of effort investment, and overall encouragement of SRL between male and female students. Female students perceive that teachers encourage self-regulated learning to a greater extent (Table 2).

The difference in perception of encouragement for learning planning and organization strategies, metacognitive monitoring, understanding, effort investment, as well as SRL encouragement overall, is statistically significant between primary school students and secondary school students (grammar school and vocational schools), while the difference in perception of encouragement for elaboration and evaluation is significant only between primary school students and grammar school students (Table 3).

A statistically significant difference in ELPLO was found between 4th-grade secondary school students and all others except 5th-grade primary school students. In EMML, a significant difference was observed between 4th and 2nd-grade secondary school students and 7th and 8th-grade primary school students and 3rd-grade secondary school students, as well as between 5th-grade students and 7th and 8th-grade primary school students. Significant differences in EEE were found between 4th-grade secondary school students and all other grades. In EU and EEL, differences were statistically significant between 4th-grade secondary school students and 6th, 7th, and 8th-grade primary school students and 3rd-grade secondary school students, as well as between 2nd-grade secondary school students and 7th-grade (8th-grade and 3rd-grade secondary school students additionally for EEL) primary school students. Overall, when it comes to encouraging SRL, significant differences were observed between 4th-grade secondary school students and all others except 5th-grade primary school students, as well as between 2nd-grade secondary school students and 7th and 8th-grade primary school students (Table 4).

The results indicated a statistically significant, moderate correlation between students' assessments of learning self-regulation and teacher encouragement of self-regulated learning (Table 5). Proactive learning self-regulation strategies showed positive and higher correlation coefficients, while defensive learning self-regulation strategies exhibited negative and/or low (positive) correlation coefficients with the perception of SRL encouragement. Academic achievement also demonstrated a significant association with the

TABLE 2 Testing gender differences in students' perception of SRL encouragement.

	Mmale	Mfemale	t	df	p	Welch F	Welch p
ELPLO	3.37	3.41	-1.00	2,152	0.32		
EMML	3.84	3.97	-3.19	2,152	0.00		
EEE	3.28	3.33	-1.59	2,152	0.11		
EU	3.69	3.85	-4.49	2,152	0.00		
E EI	4.02	4.20	-4.72	2,152	0.00	21.38	0.00
ESRL	3.57	3.67	-2.93	2,152	0.00		

ELPLO, encouragement of learning planning and learning organization strategies; EMML, encouragement of metacognitive monitoring of learning; EEE, encouragement of elaboration and evaluation; EU, encouragement of understanding; E EI, encouragement of effort investment; ESRL, overall encouragement of SRL.

TABLE 3 Testing differences in students' perception of SRL encouragement according to the type of school they attend.

	Primary school	Grammar school	Vocational school	F	df	p	Welch F	Welch p	Post-hoc
ELPLO	3.32	3.46	3.49	8.70	2/2151	0.00			Ps < Gs, Vs
EMML	3.84	4.00	4.01	8.83	2/2151	0.00	8.86	0.00	Ps < Gs, Vs
EEE	3.25	3.43	3.35	6.78	2/2151	0.00			Ps < Gs
EU	3.70	3.96	3.84	15.32	2/2151	0.00	15.98	0.00	Ps < Gs, Vs
E EI	4.01	4.20	4.26	17.47	2/2151	0.00	17.70	0.00	Ps < Gs, Vs
ESRL	3.55	3.73	3.71	11.87	2/2151	0.00	11.93	0.00	Ps < Gs, Vs

ELPLO, encouragement of learning planning and learning organization strategies; EMML, encouragement of metacognitive monitoring of learning; EEE, encouragement of elaboration and evaluation; EU, encouragement of understanding; E EI, encouragement of effort investment; ESRL, overall encouragement of SRL.

TABLE 4 Testing differences in students' perception of SRL encouragement according to their grade.

	5.	6.	7.	8.	1.	2.	3.	4.	F	p	Welch F	Welch p	Post-hoc
ELPLO	3.46	3.39	3.22	3.25	3.41	3.46	3.27	3.78	9.99	0.00	11.89	0.00	5,6,7,8,1,2,3 < 4
EMML	4.09	3.94	3.67	3.75	3.93	4.07	3.77	4.21	11.12	0.00	11.66	0.00	7,8 < 5,2,4; 3 < 2,4
EEE	3.36	3.24	3.25	3.21	3.36	3.30	3.19	3.71	9.77	0.00			5,6,7,8,1,2,3 < 4
EU	3.84	3.75	3.62	3.63	3.83	3.88	3.74	4.07	8.16	0.00	8.91	0.00	6,7,8,3 < 4; 7 < 2
E EI	4.15	4.12	3.91	3.94	4.11	4.36	4.00	4.41	12.54	0.00	14.39	0.00	6,7,8,3 < 4; 7,8,3 < 2
ESRL	3.71	3.61	3.46	3.49	3.66	3.72	3.52	3.97	11.28	0.00	13.16	0.00	6,7,8,1,2,3 < 4; 7,8 < 2

ELPLO, encouragement of learning planning and learning organization strategies; EMML, encouragement of metacognitive monitoring of learning; EEE, encouragement of elaboration and evaluation; EU, encouragement of understanding; E EI, encouragement of effort investment; ESRL, overall encouragement of SRL.

encouragement of self-regulated learning, as well as with self-regulated learning strategies.

In order to address the question regarding the contribution of self-regulated learning encouragement in the explanation of self-regulated learning, we conducted a series of regression analyses (Table 6). As the correlation coefficients among individual components of SRL encouragement showed moderate to high associations (0.54–0.84), we decided to use the overall score on the SRL encouragement scale to calculate the contribution of students' perception of SRL encouragement in explaining SRL strategies.

The results have indicated that students' perception of SRL teacher encouragement significantly contributes to explaining all components of SRL except for setting minimal demands. The percentages of explained variance range from 0 to 32% of the variance of self-regulated learning strategies. Defensive self-regulation strategies (work avoidance, self-handicapping, and orientation towards minimal demands) are explained the least, while proactive self-regulation

strategies (orientation towards acquisition, elaboration, and goal setting) are explained to a much greater extent.

4 Discussion

The question posed in this research is how students perceive teacher encouragement of SRL in regular classroom instruction, and whether there is a correlation between students' perception of SRL teacher encouragement and students' learning self-regulation in a particular subject. Students' perception of teacher encouragement of SRL during regular instruction has been shown to be moderate to relatively high. Students believe that teachers primarily encourage effort investment, followed by metacognitive monitoring of learning, understanding, learning planning, and organizational strategy, while elaboration and evaluation of learning are perceived to be encouraged the least. Šimić Šašić et al. (2024, 2023b) found a correlation between students' and teachers' assessments, but when compared to teachers'

TABLE 5 Correlation coefficients between the perception of SRL encouragement and SRL.

	ELPLO	EMML	EEE	EU	EEI	ESRL
Control	0.37**	0.49**	0.36**	0.49**	0.48**	0.48**
Self-efficacy	0.47**	0.53**	0.46**	0.52**	0.46**	0.54**
Mastery goal	0.46**	0.56**	0.44**	0.55**	0.49**	0.56**
Competition goal	0.20**	0.18**	0.23**	0.18**	0.15**	0.22**
Avoidance goal	-0.07**	-0.13**	0.00	-0.11**	-0.11**	-0.09**
Goal setting	0.50**	0.53**	0.46**	0.52**	0.46**	0.56**
Effort regulation	0.46**	0.48**	0.43**	0.47**	0.41**	0.51**
Self-handicapping	-0.03	-0.11**	0.05*	-0.08	-0.09**	-0.05*
Control of learning processes and outcomes	0.48**	0.53**	0.43**	0.53**	0.46**	0.54**
Organization	0.48**	0.47**	0.46**	0.51**	0.41**	0.53**
Elaboration	0.50**	0.53**	0.47**	0.56**	0.46**	0.57**
Setting minimal demands	0.07**	0.00	0.10**	-0.01	-0.05*	0.04
Academic achievement	0.22**	0.29**	0.25**	0.29**	0.27**	0.29**

$p < 0.001^{**}$, $p < 0.05^{*}$.

TABLE 6 The results of regression analyses with SRL encouragement as a predictor and SRL components as criterion variables.

Criterion variables	ESRL β	
Control	0.48	$R = 0.48, R^2 = 0.23, F_{(1,2,152)} = 631.05, p = 0.00$
Self-efficacy	0.54	$R = 0.54, R^2 = 0.30, F_{(1,2,152)} = 905.20, p = 0.00$
Mastery goal	0.56	$R = 0.56, R^2 = 0.31, F_{(1,2,152)} = 969.31, p = 0.00$
Competition goal	0.21	$R = 0.21, R^2 = 0.05, F_{(1,2,152)} = 104.74, p = 0.00$
Avoidance goal	-0.09	$R = 0.09, R^2 = 0.01, F_{(1,2,152)} = 17.46, p = 0.00$
Goal setting	0.56	$R = 0.56, R^2 = 0.31, F_{(1,2,152)} = 995.09, p = 0.00$
Effort regulation	0.51	$R = 0.51, R^2 = 0.26, F_{(1,2,152)} = 746.38, p = 0.00$
Self-handicapping	-0.05	$R = 0.05, R^2 = 0.003, F_{(1,2,152)} = 5.56, p = 0.02$
Control of learning processes and outcomes	0.54	$R = 0.54, R^2 = 0.30, F_{(1,2,152)} = 905.29, p = 0.00$
Organization	0.53	$R = 0.54, R^2 = 0.28, F_{(1,2,152)} = 833.43, p = 0.00$
Elaboration	0.57	$R = 0.57, R^2 = 0.32, F_{(1,2,152)} = 1014.1, p = 0.00$
Setting minimal demands	0.04	$R = 0.04, R^2 = 0.001, F_{(1,2,152)} = 2.98, p = 0.08$
Academic achievement	0.29	$R = 0.29, R^2 = 0.08, F_{(1,2,152)} = 191.51, p = 0.00$

assessments, students still perceive teacher encouragement of SRL to be lower. This is also supported by other research (Dignath-van Ewijk et al., 2013). Furthermore, it has been shown that students and teachers agree in terms of the sequence of components of SRL encouragement (Šimić Šašić et al., 2023b). Interestingly, according to student assessments, teachers primarily encourage effort investment and metacognitive monitoring of learning. This is not surprising considering that teachers perceive SRL as autonomous/self-directed learning and independence in learning (Šimić Šašić et al., 2023a), with

similar findings also having been reported by Callan and Callan and Shim (2019). Metacognition is a key component of learning self-regulation, and encouraging metacognitive skills helps students become self-regulated learners (Karlen et al., 2023). In this context, the teachers were found to primarily encourage metacognitive strategies by Rosenthal et al. (2023). Therefore, it appears necessary to develop teacher competencies in the field of SRL, as the first step in effective SRL teaching is for teachers to have a clear understanding of what constitutes SRL and how they can encourage it in students.

The conducted research revealed differences in students' perception of teacher encouragement of SRL based on gender, grade level, and type of school attended. Female students assess that teachers encourage SRL to a greater extent, particularly in terms of metacognitive monitoring of learning, understanding, and effort investment. Secondary school students perceive that teachers promote SRL more than primary school students. It appears that teachers encourage grammar school students to use more complex strategies such as elaboration and evaluation, while vocational school students are encouraged to use simpler strategies such as effort investment and learning planning and organization strategy (although differences in the latter case are not statistically significant). Differences based on grade level indicate a similar conclusion, as it seems that, according to students' assessments, teachers predominantly encourage SRL in 4th-grade secondary school students, along with 5th-grade primary school students and 2nd-grade secondary school students. It is possible that in the 5th grade, the encouragement of SRL is slightly higher due to the transition from classroom to subject-specific teaching, where students need to adapt to a new system involving more subjects and different teachers. On the other hand, the lower ratings of teacher encouragement of SRL in final (7th and 8th) grades of primary school are rather concerning. Peeters et al. (2016) found that some teachers consider encouragement of SRL as a privilege that is to be given to more successful students, expressing the belief that others should first master the necessary learning content. Similarly, teachers perceive that this teaching approach is to be reserved only for advanced students (Zohar and Barzilai, 2015) and those who can

be allowed to work independently, whereas when working with below-average students, they more often adopt a teacher-directed approach. Overall, teachers believe that younger students are not capable of self-regulated learning, and that SRL is poorly encouraged at the primary school level (de Boer et al., 2012). It is possible that teachers in our study perceive the “more successful” students, whom they can encourage in self-regulated learning, predominantly as female students, students in higher grades (especially seniors), and secondary school students (especially grammar school students), and that students agree in this perception, thereby providing such assessments. This teacher attitude is entirely erroneous because research shows that students with low achievement benefit from explicit instructions in SRL strategies in particular (Zohar and Ben David, 2008; Zohar and Peled, 2008).

Teaching students how to self-regulate their learning and engaging them in work within a stimulating environment enhances their performance (Brenner, 2022; Conesa et al., 2023; de Boer et al., 2012; Dignath and Büttner, 2008). These findings are supported by research results that have tested the effectiveness of interventions in encouraging SRL among teachers. However, research in educational practice shows contradictory results. Some studies show a positive relationship (Depaepe et al., 2010), while others found either negative or no correlation at all (Heirweg et al., 2021; Karlen, 2016). Such outcomes may result from the use of different measurement instruments to assess the encouragement of SRL and SRL in students, variations in the duration of interventions to promote SRL, differences in the perception of SRL encouragement by teachers, students, observers, various contextual factors, etc. (Rosenthal et al., 2023). The results of our research in practice indicate a moderate correlation between students' perception of teacher encouragement of SRL and the use of SRL strategies. When students perceive a higher level of SRL encouragement from teachers, they are more likely to use proactive SRL strategies. In such cases, students have higher general control beliefs, more positive motivational beliefs (self-efficacy and knowledge mastery orientation), employ more effective motivational strategies (goal setting and effort regulation), and utilize both metacognitive (monitoring and control of learning processes) and cognitive (organization and elaboration) strategies, all of which reflect better academic performance as well. Defensive self-regulation strategies, such as avoiding work, self-handicapping, and setting minimal requirements, are weakly associated with the encouragement of SRL, and when this happens, the relationship tends to be mostly negative, indicating that higher perceptions of SRL encouragement remain linked to lower use of defensive strategies. Along these lines, the encouragement of SRL contributes most to explaining proactive self-regulation strategies. Students' assessments of higher teacher encouragement of SRL primarily explain students' motivational beliefs, such as self-efficacy and mastery goals, but also motivational strategies (goal setting and effort regulation) and learning strategies encompassing metacognitive (monitoring and control of learning processes) and cognitive strategies (elaboration and organization). These findings are consistent with the findings of authors who discuss a positive relationship between the encouragement of SRL and students' self-regulated learning (Depaepe et al., 2010). It is necessary to emphasize the absence of connection and contribution of SRL encouragement in the explanation of setting minimum demands, i.e., low level of cognitive effort investment in learning. When working

with below-average students, teachers use a more teacher-centred approach, believing that if they allowed students to self-regulate their learning, they would not achieve the necessary teaching goals (Peeters et al., 2016). However, research shows that it is precisely low-achieving students who particularly benefit from SRL encouragement, especially when it comes to explicit instruction in SRL strategies (Zohar and Ben David, 2008; Zohar and Peled, 2008).

The conducted research contributes to understanding the encouragement of SRL from the students' perspective and underscores the importance of students' assessments of SRL encouragement. Despite the potential drawbacks tied to data collection techniques and the lack of simultaneous student assessments of both SRL encouragement and SRL, student ratings are based on a larger sample of teacher behaviours accumulated over a greater number of teaching hours. De Jong and Westerhof (2001) argue that student perceptions shape their behaviour and therefore bear a greater impact on student learning than external observations. Similarly, Seidel and Prenzel (2006) consider student perceptions of learning conditions to be among the most relevant factors mediating between teaching quality and students' use of learning opportunities, while Newmann et al. (1996) suggest that teaching methods are less important than the quality of students' educational experiences. Dignath-van Ewijk et al. (2013) found that student and observer assessments have greater predictive value for student self-regulation than teacher assessments, thus indicating that student assessments appear to be an important source of information about teacher encouragement of SRL. The results of the present study support the possibility of teacher encouragement of SRL in everyday teaching from the students' perspective, and point towards the existence of a relationship with student self-regulated learning. The findings also indicate the need for enhancing teacher competencies in fostering self-regulated learning, understanding SRL, and methods of its encouragement. It is particularly important to emphasize the need for SRL encouragement among young students, those in lower grades, or elementary school students. Future research should continue to investigate students' perceptions of teachers' encouragement of SRL in class and the factors that influence it. Research should also focus on clarifying the relationship between the encouragement of specific self-regulation strategies during teaching and student self-regulated learning.

Data availability statement

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

Ethics statement

The studies involving humans were approved by Ethics Committee of the University of Zadar and Approval of the Ministry of Science and Education of the Republic of Croatia according to the positive opinion of the Education Agency. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants' legal guardians/next of kin.

Author contributions

ŠŠ: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Writing – original draft, Writing – review & editing. MA: Data curation, Formal analysis, Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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