SELF-REGULATED LEARNING AND PROSOCIAL BEHAVIOR: IMPLICATIONS FOR DIGITAL AFFECTIVE LITERACY

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ABSTRACT
This study investigated the relationship between Self-Regulated Learning (SRL) and prosocial behavior in 29 adolescents attending a MOOC-based course. Results showed a significant positive correlation between SRL and prosociality ($\rho = .360$, $p = .028$). Findings suggest that self-regulation may support both learning processes and positive social behaviors, highlighting its relevance for digital education and student development.

KEYWORDS
Self-Regulated learning; prosocial behavior; digital affective literacy

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1. Introduction

Self-Regulated Learning (SRL) is one of the main theoretical frameworks for understanding how students actively manage their own learning through processes of planning, monitoring, and controlling the cognitive, motivational, behavioral, and emotional components involved in academic activities. From this perspective, learning is not a passive process determined solely by the instruction received, but rather an intentional activity in which individuals set goals, select strategies, monitor their progress, and critically reflect on the results obtained. Self-regulation can, therefore, be defined as the set of self-generated thoughts, emotions, and behaviors oriented toward the achievement of personal goals, through which students transform their potential into competencies that can be effectively utilized in learning contexts (Zimmerman, 2002).

The emphasis placed on the active nature of learning implies that self-regulation should not be interpreted as a stable characteristic of the individual, but as a skill capable of development through experience, reflective practice, and appropriate educational guidance. Consequently, self-regulatory skills can be progressively acquired and refined by all students, regardless of age, gender, cultural background, or initial skill level, emerging as one of the fundamental goals of educational systems aimed at promoting lifelong learning and student autonomy (Pintrich, 2000).

The growing attention given to SRL in the international literature reflects its relevance to understanding the mechanisms that underpin effective learning. Although differing in theoretical assumptions and interpretive emphases, the main models developed in recent decades converge in describing self-regulation as a multidimensional process in which cognitive, metacognitive, motivational, and emotional factors constantly interact to guide behavior toward the achievement of meaningful goals. This theoretical convergence is supported by empirical evidence documenting the effectiveness of interventions aimed at developing self-regulation in promoting academic performance, task persistence, effort, and perceived self-efficacy. SRL, therefore, is not merely a predictor of academic success but a cross-cutting competency that supports the adaptive management of the educational experience across its multiple dimensions (Panadero, 2017).

It is precisely this cross-cutting nature that suggests the influence of self-regulation extends beyond the strictly academic sphere, involving relevant aspects of socio-emotional and relational functioning. The ability to monitor and regulate thoughts, emotions, and behaviors appears, in fact, to be closely associated with the ability

to adapt effectively to the demands of the social environment. In this sense, the literature highlights how high levels of self-regulation are systematically associated with a lower prevalence of externalizing and problematic behaviors, while deficits in attentional control, emotional regulation, and inhibitory control are correlated with greater difficulties in social adaptation (Eisenberg et al., 2010).

This evidence suggests that self-regulation may represent a central mechanism not only for academic success but also for building positive social relationships. In particular, the ability to effectively regulate one's emotions appears to foster a focus on the needs of others and the enactment of prosocial behaviors. Individuals who are able to adequately modulate their emotional responses, in fact, demonstrate higher levels of empathy, interpersonal trust, and willingness to help others, suggesting a close connection between emotional regulation and prosociality (Song et al., 2018).

The significance of this relationship appears particularly pronounced during adolescence, a developmental stage characterized by profound cognitive, emotional, and social changes. During this period, values, moral principles, and more mature forms of responsibility toward others gradually solidify, contributing to the construction of personal identity and the moral self. Adolescence therefore represents a privileged developmental window for the development of attitudes and behaviors oriented toward caring for others, fairness, and social responsibility (Malti, 2021).

In contemporary educational contexts, characterized by the progressive integration of digital technologies into teaching and learning processes, self-regulatory and prosocial skills are taking on an increasingly central role. In such contexts, students are called upon not only to effectively manage their own educational journey but also to participate responsibly in technology-mediated social interactions. The concept of digital citizenship, in fact, refers to the ability to use digital tools in a conscious, critical, and ethically oriented manner, adopting responsible and respectful behaviors toward others and actively participating in the social and civic life of online environments (Milenkova & Lendzhova, 2021). Digital citizenship involves the development of attitudes grounded in responsibility, respect for the rules of digital coexistence, and awareness of the consequences of one's actions in virtual spaces, dimensions that appear closely linked to both self-regulation processes and prosocial dispositions.

In digitally mediated educational contexts, digital affective literacy can be understood as the capacity to recognize and regulate one's emotions and to

respond to others with awareness and care during online interactions. SRL may contribute to this capacity through the monitoring and regulation of one's own responses, while prosocial behavior reflects a related interpersonal dimension. In the present study, digital affective literacy provides an interpretive framework; it was not directly measured.

Although the literature has extensively examined self-regulation in learning and emotional regulation in relation to prosocial behavior, the association between SRL and prosociality remains relatively underexplored among adolescents learning in digital environments. This study therefore investigates that association in a group of adolescents participating in a MOOC-based course on Italian sentence structure. We hypothesize that higher levels of SRL are associated with greater self-reported prosocial behavior.

2. Methods

2.1 Participants

The study involved 29 upper secondary school students (aged 14–17 years) enrolled in two second-year classes (2C, *n* = 16; 2D, *n* = 13) participating in a MOOC-based educational program. The sample was predominantly female (96.6%), with most participants aged between 14 and 15 years (93.1%). Three students (10.3%) reported a special educational need, and the majority had Internet access at home (89.7%). Participation was voluntary, and data were collected in accordance with the ethical guidelines for educational research.

2.2 MOOC-based educational program

The five-module MOOC on Italian sentence structure was developed and delivered through Canva. The five modules progressed from an introduction to the Italian *periodo* (a complex sentence) to main and coordinate clauses, the recognition of subordinate clauses, their types and functions, and, finally, guided and independent analysis of complex sentences. Each module followed the same six-part structure: a brief prior-knowledge activation task (3–5 minutes); a narrated, subtitled micro-lesson with an equivalent PDF handout (6–8 minutes); a worked example (5–7 minutes); a guided application activity with immediate feedback (5–10 minutes); a low-stakes retrieval quiz (3–5 minutes); and a brief reflection on learning strategies (1–2 minutes). The sequence was designed in accordance with UDL (CAST, 2018) and CLT (Sweller, 1988) principles. At the end of the course, students completed a

Genially escape room in which progressively more difficult questions guided them through a maze of propositions.

2.3 Instruments

To assess motivational regulation and self-regulated learning strategies, selected subscales of the Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich et al., 1991) were administered. The MSLQ is one of the most widely used instruments for assessing motivational beliefs and self-regulated learning processes. Consistent with the aims of the present study, six subscales were selected: Task Value, Control of Learning Beliefs, Self-Efficacy for Learning and Performance, Elaboration, Planning (derived from the Metacognitive Self-Regulation scale), and Effort Regulation, for a total of 32 items rated on a 7-point Likert scale (1 = not at all true of me; 7 = very true of me).

As no official Italian version of the complete MSLQ is currently available, the selected items were translated directly from the original English version. The translation involved only minor linguistic adaptations to improve readability and comprehensibility for upper secondary school students, while preserving the conceptual meaning of each item. No formal linguistic or psychometric validation of the translated version was conducted. However, the wording adopted is conceptually consistent with previous Italian studies that have employed partial or adapted versions of the MSLQ.

Following the original scoring procedure, the mean score for each subscale was calculated, with higher scores indicating higher levels of motivational regulation and self-regulated learning. For the purposes of the present study, the selected dimensions were also aggregated into a composite SRL score used in the subsequent analyses.

Prosocial behavior was assessed using the Italian self-report version of the *Strengths and Difficulties Questionnaire* (SDQ; Goodman, 1997) for adolescents aged 11–17 years. The Prosocial Behavior subscale comprises five items assessing helping behavior, empathy, kindness, and cooperation. Responses are rated on a 3-point scale (0 = *Not true*; 1 = *Somewhat true*; 2 = *Certainly true*), referring to behaviors displayed during the previous six months.

2.4 Data Analysis

Statistical analyses were conducted using Jamovi software. In the first phase, descriptive statistics for the variables under consideration were calculated. The

internal reliability of the instruments was verified using Cronbach's α coefficient (Cronbach, 1951) and McDonald's ω coefficient (McDonald, 1999). To examine the relationship between self-regulated learning and prosocial behavior, nonparametric correlations were calculated using Spearman's rho coefficient (Spearman, 1904) and Kendall's tau coefficient (Kendall, 1938). Given the directional hypothesis specified in the Introduction, one-tailed tests were used to assess positive associations between self-regulated learning and prosocial behavior. The decision to use nonparametric techniques was motivated by the small sample size and the distributional characteristics of the variables under consideration. The level of statistical significance was set at $p < .05$.

3. Results

The demographic characteristics of the participants are reported in **Table 1.** The sample consisted of 29 upper secondary school students, predominantly female (96.6%) and aged between 14 and 15 years (93.1%). Most participants reported having Internet access at home (89.7%), while 10.3% declared the presence of special educational needs.

Table 1: Demographic characteristics of the sample

Variable	**n**	**%**
Class		
2C	16	55.2
2D	13	44.8
Age		
14–15 years	27	93.1
16–17 years	2	6.9

Gender		
Female	28	96.6
Male	1	3.4
Special Educational Needs (SEN)		
Yes	3	10.3
No	26	89.7
Internet access at home		
Yes	26	89.7
No	3	10.3

Descriptive statistics and reliability indices for the study variables are reported in **Table 2**.

The composite Self-Regulated Learning score showed good internal consistency ($\alpha = .784$; $\omega = .801$), while the Prosocial Behavior scale also demonstrated satisfactory reliability ($\alpha = .735$; $\omega = .758$). The mean score for Self-Regulated Learning was 5.43 (SD = 0.84), whereas the mean score for Prosocial Behavior was 5.67 (SD = 1.05), indicating generally high levels of both constructs within the sample.

Table 2: Descriptive statistics and reliability indices of the study variables

Measure	M	SD	Cronbach's α	McDonald's ω
Self-Regulated Learning (SRL_Total)	5.43	0.84	.784	.801
Prosocial Behavior (SDQ)	5.67	1.05	.735	.758

Note. M = Mean; SD = Standard Deviation.

To examine the relationship between Self-Regulated Learning and prosocial behavior, non-parametric correlation analyses were conducted using Spearman's rho and Kendall's tau coefficients. As shown in **Table 3**, a positive and statistically significant association emerged between SRL_Total and Prosocial Behavior (ρ = .360, p = .028; τ = .282, p = .025). These findings indicate that higher levels of self-regulated learning tend to be associated with greater prosocial orientation among adolescents.

Table 3: Correlations between Self-Regulated Learning and Prosocial Behavior

Variables	Spearman's ρ	p	Kendall's τ	p
SRL_Total – Prosocial Behavior	.360*	.028	.282*	.025

Note. One-tailed p values are reported.

Correlations between prosocial behavior and each of the six individual SRL subscales were also examined. None reached the specified threshold for statistical significance. The association between Self-Regulated Learning and Prosocial Behavior is graphically represented in Figure 1. Consistent with the results of the correlational analyses, the scatterplot shows a positive trend between the two variables, despite the variability observed among participants.

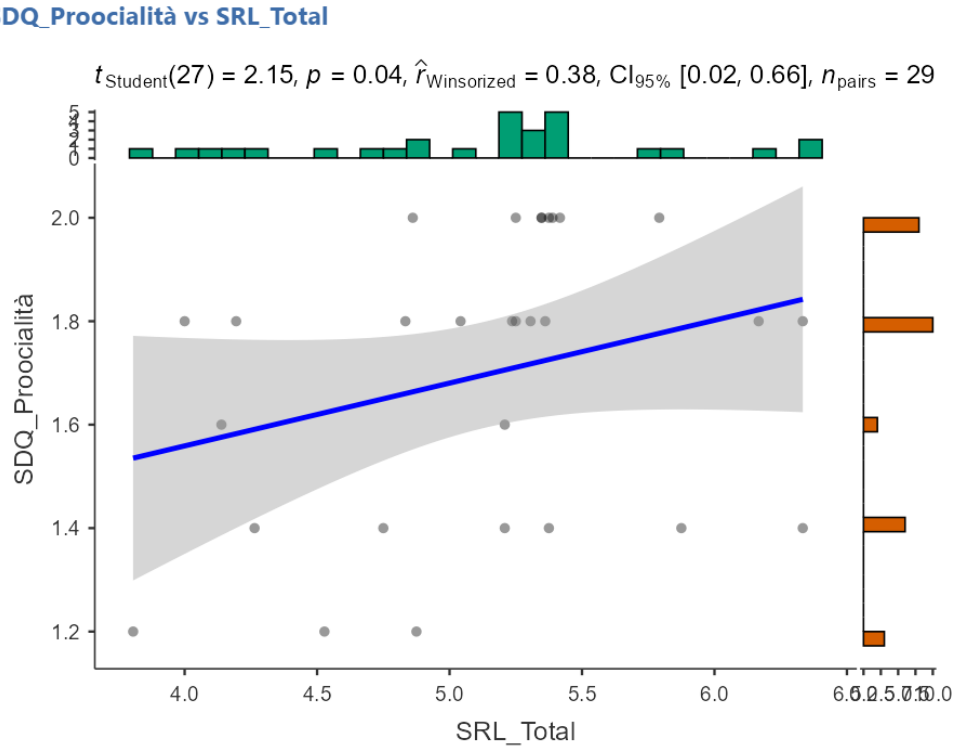


Figure 1. Scatterplot illustrating the relationship between Self-Regulated Learning (SRL_Total) and Prosocial Behavior. The solid line represents the linear trend, whereas the shaded area indicates the 95% confidence interval.

4. Discussion

The present study examined the relationship between Self-Regulated Learning (SRL) and prosocial behavior among adolescents participating in a MOOC-based educational program. The results revealed a moderate positive correlation between the overall SRL score and prosocial behavior (ρ = .360, *p* = .028), indicating that students who reported higher levels of self-regulation also tended to perceive themselves as more willing to help, cooperate with, and support others. Although the effect size is moderate, it suggests that the ability to regulate one's own learning is associated not only with academic functioning but also with adaptive interpersonal behaviors. This finding is consistent with previous research showing that self-regulatory competences facilitate empathic responding, cooperation, and

socially responsible behavior (Eisenberg et al., 2010; Simões & Calheiros, 2016; Ritgens et al., 2024).

An interesting aspect of the findings is that the significant association emerged only for the overall SRL score, whereas none of the individual dimensions reached statistical significance when analyzed separately. This pattern suggests that prosocial behavior is more closely related to the integration of motivational, cognitive, metacognitive, and behavioral regulation than to any single component considered in isolation. Rather than reflecting the influence of task value, self-efficacy, or effort regulation alone, prosocial orientation appears to emerge from the coordinated functioning of multiple self-regulatory processes. This interpretation is consistent with contemporary models describing SRL as a multidimensional and dynamic system in which the interaction among its components supports adaptive goal-directed behavior (Pintrich, 2000; Panadero, 2017; Schunk & Greene, 2018).

The educational context in which the study was conducted may also contribute to explaining these findings. MOOCs require learners to independently organize study activities, monitor their progress, and sustain motivation despite the limited external regulation typically provided by online environments. Previous research has consistently identified self-regulation as one of the strongest predictors of persistence and successful participation in online learning (Barnard et al., 2009; Broadbent & Poon, 2015; Kizilcec et al., 2017; Hadwin et al., 2018). The present findings suggest that these same self-regulatory competences may also support more constructive and collaborative social orientations, highlighting the close relationship between learning regulation and socio-emotional functioning in digital educational settings.

This interpretation is particularly relevant during adolescence, when self-regulatory capacities and prosocial values undergo substantial development (Malti, 2021). Educational interventions designed to strengthen planning, monitoring, self-evaluation, and reflective learning may therefore generate benefits that extend beyond academic achievement, fostering greater responsibility, cooperation, and sensitivity towards others. In line with the OECD framework on social and emotional skills (OECD, 2021), SRL may represent a foundational competence supporting both successful learning and positive social participation.

From an educational perspective, these findings reinforce the importance of integrating self-regulation into teaching practices, particularly within technology-enhanced learning environments. Strategies such as goal setting, formative

feedback, reflective activities, and guided self-assessment may simultaneously promote autonomous learning and prosocial attitudes, contributing to students' personal development and responsible participation in digital communities (Delfino et al., 2010; Morales-Álvarez et al., 2025).

The study has some limitations. The relatively small sample size and the predominance of female participants limit the generalizability of the findings, while the cross-sectional design prevents causal interpretations. Future studies involving larger and more heterogeneous samples, as well as longitudinal or intervention-based designs, are needed to clarify the mechanisms linking self-regulated learning and prosocial behavior across different educational contexts.

5. Limitations and Future Research

This study has several limitations that must be taken into account when interpreting the results. First, the small sample size and the fact that the study involved students from a single school, the “Staffa” High School in Trinitapoli, limit the ability to generalize the results to other educational contexts. Furthermore, the research involved only two high school classes, making it necessary to interpret the observed relationship between self-regulated learning and prosocial behavior with caution. The marked predominance of female participants may also have influenced the baseline level and variability of self-reported prosocial behavior. Given the presence of only one male participant, the study cannot assess whether the observed association differs by gender.

A second limitation concerns the characteristics of the MOOC. Although each module included a brief reflection on learning strategies, the program did not provide a structured intervention or direct instruction specifically designed to develop SRL. Therefore, the observed association cannot be attributed to the course activities. In line with findings from the literature on digital learning environments, the MOOC can be interpreted as a context in which self-regulation is primarily elicited implicitly through the need to autonomously manage time, activities, and study strategies, rather than through specific interventions involving metacognitive scaffolding or direct instruction of self-regulatory strategies. Consequently, the results obtained do not allow us to distinguish whether the observed relationship is primarily attributable to students’ individual characteristics or to the interaction between those characteristics and the digital learning context.

Further limitations stem from the exclusive use of self-report instruments, which, while representing a widely used method in self-regulation research, can be influenced by social desirability effects and a subjective perception of one's own competencies. Recent studies have highlighted how the integration of learning analytics, trace data, and behavioral indicators derived from students' interaction with digital environments can provide more direct and ecologically valid information on self-regulatory processes, allowing for the observation of strategies actually adopted during learning and not merely those reported by students (Kizilcec et al., 2017).

Future research should involve larger and more diverse samples, including schools from different Italian regions according to the geographical classification adopted by the INVALSI surveys (Northwest, Northeast, Central, South, and Islands). Such an approach would make it possible to examine whether the relationship between self-regulated learning and prosocial behavior remains stable across different socioeconomic, cultural, and educational contexts, thereby increasing the generalizability and ecological validity of the findings (Creswell & Creswell, 2023).

Further studies could also explore this relationship across different subject areas to determine whether the observed association extends beyond the specific educational context investigated here and remains consistent in disciplines characterized by different cognitive and methodological demands. Moreover, longitudinal and intervention-based designs would help clarify the directionality of the relationship between self-regulated learning and prosocial behavior.

A particularly promising avenue concerns the design and evaluation of educational interventions explicitly aimed at fostering self-regulation. Programs integrating goal setting, monitoring, metacognitive reflection, formative feedback, and digital scaffolding have consistently been identified as effective strategies for strengthening self-regulated learning (Zimmerman, 2002; Schunk & Greene, 2018). Future research should investigate whether the intentional enhancement of these processes also promotes socio-relational outcomes, including prosocial behavior and responsible participation in digital environments. At the same time, the pedagogical, organizational, and technological sustainability of such interventions should be carefully examined, considering implementation costs, teachers' professional competences, and the balance between educational benefits and required resources, particularly in light of current international recommendations on social-emotional learning and educational innovation (OECD, 2021; UNESCO, 2023).

Finally, adopting multimethod approaches could provide a deeper understanding of the mechanisms underlying the relationship between SRL and prosocial behavior. Combining self-report instruments with behavioral indicators, measures of cognitive load and mental effort (Sweller, 1988; Paas et al., 2003), and physiological techniques such as quantitative electroencephalography (qEEG) (Howard-Jones, 2014) may offer a more comprehensive understanding of how self-regulation develops in digital learning environments and interacts with learners' cognitive, emotional, and social processes.

6. Conclusions

This study contributes to the debate on the role of self-regulated learning in digital educational contexts, highlighting how the skills necessary to effectively manage one's own learning can also be associated with relevant dimensions of social functioning. In a context characterized by the growing integration of technologies into educational processes, the promotion of self-regulation takes on a significance that transcends the improvement of academic performance, involving aspects related to responsible participation, collaboration, and the building of positive relationships (Panadero, 2017; Milenkova & Lendzhova, 2021).

The results suggest that self-regulated learning should be considered a cross-cutting competency capable of supporting not only educational success but also students' personal and social development. From this perspective, schools are called upon to design educational experiences capable of integrating cognitive, motivational, emotional, and relational dimensions, recognizing the value of self-regulation as a strategic resource for addressing the challenges posed by contemporary learning environments (Zimmerman, 2002; Malti, 2021).

The growing prevalence of digital learning pathways makes it particularly important to explore the relationships between self-regulation, socio-emotional development, and participation in online ecosystems. Understanding these connections can contribute to the design of more inclusive, mindful educational environments geared toward developing students capable of learning autonomously and participating responsibly in social and digital life (Morales-Álvarez et al., 2025) .

From this perspective, it is also essential to invest in initial and in-service teacher training so that teachers can acquire the knowledge and strategies needed to intentionally promote self-regulation processes within their teaching practices. The

literature highlights, in fact, how training interventions specifically aimed at developing SRL can enhance teachers' ability to design learning environments that support students' planning, monitoring, metacognitive reflection, and autonomy (Delfino et al., 2010; Dignath & Büttner, 2008). Strengthening these professional competencies is an essential prerequisite for supporting the development of students who are increasingly autonomous, self-aware, and responsible in contemporary educational and social contexts.

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