Universidade do Minho
Escola de Psicologia

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Promover o Envolvimento Escolar através de narrativas: Um programa no 1.º Ciclo do Ensino Básico

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STATEMENT OF INTEGRETY

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PROMOVER O ENVOLVIMENTO ESCOLAR ATRAVÉS DE NARRATIVAS: UM PROGRAMA NO 1.º CICLO DO ENSINO BÁSICO

RESUMO

A sociedade moderna e o sistema educativo desafiam cada vez mais os alunos a construírem recursos pessoais para lidarem com os desafios educativos atuais. No entanto, ainda existem situações que precisam ser abordadas pois podem comprometer a aprendizagem dos alunos. Este trabalho tem como objetivo atender aos primeiros sinais de baixo envolvimento e capacitar crianças do 4.º ano de escolaridade e jovens hospitalizados para os ajudar a lidar com os desafios colocados. A presente tese inclui três estudos que descrevem o desenho, implementação e avaliação de intervenções educativas distintas, baseadas em narrativas. As duas primeiras foram implementadas em contexto escolar e a última em contexto hospitalar. O primeiro estudo avaliou o impacto de uma intervenção desenhada para promover o envolvimento escolar em crianças do quarto ano de escolaridade. Os dados sugerem que a intervenção foi eficaz na promoção do envolvimento cognitivo, emocional e comportamental dos alunos. Os resultados foram particularmente relevantes para os rapazes na dimensão emocional. No segundo estudo, foi implementada uma intervenção com o objetivo de promover competências de autorregulação da aprendizagem e performance académica em alunos de baixo nível socioeconómico. Os resultados indicam que a intervenção foi eficaz, alcançando este objetivo. Além disso, o treino foi mais eficaz em alunos com níveis iniciais de autorregulação da aprendizagem baixos ou médios. Finalmente, no último estudo foi implementada uma intervenção combinada (i.e., presencial e online) com o objetivo de treinar adolescentes em idade escolar em estratégias de autorregulação da aprendizagem. Os resultados mostraram que os participantes melhoraram o uso, a instrumentalidade percebida, e a autoeficácia para as estratégias autorregulatórias. O impacto da intervenção foi diferente de acordo com a idade, ano de escolaridade, ter ou não retenções escolares e o envolvimento na intervenção. De uma forma geral, os resultados defendem (i) o papel das narrativas em diferentes contextos e com diferentes propósitos, e (ii) o papel do envolvimento escolar e da autorregulação da aprendizagem na promoção de trajetórias de aprendizagem positivas.

Palavras-chave: Autorregulação da Aprendizagem, Hospital, Intervenção, School Engagement

PROMOTING SCHOOL ENGAGEMENT THROUGH NARRATIVES: A PROGRAM IN THE ELEMENTARY SCHOOL

ABSTRACT

Modern society and the educational system are increasingly challenging students into building their personal resources to deal with nowadays educational challenges. However, there are still situations in need to be addressed which may compromise students' learning. This work aims to address the first signs of low engagement and empower fourth graders and hospitalized youth to help them deal with the presented challenges. The current thesis includes three studies reporting the design, implementation, and assessment of distinct narrative-based educational interventions. The first two interventions were implemented in the school context and the last one in the hospital context. The first study evaluated the impact of an intervention designed to promote school engagement in fourth graders. Data suggest the intervention was efficacious in promoting students' cognitive, emotional, and behavioral engagement. Results were particularly relevant for boys in the emotional dimension. In the second study, we implemented an intervention aimed to promote self-regulated learning skills and academic performance amongst students from low socioeconomic backgrounds. Results indicate that the intervention was efficacious in achieving this aim. Additionally, training was more efficacious for students with low or medium self-regulated learning initial levels. Finally, the last study implemented a blended intervention (i.e., face-to-face and online) with the goal of training self-regulated learning skills with hospitalized school-aged adolescents. Findings showed that the participants improved on their use of, perceived instrumentality of, and self-efficacy for self-regulated learning strategies. The impact of the intervention differed according to the adolescents' age, grade level, grade retention, and engagement in the intervention. Overall, results advocate (i) the role of narratives in different contexts and with distinct purposes and (ii) the role of school engagement and self-regulated learning in promoting positive learning trajectories.

Keywords: Hospital, Intervention, Learning Self-regulation, School Engagement

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INTRODUCTION

INTRODUCTION

Society is constantly changing and becoming more complex and demanding. For example, children of today may engage in jobs that do not exist yet. Consequently, the educational system is required to adapt to the demands of the 21st century (Kennedy & Sundberg, 2020; National Research Council, 2012). To respond to these challenges, the educational system is called upon to rethink the curriculum, educational practices, and assessment methods. Furthermore, the educational system is expected to update both knowledge and skills to prepare students for the constantly evolving world (Ananiadou & Claro, 2009; Kennedy & Sundberg, 2020). Lifelong learning and the ability to transfer knowledge to other contexts is, thus, the ultimate goal of education (Conselho da União Europeia, 2018; de Boer et al., 2018).

Learning to learn (e.g., evaluate the learning process) has been identified as a core 21st century skill due to its crucial role in lifelong learning (Ananiadou & Claro, 2009; OECD, 2018). This skill has the potential to help individuals meet the increasing demands of education, job requirements, and overall modern society. Importantly, for the students to acquire and develop learning to learn skills, they need not only, to attend school but be fully and actively engaged in learning (i.e., cognitively, emotionally, and behaviorally invested in school related tasks and academic activities) (Fredricks et al., 2019). Thus, self-regulated learning may be key to sustain learning throughout life (Conselho da União Europeia, 2018; de Boer et al., 2018; Dignath et al., 2008) and maintain students engaged in school (Wang et al., 2021). Self-regulated learning is broadly understood as an active self-directed process through which students guide their cognitions, behaviors, and emotions to achieve their self-set goals (Rosário, 2004; Zimmerman, 2008). Thus, schools are expected to equip their students with the necessary skills to succeed across academic and lifelong learning contexts, while promoting their agency and engagement with school and learning (Ananiadou & Claro, 2009; OECD, 2018). However, many teachers do not promote these self-regulatory skills in class (Dignath et al., 2008; Thomas et al., 2020). Also, literature has been warning to low levels of school engagement already present at the elementary level (Archambault & Dupéré, 2016). Overall, this is a worrying scenario because the way students engage in school and their academic success are closely related (e.g., Baroody et al., 2016).

How can we address these important gaps? Research broadly advocates for timely, evidence-based educational interventions, highlighting the role of school engagement and training in self-regulation learning skills in paving successful educational trajectories.

The Role of Educational Interventions

Recognizing the importance of tackling the identified gaps and of learning to learn skills for academic and lifelong success, several educational interventions have been implemented. Specifically, self-regulated learning narrative-based interventions have been shown to be efficacious in promoting competencies with different populations. For example, young children (Rosário et al., 2007a), college students (e.g., Rosário et al., 2015), children from minority groups such as Gypsy students (Rosário et al., 2016), or children with cerebral palsy (Pereira et al., 2019). These interventions were also efficacious when domain focused, for example, writing compositions (Högemann et al., 2017), selective attention (Pereira et al., 2021), or school engagement (Rosário et al., 2016).

Everyone is expected to build their own narrative fitting and organizing life events and psychological processes (e.g., Bruner, 1986). Choosing narratives to deliver the intervention is selecting a familiar methodology for students that has also an important role in the learning process. Through stories, children are invited to reflect upon their own *modus operandi*, while having the opportunity to re(organize) their experiences (Bruner, 1990).

These story-tool interventions are based on the premise that self-regulated learning strategies may be taught to children to help them solve problems in several dimensions of their lives (i.e., cognitive, emotional, and behavioral). In fact, self-regulated children have control over their cognitions, emotions, and behaviors to achieve their goals (Zimmerman, 2000) which promotes responsibility and autonomy over their educational path. Besides, students trained in self-regulated learning strategies are more likely to have higher academic achievement and be more engaged in the learning process (e.g., Rosário, Högemann et al., 2019). Ultimately, children are invited not only to learn the strategies but also to adopt and integrate them into their own repertoire because "learning is always an authors' work" (Rosário, 2004, p.11).

Structure of the Thesis

Currently, we assist to an increasingly demanding society which brings several challenges to our students (Kennedy & Sundberg, 2020; OECD, 2018). For example, students' attention is requested by the educational system that finds itself in constant competition with numerous distractors. These distractors are external (e.g., conversations with peers, mobile phones) or internal (e.g., students' beliefs) to the student (Billington & DiTommaso, 2003; Lin-Siegler et al., 2016). In fact, nowadays

many teachers report students being bored and disinterested in school and education (Rosário, Cunha et al., 2019; Wang et al., 2011). Additionally, children may be living vulnerable experiences, which may translate into different expressions: signs of low school engagement (Archambault & Dupéré, 2016), challenges risen from low socioeconomic backgrounds (O'Connor et al., 2019) or even in the hardships related to hospitalization and recovery periods that drive students away from their school context (Eaton, 2012; Nisselle et al., 2012).

The ultimate goal of the current work is to understand how to equip students with the skills likely to enable them to follow successful educational trajectories and to be future-ready students. Three premises constitute the foundation for the present thesis: (i) narrative-based educational interventions are an agreed-upon efficacious way to address students' challenges; (ii) that school engagement is crucial for acquiring the necessary future-ready skills; and lastly, (iii) the promotion of self-regulated skills play an important role in learning outputs. Taking this into account, this work aims to develop, implement, and assess three educational interventions promoting school engagement and self-regulated learning skills.

Research broadly advocates the importance of promoting engagement for all students (Fredricks et al., 2019). Therefore, in the first study (chapter 1), an educational intervention was implemented to enhance fourth graders school engagement (i.e., cognitive, emotional, and behavioral engagement) using a story-tool. The narrative, *Yellow trials and tribulations* (Rosário et al., 2007), chosen for this study was designed for students under the age of 10. The study followed a cluster-randomized design and a multilevel approach to evaluate whether the intervention was efficacious. Study two (chapter 2) was developed to empower students from low socioeconomic backgrounds' ability to cope with learning challenges and take control over their learning process. Considering the relationship between students' socioeconomic status, use of self-regulated learning strategies, and academic achievement (e.g., Berkowitz et al., 2017; Vandevelde et al., 2017), the study used a story-tool (i.e., *Yellow trials and tribulations*, Rosário et al., 2007) to increase forth graders' use of self-regulated learning strategies and academic performance. The second study followed a longitudinal quasi-experimental design, with an intervention and control group, and reports data on the efficacy of the intervention. Finally, motivated to respond to the needs felt on the ground, the last study (chapter 3) reports on the assessment of a blended intervention (i.e., face-to-face and online) with a story-tool to promote hospitalized adolescents' self-regulation skills. Being hospitalized may place students in a vulnerable position. In fact, even short hospital stays disrupt the normalcy of everyday students' lives. In this study, the story-tool used was *Testas' (Mis)adventures* (e.g., Rosário, 2004), a collection of

narratives designed for 5th through 9th graders.

In summary, the present thesis comprises three chapters, each one presenting an educational intervention. Evidence-based educational interventions are often classified in a three-tiered model with distinct categories according to their level of intervention (e.g., Archambault et al., 2019; Fredricks et al., 2019; Miller, Dufrene, Joe Olmi, Tingstrom, & Filce, 2015). The universal tier or tier 1 includes interventions targeting all students within a given context (e.g., classroom). The selective tier or tier 2 pertains to interventions for the spectrum of students who may be at risk of presenting problems due to a number of characteristics (e.g., family background). Finally, the intensive tier or tier 3 includes tailored programs for a narrow subset of students experiencing increased difficulties. Each study of the current thesis falls in one of these tiers (see figure below).

Study 1	- Assess if the intervention was efficacious in promoting school engagement amongst fourth graders;
Universal -Tier 1	- Story-tool: *Yellow trials and tribulations.*
Study 2	- Assess if the intervention was efficacious in promoting self-regulated learning strategies and academic performance in students from low socioeconomic backgrounds;
Selective - Tier 2	- Story-tool: *Yellow trials and tribulations.*
Study 3	- Assess if the intervention was efficacious in promoting adolescent's use of, perceived instrumentality of, and self-efficacy for self-regulated learning strategies;
Intensive - Tier 3	- Story-tool: *Testas' (Mis)adventures.*

Structure of the thesis

Lastly, the thesis concludes with a general discussion reflecting on the key results of the interventions and the implications for theory and practice.

CHAPTER 1

THINKING, FEELING, AND BEHAVING WHILE LEARNING: A SCHOOL BASED INTERVENTION ON ELEMENTARY STUDENTS' SCHOOL ENGAGEMENT

# 1.	THINKING, FEELING, AND BEHAVING WHILE LEARNING: A SCHOOL BASED INTERVENTION ON ELEMENTARY STUDENTS' SCHOOL ENGAGEMENT

Abstract

The way students think, feel, and behave in and towards school is a major topic of educational research with a great impact on students' learning processes and academic trajectories. The elementary school level is a foundational period for building students' basic skills, setting the stage for their upcoming academic trajectories. However, prior research has reported signs of low engagement in this early stage of schooling. The present study assessed the effectiveness of a school-based intervention aimed to promote cognitive, emotional, and behavioral engagement in elementary school children through a story-tool. The study followed a cluster-randomized design with 259 fourth graders nested in 12 classes, randomly assigned to an intervention or control group. Both groups were assessed in four waves in two measures for each engagement dimension. Data were analyzed with a multilevel approach. Findings show that the intervention was efficacious in enhancing students' cognitive, emotional, and behavioral engagement. Importantly, gender discrepancies were found. Prior to the intervention, girls showed higher cognitive and emotional engagement, but after the intervention, boys exhibited higher emotional engagement. Parents' educational attainment did not influence students' school engagement after the intervention. Findings provide valuable information for future research and educational practice.

Keywords: school engagement, school-based intervention, narrative, self-regulated learning, elementary school students

## 1.1.	Introduction

The increasing complexity of modern society demands equipping students with skills likely to help them cope with 21st century educational and societal challenges (Kennedy & Sundberg, 2020). However, extant data reporting students' high level of apathy and discouragement in school merits researchers and educators' attention (Fredricks, Reschly et al., 2019; Shernoff, 2013). Importantly, signs of low engagement were found in early stages of schooling (Archambault & Dupéré, 2016; Bae et al., 2020). This finding is worrying as students' active engagement in school is critical for their academic success (Liem & Chong, 2017). Adopting a preventive approach, the current study examines the effectiveness of a school-based intervention developed to promote elementary students' School

Engagement (SE).

1.1.1. *School Engagement*

Engagement has been portrayed as an interactive process between the student, the context, and the learning tasks (Boekaerts, 2016). The present study followed the model of Fredricks et al. (2004), which defines SE as a complex multidimensional construct comprising three interrelated facets: cognitions, emotions, and behaviors. Cognitive engagement refers to students' cognitive efforts in learning, as well as the use of self-regulation strategies to engage in deep learning (Fredricks et al., 2004; Rosário et al., 2016). Emotional engagement pertains to students' positive (e.g., interest) and negative (e.g., boredom) reactions towards, sense of belonging to, and identification with school (Fredricks et al., 2004; Wang & Eccles, 2013). Lastly, behavioral engagement outlines the students' overt actions towards learning and school, including, for example, being punctual, attending class, completing homework, and participating in school-related activities (Fredricks et al., 2004; Sinatra et al., 2015).

Extensive research has shown SE as a strong predictor of short and long-term academic achievement (e.g., Baroody et al., 2016; Rosário et al., 2016). In addition, engagement has been pictured as a protective dimension of the learning process (Wang & Fredricks, 2014) because it helps students develop strategies to cope with school-related difficulties, recover from setbacks, or follow up with academic tasks (Skinner & Pitzer, 2012). Furthermore, the literature indicates that students displaying low SE behaviors are likely to show unsuccessful learning trajectories (Appleton et al., 2008; Luo et al., 2019).

Students' SE is shaped by individual (e.g., gender) and family background characteristics (e.g., socioeconomic status, parental educational attainment). For example, data indicate that girls, when compared with boys, tend to be more engaged in school (Archambault & Dupéré, 2016; Rimm-Kaufman et al., 2015), regardless of their cultural and socioeconomic background (Lam et al., 2016). Moreover, studies examining the relationships between SE and parental educational attainment (PEA) found that low PEA is related to low levels of engagement (Fredricks et al., 2005) and school dropout (Suh et al., 2007).

Importantly, research shows a decrease in SE throughout schooling (Lam et al., 2016), starting in the elementary school years (Archambault & Dupéré, 2016; Bae et al., 2020). For example, Archambault and Dupéré (2016) identified low engagement signs in grade four (e.g., difficulty in conforming to classroom rules and expectations, low interest in learning, resistance to use learning tools in class, and disruptive behaviors). More recently, Fredricks, Ye et al., (2019) reported task-

related signs of low engagement from the 5th grade onwards (e.g., not paying attention, not putting in effort, avoiding participation, being bored and not enjoying learning, and giving up when faced with academic challenges).

Looking to reverse the declining curve in SE from elementary school onwards, the literature has called for timely school-based interventions on SE. Addressing the precursors of low engagement as early as possible may help prevent further inappropriate behaviors and subsequent poor SE (McMahon & Sembiante, 2019).

1.1.2. *School Engagement Interventions*

Initial research on engagement was focused on preventing early school dropouts and increasing school completion (Christenson & Thurlow, 2004). Consistently, interventions following this line of research investigated behavioral indicators of students' low involvement in academic activities, such as school absenteeism and disruptive or off-task behaviors (e.g., Miller et al., 2015; Rosário et al., 2017a). Over time, studies adopting an ecological perspective on engagement extended their investigation to contextual factors key to helping students develop relationships and skills enabling SE and school completion (Christenson et al., 2008; Fredricks, Reschly et al., 2019). This shift translated to, for example, interventions focused on parents' and teachers' training (e.g., Strambler & McKown, 2013), or to building specific sets of skills (e.g., reading skills, Cantrell et al., 2014; cognitive-behavioral strategies, Ruttledge et al., 2016; self-regulation and executive function skills, Pereira et al., 2019).

Importantly, the way SE is conceptualized and measured varies greatly across interventions (Sinatra et al., 2015). For instance, Rosário et al. (2016) followed the model of Fredricks et al. (2004), while other studies adopted distinct conceptualizations (e.g., Schardt et al., 2019). Moreover, amongst the interventions referring to the model presented by Fredricks et al. (2004), we found variability in the number of SE dimensions addressed. For example, the literature reports on studies evaluating three SE dimensions (Pereira et al., 2019), two (e.g., behavioral and psychological dimensions, Strambler & McKown, 2013), or just one (e.g., behavioral, Rosário et al., 2017a).

Depending on the conceptualization adopted, the number of dimensions addressed, and the overall goal of the intervention, the measures used to evaluate SE vary. Most studies use one source of information (e.g., observations, Lutz et al., 2006), while others use two (e.g., teachers and students' reports, Strambler & McKown, 2013). Moreover, the majority of authors used a single data collection method (e.g., student reported questionnaires, Cantrell et al., 2014; teacher reported questionnaires, Miller et al., 2015; or classroom observations, Rosário et al., 2016), while a few used two data collection methods (e.g., students and teachers' reported questionnaires, Strambler & McKown, 2013).

In sum, to capture the complexity of the interrelated aspects of students' engagement (Hong et al., 2020), the literature has stressed the need to address engagement comprehensively, in all its dimensions (Archambault & Dupéré, 2016), and use diverse sources of information and data collection methods (Sinatra et al. 2015). This approach is likely to maximize positive outcomes and the effectiveness of interventions.

1.1.3. *Engagement and Self-regulated Learning*

Self-regulated learning (SRL) may be understood as a process through which students activate and sustain thoughts, emotions, and actions towards a self-set goal (Rosário et al., 2006). Both SE and SRL address students' characteristics and processes key to effective learning and are conceptualized as multidimensional, combining cognitive, emotional, and behavioral features of academic functioning (Wolters & Taylor, 2012). For example, the work of Stefansson et al. (2018) analyzed the relationship between these two constructs and concluded that, despite distinct, they are intertwined. This finding is consistent with prior research showing that students engaged in their activities display an agent role in their learning (Bandura, 2006, 2018) and are likely to use self-regulation and metacognitive strategies to achieve their self-set learning goals (Fredricks et al., 2004; Zimmerman, 2002). Furthermore, students who self-regulate their learning are expected to experience positive emotions, be involved in cognitive activities, and display overt behaviors congruent with a high SE profile (Wolters & Taylor, 2012). More recently, Wang et al. (2021) warned of the need to use metacognitive skills and exert self-control in class to persevere through challenges and remain engaged in school. In fact, prior research shows that students who receive training in SRL strategies are prone to show better academic achievement and more engagement in the learning process (e.g., Núñez et al., 2013; Rosário et al., 2019; Zimmerman, 2002).

1.1.4. *Purpose of the Study*

Recent studies (e.g., Archambault & Dupéré, 2016; Bae et al., 2020) identified trajectories of low engagement at the elementary level. This is a worrying scenario as it may compromise the development of core skills (Hill et al., 2008) critical for sustaining subsequent complex content learning (Reyna & Brainerd, 2007). For this reason, it is crucial to foster students' engagement in elementary school to assure the foundations of learning and prevent future low engagement behaviors. Moreover, equipping students with SRL skills has been highlighted as a key element in the promotion of SE (Pereira et al., 2019; Rosário et al., 2016; Wang et al., 2021). As each of the three SE dimensions pertains to specific aspects of SE, it is crucial to analyze all dimensions to capture their distinct

contributions to the engagement process. However, to the best of our knowledge, there are no school-based interventions in elementary school addressing the three dimensions of engagement through the training of SRL competencies.

Hence, the current study adds to the literature by using a cluster randomized trial (CRT) to examine the effectiveness of a school-based classroom intervention to promote cognitive, emotional, and behavioral engagement in fourth-grade students using two distinct measures to evaluate each dimension. This intervention is grounded on a self-regulation framework and uses a story-tool (*Yellow trials and tribulations*, Rosário et al., 2007) to convey the program's contents. Narratives provide a structure to organize life events (Bruner, 1986) and psychological processes (e.g., interpersonal processes, Hermans & Kempen, 1994) and impact individuals' behaviors and attitudes (Kaufman & Libby, 2012; Oatley, 1999).

Considering the importance of intervening at the elementary level while addressing the three dimensions of SE, we hypothesize that:

(i) Students engaged in the intervention will increase their cognitive, emotional, and behavioral engagement with learning more than their counterparts in the control group;

(ii) Girls, when compared with boys, will show higher SE in the three dimensions;

(iii) The effects of the intervention will be higher for students whose parents have higher parental educational attainment.

1.2. **Method**

The current investigation is part of a larger project aimed to examine the impact of SRL school-based interventions on elementary students' learning processes. Still, the outputs were drawn by methodologies fit to address the present research questions and are derived from distinct databases.

1.2.1. *Study Design and Procedure*

Consent and ethical approval were granted by the ethics committee of the Portuguese Ministry of Education and by the ethical committee of the University of Minho, respectively. The program was developed in the classroom setting, targeting the group rather than particular students; therefore, a CRT was used to analyze data to prevent "contamination" between participants enrolled in the intervention and those who are not (Eldridge et al., 2008). Finally, classes were randomly assigned to either the intervention (n=7) or control condition (n=6). For each of the SE dimensions considered, students were measured in two dependent variables (i.e., student reports or journals and teacher or school reports of cognitive, emotional, and behavioral engagement) on four sequential occasions. Due

to one of the control class's teacher going on sick leave, students missed two data collection waves and thus were excluded from data analyses. Finally, the experimental group consisted of seven classes and the control group of five classes.

All participating students followed the Portuguese official curriculum for fourth grade (the final grade level in elementary school). In addition, children in the intervention group participated in all steps of the program, whilst children in the control group followed the curriculum as usual. Note that the national curriculum for the fourth grade has no references to SE and teachers in the control group declared that they did not enroll in training on SE. Outcome measures (i.e., teacher, school, and student reports of cognitive, emotional, and behavioral engagement) were completed in four waves. Specifically, at baseline, prior to the beginning of the intervention (i.e., T0, four weeks before), at the beginning of the program (i.e., T1), at the fifth week of the program (i.e., T2), and at the end of the program (i.e., T3).

1.2.2. *Participants*

Twelve elementary public schools were contacted and invited to participate in the research project. Eventually, nine schools (a response rate of 75%) responded positively. Those who declined the invitation declared to be involved in other school-based projects and thus were not available to engage in a new one. Parents in these schools were informed about the intervention (e.g., phases, evaluation, voluntary participation, and confidentiality of the data), and all authorized their children's enrollment in the study by filling out an informed consent.

Participants were 259 fourth grade students (117 girls; Mage = 9.41; SD = 0.55) from 12 classes in nine public elementary schools in the north of the country. The families of 34% of the students were from low socioeconomic status. Classes enrolled ranged from 17 to 25 students (M = 21.73; SD =2.87). Students with special education needs (i.e., specific learning disabilities; n = 10) participated in all steps of the program. Nevertheless, they were excluded from the data analyses because we were only interested in evaluating how the intervention affected the SE of students with no learning disabilities.

1.2.3. *General Description of the Intervention: The Story-Tool*

The program was designed to promote children's SE competencies using a story-tool grounded on SRL. Specifically, the present program draws on the narrative *Yellow trials and tribulations* designed for children (Rosário et al., 2007, 2017b). The story begins with the disappearance of the color *Yellow* from the rainbow and follows the adventures of the other colors of the rainbow while searching for their

friend. The underlying message "We are all important, so no one should be left behind" prompts the quest. Along their adventure, the colors of the rainbow meet new friends and learn useful SRL strategies on how to adapt and overcome obstacles found along the way. The story chapters focus on both SRL strategies and the three SE dimensions behaviors (see Appendix 1).

1.2.4. *The Self-regulated Learning Model*

The story-tool follows the PLEE (i.e., Planning, Execution, Evaluation) cyclical model, which emerged from Zimmerman's SRL model (2002) (see Núñez et al., 2013; Rosário et al., 2017b for a more detailed explanation). Students are expected to regulate their school behaviors in three interdependent phases. The cyclical nature of these phases is enriched with a recursive loop, i.e., a PLEE cycle runs within each phase of the process. For example, when faced with a problem, children are expected to design a plan (e.g., identify and understand the problem), execute tasks (e.g., draw and operationalize an action plan), and evaluate the output (e.g., evaluate the adequacy and success of the plan).

1.2.5. *Intervention Structure*

The program's 60-minute weekly sessions were held during regular classes for 10 weeks and were video recorded. All sessions were conducted by an implementer with experience in delivering educational school-based courses on SE. At the end of the study, children in the control group received a compact version of the program, following ethical considerations.

The instructional sequence followed the protocol adopted in previous studies using story-tools (e.g., Núñez et al., 2013; Rosário et al., 2017). Throughout the program, chapters were read, and their content was analyzed by the children in the intervention group. Except for the first, sessions began with a review of the contents previously discussed. Afterwards, the implementer and students alternated in reading the session's chapter; during reading, small breaks were taken to ensure children's understanding of the story plot. Subsequently, through intentional questioning, students were encouraged to reflect on and discuss the messages embedded in the narrative. For example, students were encouraged to use SRL strategies to solve their cognitive, emotional, and behavioral challenges (e.g., think before saying something hurtful to a classmate). Discussions helped students reflect on their school-related behaviors and difficulties and encouraged alternative approaches. Finally, students were asked to perform a consolidation task, i.e., an individual or group activity targeting the promotion of SE (e.g., report feelings towards schoolwork). This activity was an opportunity to introduce emotional regulation skills and promote students' awareness of their own and of their classmates' feelings. As a

take-home message, students were invited to summarize what they learned in a slogan (see Rosário et al., 2017).

1.2.6. *Treatment Integrity*

To assure the integrity of the protocol by the implementer, four measures were applied: (i) a dossier with the sessions' record sheets, including the activities for each session (e.g., chapter to be read; intentional pauses for reflection), guided and helped monitor the steps of the program across all classes; (ii) moreover, at the end of each session, the implementer checked the activities completed on the session record sheets and reported any deviations from the protocol; (iii) additionally, throughout the implementation of the intervention, the principal investigator and the implementer met, on a weekly basis, to discuss project issues and adherence to the protocol (e.g., analysis of the record sheets); finally, (iv) an expert on SE with no previous contact with the current research conducted random integrity checks on 30% of the session video records. These video records were checked using the same session's sheets.

The implementer's reported adherence to the protocol was 93% (range 89 - 97). Independent data showed that the implementer completed 90% of the activities (range 85-95). Results indicate a high treatment fidelity.

1.2.7. *Instruments and Mesures*

For each dimension of SE, students were measured in two dependent variables (i.e., student reports or journals and teacher or school reports) on four occasions.

1.2.7.1. **Cognitive Engagement**

Student reports. This variable was evaluated using four items of the SE questionnaire by Wang and Holcombe (2010) (e.g., "I usually review my homework to make sure I did it well."). The items were presented in a Likert-like format (1 = never to 5 = always); (α = .73; .71; .69; and .70; present study data for each moment, respectively).

Teacher reports. Teachers' reports were gathered using a three-item measure built by the Institute for Research and Reform in Education (1998) (i.e., "In my class, this student seems tuned in."; "This student does more than required."; "This student comes prepared for class."). Teachers scored the three items for each student on a four-point scale ranging from 1 (not at all true) to 4 (very true); (α = .69; .70; .71; and .71, present study data for each moment, respectively).

1.2.7.2. **Emotional Engagement**

Student reports. Student reports were measured through six items from the SE questionnaire (see Wang & Holcombe, 2010) (e.g., "School is very important to me"). The items were presented in a Likert-like format of five points (1 = never to 5 = always); (α = .71; .70; .69; and .70, present study data for each moment, respectively).

Student journals. The Experience Sampling Method (ESM) was used to assess emotional engagement. This approach captures the ongoing personal experiences of students in a set of representative everyday learning activities, thus reducing the response bias (Park et al., 2012; Salmela-Aro et al., 2016). In our study, participants were given a notebook ("the researchers´ notebook") with the questionnaire. Over five consecutive days, teachers asked students to answer the questionnaires twice per day in four distinct temporal moments. Eventually, every student responded 40 questionnaires. Following previous studies (e.g., Park et al., 2012), we used three ESM items (1 indicating not at all and 5 indicating very much): interest (''Was the activity interesting?''), concentration ('How hard were you concentrating?''), and enjoyment (''Did you enjoy what you were doing?''). Moreover, a composite measure of emotional engagement was constructed by averaging students' ratings on the three ESM items for each moment (see Park et al., 2012). This composite achieved a good reliability level (ranging between .70 and .87 with an average of .72), which is slightly higher than reliability data in papers using a similar measure (e.g., Park et al., 2012).

1.2.7.3. **Behavorial Engagement**

Student reports. This variable was evaluated with three items (e.g., "For me it is difficult to finish my homework.") from the SE questionnaire (see Wang & Holcombe, 2010). The items were presented in a Likert-like format of five points (1 = never to 5 = always); (α = .72; .69; .71; and .78, present study data for each moment, respectively).

School reports. Data were gathered from information on class attendance (number of missed school days) and punctuality to class (number of days students were tardy). Administrative records provided both the total number of days absent or tardy during the second and third terms of the school year for each child. Note that these totals represent the combination of both excused and unexcused absences and tardiness. Following Morrissey et al. (2013), we constructed a variable combining students' levels of absences and tardiness with cutoffs adapted from prior research (Chang & Romero, 2008): no days absent or tardy; fewer than 2 days absent or tardy; 3–6 days absent/tardy; 7– 10 days absent/tardy; and 10 or more days absent/tardy.

1.2.7.4. **Individual Variables**

Gender was dummy coded (boys = 1, girls = 0). Parental educational attainment (PEA) was assessed by both parents' reports on their educational level (1= elementary school to 4= graduate degree).

1.2.8. *Analytic Plan*

Likelihood-based mixed-effects regression models (MRM), both multivariate and univariate, were used to analyze data (Vallejo et al., 2011a). The MRM modeling approach provides an appropriate general analytic framework to determine whether the change in response profiles over time is different among the treatment groups and facilitates the comparison of groups considering time. Dataset was analyzed using MRM with the maximum likelihood (ML) estimation as implemented in SAS PROC MIXED (SAS Institute, 2020). Additionally, a mixed model using SAS PROC NLMIXED was run to examine whether the missing data was not completely random (MCAR). Finally, Cohen's d was calculated as a measure of standardized effect size using the approach for growth curve models with attrition (Vallejo et al., 2019).

Three conditional growth models were modeled to fit data, each extending a prior model. The first (hereafter, Model A) analyzed data assuming the 12 classes were assigned to treatment groups and measured across four time-points in two dependent variables in each of the components of SE. In this model, the analysis was conducted without clustering the data at the classroom level. The second and third models (hereafter, Model B and Model C) analyzed data from 259 students nested in 12 classes randomly assigned to each treatment. The three-level conditional Model B examined the effects of different participant characteristics at level 2 (student level), i.e., students' gender and parents' educational level. The three-level conditional Model C added one explanatory variable measured at level 3 (class level), i.e., intervention on SE.

1.3. **Results**

Observed outcomes (i.e., student reports or journals and teacher or school reports), means, standard deviations, and sample sizes across the four moments for each of the dimensions of SE are presented in Table 1.

Table 1. *Observed dependent variables' means, standard deviations, and sample size across time*

Construct dimensions	Dependent variables		Intervention Group				Control Group			
			T_0	T_1	T_2	T_3	T_0	T_1	T_2	T_3
Cognitive Engagement	Student Reports	Mean	3.77	4.07	4.33	4.31	3.73	3.88	3.88	3.83
		SD	.65	.77	.46	.55	.62	.69	.64	.66
		N	137	141	146	145	100	101	101	101
	Teacher Reports	Mean	2.79	2.79	3.49	3.40	2.85	2.79	2.77	2.77
		SD	.58	.57	.57	.58	.62	.69	.64	.66
		N	145	149	149	149	105	106	106	106
Emotional Engagement	Student Reports	Mean	4.20	4.68	4.65	4.63	4.13	4.45	4.22	3.94
		SD	.50	.34	.42	.44	.54	.44	.57	.54
		N	148	145	146	148	104	106	105	106
	Students Journals	Mean	3.98	4.29	4.29	4.39	4.01	4.03	4.03	4.05
		SD	.54	.55	.47	.42	.53	.58	.46	.49
		N	137	141	147	148	100	101	101	101
Behavioral Engagement	Student Reports	Mean	1.82	2.06	2.54	2.86	1.94	1.89	1.81	1.85
		SD	.57	.95	.85	1.07	.61	.58	.52	.60
		N	139	142	148	148	101	102	103	101
	School Reports	Mean	1.64	1.75	1.28	1.19	1.63	2.52	2.06	2.26
		SD	.79	.79	.49	.40	.75	1.50	1.02	.91
		N	144	150	151	151	106	106	107	107

Note: SD = Standard deviations; *N* = Sample size.

Note that, although there were 259 participants, the number of subjects with all measures at each of the evaluations fluctuated. The Little's test (Little, 1988) was run to test whether the missing data on each dependent variable were missing completely at random (MCAR). The analysis of cognitive engagement showed that the LRT statistic yielded a χ^2 value of 23.84 on 19 *df* (p = 0.2025) for student reports and a χ^2 value of 4.60 on 3 *df* (p = 0.2032) for teacher reports. Data on emotional engagement, showed that the LRT statistic yielded a χ^2 value of 11.55 on 17 *df* (p = 0.8264) for student reports and a χ^2 value of 25.48 on 19 *df* (p = 0.1452) for student journals. Finally, for the behavioral dimension, the likelihood ratio test (LRT) statistic yielded a χ^2 value of 26.19 on 19 degrees of freedom (*df*, p = 0.1247) for student reports and a χ^2 value of 6.11 on 8 *df* (p = 0.6351) for school reports. These

results indicate that the MCAR model provides an adequate fit to the data of the two dependent variables for each of the three dimensions of SE.

1.3.1. *Fitting Competing Models*

Table 2 shows data from the three multivariate MRM (i.e., Model A, B, and C). Model C was chosen as our "final model" after assessing model fit with likelihood-based AIC and BIC criteria (see Vallejo et al., 2011b). For behavioral engagement, cognitive engagement, and emotional engagement, the deviance statistic and number of estimated parameters for models A, B, and C were 3566.9(15), 3544.4 (16), and 3274.0 (20); 2066.2(16), 1986.1 (17), and 1895.0 (20), and 1614.6(16), 1528.6 (17), and 1460.2 (23), respectively. The likelihood ratio test comparing Model B to Model A indicated that Model B had a significantly better fit than Model A [χ 2(1) = 86.0, p < .0001]. When comparing Model C against Model B, the likelihood ratio test indicated that Model C provides a better fit [χ 2(6) = 68.4, p < .0001]. Therefore, we adopted Model C as our final model. These findings provide an argument for using a three-level analysis with within-student measurements at level 1, between students within classes at level 2, and between-classes at level 3. Moreover, we found that 57.4% of the outcomes' between-students variation measured at different time points is explained by the covariates at the student level. Whereas 69.8% of the outcomes' between-classes variation measured at different times is explained by the covariate at the class-level and cross-level interaction term (i.e., treatment by linear trend). Finally, an additional 18.6% of the within-subjects variation in outcomes is explained by linear time.

1.3.2. *Multivariate MRM analyses*

Data in Table 2 are as follows. First, we observed a significant increase in the mean response over time by simultaneously considering the two dependent variables of cognitive engagement [F (2, 1119) = 23.59, p <.0001], emotional engagement [F (2, 1106) = 35.54, p <.0001], and behavioral engagement [F (2,1328) = 21.30, p <.0001]. That is, on average, participants improved across time on each of the SE dimensions. Second, gender has a statistically significant effect on the two dependent variables considered simultaneously (i.e., student and teacher reports, and student reports and student journals), both for cognitive engagement [F (2, 530) = 3.40, p =.0343] and emotional engagement [F (2, 482) = 3.91, p =.0206], respectively. Data indicate that, on average, girls reported higher levels of cognitive and emotional engagement than boys. In addition, considering emotional engagement, the interaction term of students' gender × treatment groups showed significant effects on the two dependent variables considered simultaneously [F(2, 483) = 4.10, p = .0172]. Specifically, for the

control group, girls reported data were higher than those of the boys while, in the experimental group, the reported results were practically identical for girls and boys. Therefore, current results indicate that the program benefited the boys more than the girls. Thirdly, it is very important to note that, controlling for the effects of the covariates, we found a significant difference between the treatment conditions over time in the two dependent variables considered simultaneously: cognitive engagement [F (2, 1119) = 27.11, p <.0001], emotional engagement [F (2, 1106) = 20.31, p <.0001], and behavioral engagement [F (2, 1328) = 15.99, p <.0001]. Finally, for all cases, there was no evidence that the engagement outcomes differed depending on the parents' educational level.

Due to the significant differences found between treatment conditions regarding their average growth rates in the three dimensions of SE (i.e., the pattern of change in the variables measured over time are not the same in the two groups), we focused on analyzing this finding.

Table 2. *Results of fitting taxonomy of multivariate mixed-effects regression models*

Cognitive_E	(A) Conditional MMRM				(B) Conditional MMRM				(C) Conditional MMRM			
Fixed Effects	df_N	df_D	F	Pr > F	df_N	df_D	F	Pr > F	df_N	df_D	F	Pr > F
LB_S	2	501	81.80	<.0001	2	482	95.07	<.0001	2	502	105.44	<.0001
LB_T	2	503	48.02	<.0001	2	486	74.87	<.0001	2	505	80.13	<.0001
NE1	2	502	1.06	.3477	2	484	.13	.8765	2	503	.21	.8129
NE2	2	503	1.91	.1492	2	486	.81	.4434	2	505	.64	.5253
Gender_S	2	502	1.63	.1971	2	484	2.84	.0594	2	503	3.40	.0343
Time	2	1116	29.53	<.0001	2	1118	29.55	<.0001	2	1119	23.59	<.0001
Group									2	1257	1.71	.1819
Group×Time									2	1119	27.11	<.0001
Random Effects	Estim	SE	Z	Pr > Z	Estim	SE	Z	Pr > Z	Estim	SE	Z	Pr > Z
Level-1 (WSV)												
Residual	.2322	.0098	23.59	<.0001	.2321	.0098	23.60	<.0001	.2208	.0093	23.61	<.0001
Level-2 (BSWCV)												
Intercept	.0644	.0099	6.52	<.0001	.0242	.0063	3.82	<.0001	.0250	.0061	4.13	<.0001
Level-3 (BCV)												
Intercept	-	-	-	-	.0428	.0190	2.26	.0120	.0017	.0026	0.64	.2602
Goodness-of-fit												
Dev/AIC/BIC	2066.2(16)/2098.2/2153.0				1986.1(17)/2020.1/1986.0				1895.0(20)/1935.0/1895.0			

Emotional_E	(A) Conditional MMRM				(B) Conditional MMRM				(C) Conditional MMRM			
Fixed Effects	df_N	df_D	F	Pr > F	df_N	df_D	F	Pr > F	df_N	df_D	F	Pr > F
LB_S	2	500	16.27	<.0001	2	481	18.50	<.0001	2	488	17.18	<.0001
LB_T	2	500	5.99	.0027	2	486	9.00	.0001	2	494	8.98	<.0001
NE1	2	500	1.39	.2501	2	477	1.88	.1531	2	477	1.42	.2426
NE2	2	500	1.56	.2111	2	479	.41	.6635	2	482	.22	.8045

	df_N	df_D	F	Pr > F	df_N	df_D	F	Pr > F	df_N	df_D	F	Pr > F
Gender_S	2	501	3.52	.0303	2	478	3.34	.0363	2	482	3.91	.0206
Time	2	1107	28.65	<.0001	2	1106	28.47	<.0001	2	1106	35.54	<.0001
Group									2	50	3.58	.0352
Gender×Group									2	483	4.10	.0172
Group×Time									2	1106	20.31	<.0001
Random Effects	Estim	SE	Z	Pr > Z	Estim	SE	Z	Pr > Z	Estim	SE	Z	Pr > Z
Level-1 (WSV)												
Residual	.1504	.0064	23.50	<.0001	.1505	.0064	23.48	<.0001	.1436	.0061	23.48	.0001
Level-2 (BSWCV)												
Intercept	.0986	.0117	8.40	<.0001	.0477	.0072	6.61	<.0001	.0475	.0070	6.71	.0001
Level-3 (BCV)												
Intercept	-	-	-	-	.0553	.0244	2.27	.0116	.0217	.0112	2.00	.0227
Goodness-of-fit												
Dev/AIC/BIC		1614.6(16)/1646.6/1701.4				1528.6(17)/1562.6/1570.8				1460.2(23)/1506.2/1517.3		

Behavioral_E	(A) Conditional MMRM				(B) Conditional MMRM				(C) Conditional MMRM			
Fixed Effects	df_N	df_D	F	Pr > F	df_N	df_D	F	Pr > F	df_N	df_D	F	Pr > F
LB_S	2	1326	12.97	<.0001	2	1334	13.68	<.0001	2	1336	21.64	<.0001
LB_T	2	1326	15.68	<.0001	2	1316	14.20	<.0001	2	1325	12.85	<.0001
NE1	2	1326	6.39	.0017	2	1334	5.11	.0062	2	1334	2.15	.1168
NE2	2	1326	.30	.7423	2	1326	.33	.7206	2	1333	.42	.6577
Gender_S	2	1326	.23	.7911	2	1326	.10	.9080	2	1330	.04	.9646
Time	2	1326	21.11	<.0001	2	1328	21.54	<.0001	2	1328	21.30	<.0001
Group									2	191	4.92	.0083
Group×Time									2	1328	15.99	<.0001
Random Effects	Estim	SE	Z	Pr > Z	Estim	SE	Z	Pr > Z	Estim	SE	Z	Pr > Z
Level-1 (WSV)												
Residual	.8386	.0324	25.88	<.0001	.8220	.0319	25.77	<.0001	.6660	.0258	25.77	<.0001

Level-2 (BSWCV) Intercept												
Level-3 (BCV) Intercept	-	-	-	-	.0169	.0100	1.69	.0455	.0167	.0093	1.79	.0364
Goodness-of-fit Dev/AIC/BIC		3566.9(15)/3596.9/3674.9				3544.4(16)/3586.4/3594.1				3274.0(20)/3314.0/3327.7		

Note: Cognitive_E= Cognitive engagement; Emotional_E= Emotional engagement; Behavioral_E= Behavioral engagement; LB_S = Baseline student engagement questionnaires; LB_T = Baseline school reports, teacher engagement questionnaires, students journals; NE1= fathers' educational level; NE2= mothers' educational level; Gender_S = Students' gender; df = Degree of freedom; Estim= Estimate; SE= Standard error; Dev = Deviance; WSV = within-subject variance; BSWCV = between students within classes variances; BCV = between-classes variances; AIC = Akaike information criterion; BIC = Bayesian information criterion.

The differences of least-squares means in Table 3 provide pairwise comparisons among the treatment groups over time (see also Figure 1). Specifically, results showed significant differences between the means of treatment and control groups, both in the middle of the program (i.e., T2) and at the end of the program (i.e., T3) in all dimensions of SE.

Table 3. *Differences of least-squares means adjusted for baseline covariates by simultaneously considering both dependent variables under each of the three SE dimensions*

Multivariate Comparisons			Cognitive Engagement			Emotional Engagement			Behavioral Engagement		
Month	Group	_Group	Estim	SE	$|t|$	Estim	SE	$|t|$	Estim	SE	$|t|$
T1	Control	Intervention	.2538	.064	3.99***	.2073	.090	2.29*	.2548	.128	1.99
T2	Control	Intervention	.3860	.044	8.70***	.4439	.098	4.54***	.6984	.101	6.92***
T3	Control	Intervention	.5181	.063	8.10***	.6784	.104	6.52***	1.1420	.128	8.96***

Note: See Table 2. *$p < .05$ **$p < .01$; ***$p < .001$.
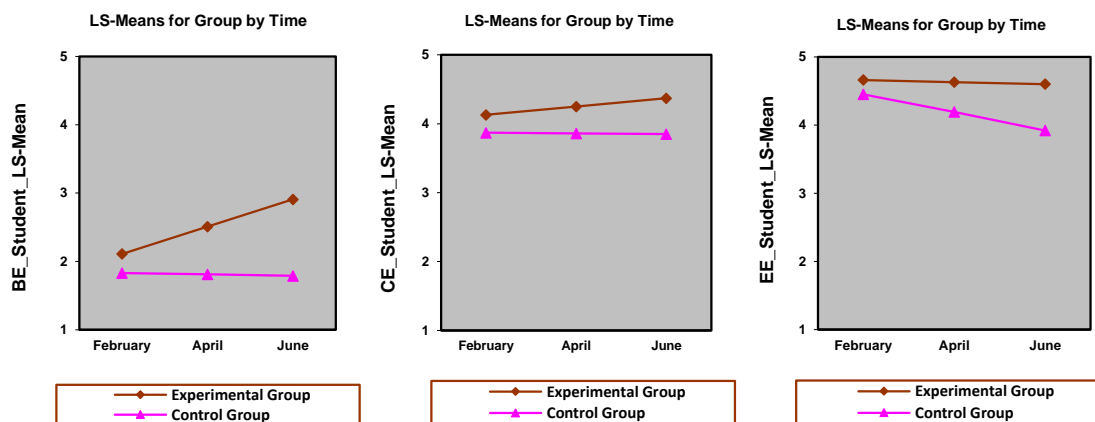
Figure 1. Plot of least-squares means adjusted for baseline covariates by time × group on the two dependent variables considered simultaneously under each of the three SE dimensions.

1.3.3. *Univariate MRM Analyses for each Dependent Variable*

Follow-up univariate MRM analyses were performed to determine which dependent variables (e.g., student reports and teacher reports) might explain the significant omnibus test of group-by-time interaction in each of the SE dimensions. Table 4 includes the results of the hypothesis tests for the outcome response measurement data.

Table 4. *Results of mixed-effects regression analysis for the dependent variables under each of the three SE dimensions*

	Cognitive Engagement				Emotional Engagement				Behavioral Engagement			
	Student reports				Student reports				Student reports			
Fixed Effects	df_N	df_D	F	Pr > F	df_N	df_D	F	Pr > F	df_N	df_D	F	Pr > F
LB	1	230	182.92	<.0001	1	245	35.62	<.0001	1	693	62.59	<.0001
Gender_S	1	232	4.37	.0377	1	243	0.15	.6967				
Group	1	674	0.53	.4648	1	103	0.23	.6071	1	32	0.82	.3719
Time	1	454	7.17	.0077	1	493	89.28	<.0001	1	465	36.14	<.0001
Gender_S×Group					1	241	0.64	.4243				
Group × Time	1	454	11.26	.0009	1	493	56.74	<.0001	1	465	46.51	<.0001
Random Effects	Estim	SE	Z	Pr > Z	Estim	SE	Z	Pr > Z	Estim	SE	Z	Pr > Z
Level-1 (WSV)												
Residual	.1843	.0123	14.93	<.0001	.1095	.0070	15.67	<.0001	.4345	.0288	15.11	<.0001
Level-2 (BSWCV)												
Intercept	.0966	.0155	623	<.0001	.0717	.0103	6.96	<.0001	.1181	.0271	4.36	<.0001
Level-3 (BCV)												
Intercept					.0158	.0009	1.61	.0539	.0567	.028	1.97	.0242
	Teacher reports				Student journals				School reports			
Fixed Effects	df_N	df_D	F	Pr > F	df_N	df_D	F	Pr > F	df_N	df_D	F	Pr > F
LB	1	247	258.29	<.0001	1	221	14.720	.0002	1	747	27.39	<.0001
Gender_S	1	246	2.63	.1058	1	218	1.82	.1792				
Group	1	683	2.42	.1202	1	52	8.93	.0043	1	87	8.74	.0040
Time	1	498	52.40	<.0001	1	446	3.90	.0489	1	737	28.01	<.0001
Gender_S×Group						218	5.56	.0192				
Group × Time	1	498	56.71	<.0001	1	446	0.21	.6464	1	737	3.87	.0495
Random Effects	Estim	SE	Z	Pr > Z	Estim	SE	Z	Pr > Z	Estim	SE	Z	Pr > Z
Level-1 (WSV)												

Residual	.2090	.0132	15.78	<.0001	.1336	.0090	14.81	<.0001	.7309	.0381	19.19	<.0001
Level-2 (BSWCV)												
Intercept	.0282	.0098	2.86	.0021	.0723	.0120	6.03	<.0001				
Level-3 (BCV)												
Intercept					.0429	.0223	1.92	.0273	.0275	.0162	1.69	.0451

Note: See Table 2.

Table 4 shows that, except for emotional engagement in the variable dependent students journals [$F(1, 446) = 0.21$, $p = .6464$], the null hypothesis of no differences between treatment conditions is rejected at a significance level of no more than 5% for two outcome variables [$F(1, 465) = 46.51$, $p = <.0001$; $F(1, 454) = 11.26$, $p = .0009$; $F(1, 493) = 56.74$, $p <.0001$; $F(1, 737) = 3.87$, $p = .0495$; $F(1, 498) = 56.71$, $p <.0001$]. In other words, there is a significant difference between the treatment conditions over time for each type of dependent variable across the three dimensions of SE. Therefore, the program's time of implementation is crucial to conclude the efficacy of the intervention.

For emotional engagement, our results also show that the interaction term of students' gender × treatment groups showed significant effects on the student journals outcome [$F (1, 218) = 5.56$, $p = .0192$], but not on the student reports outcome [$F (1, 241) = .64$, $p = .4243$]. Regarding the student journals' measure of emotional engagement, in the control group, girls outperformed boys, while in the experimental group, the performance of girls and boys was similar. Therefore, results indicate that the intervention program benefited the boys more than the girls.
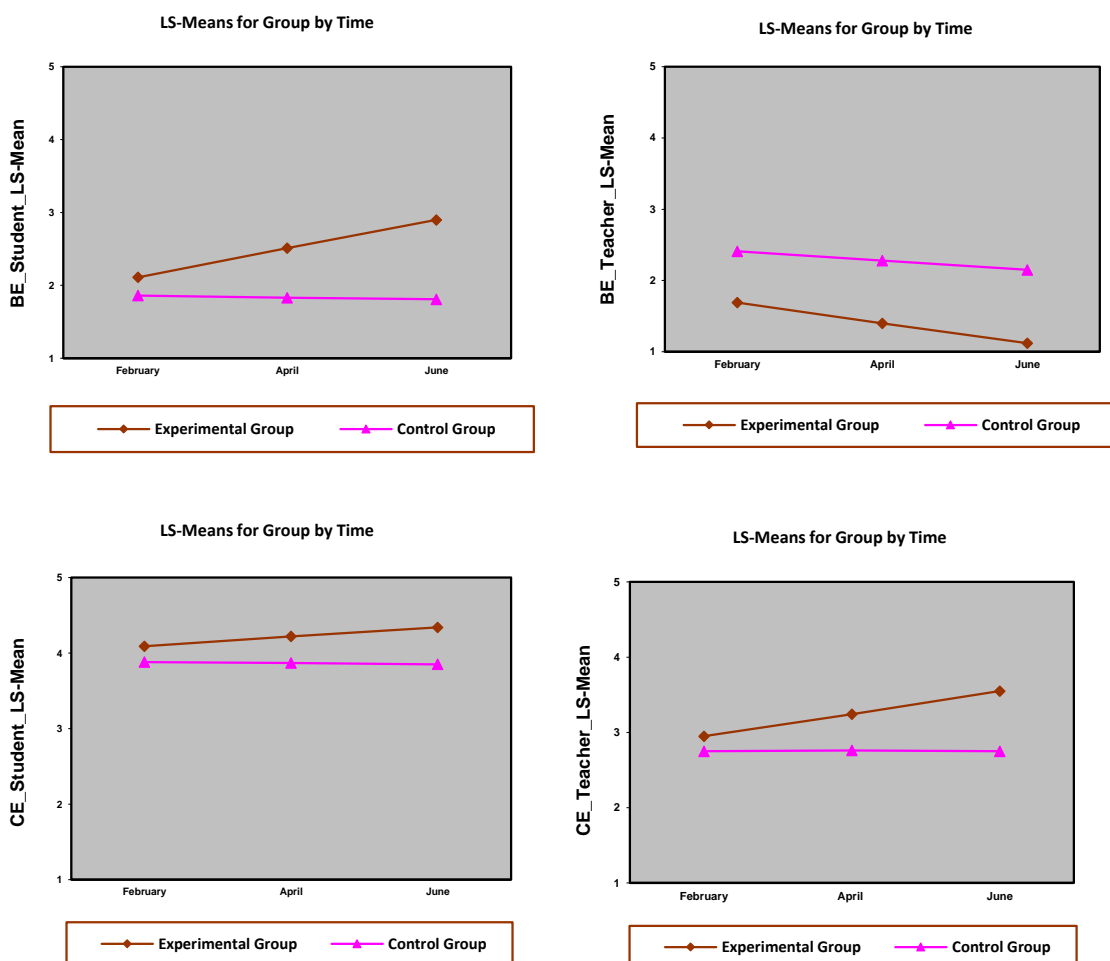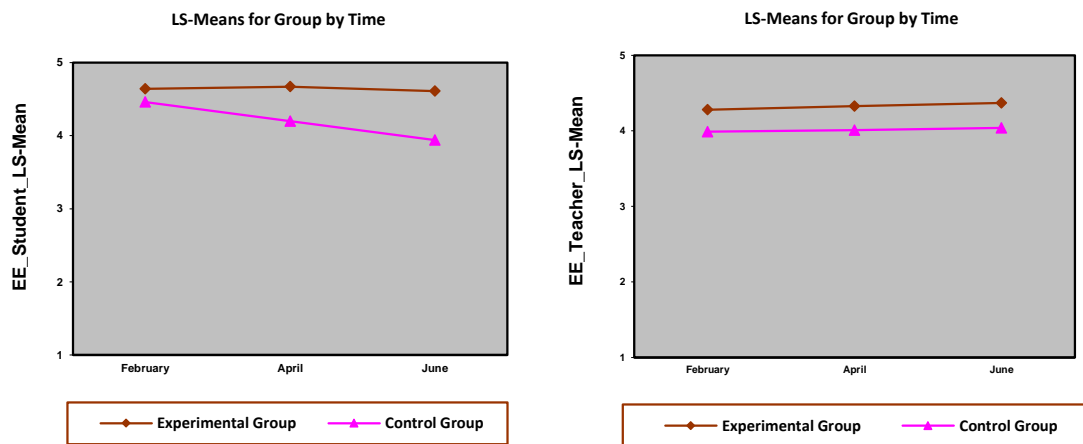
Figure 2. Plot of least-squares means adjusted for baseline covariate by time × group and for each type of dependent variable across the three dimensions of SE.

The next step aimed to explain the group × time interaction in the response variables in a manner consistent with our objectives. Linear combinations of means were estimated and compared using the LSMEANS statement of the PROC MIXED. The least-squares means are estimates of the two groups, evaluated prior to the program delivery (i.e., T1), during the program (i.e., T2), and at the end of the program (i.e., T3). These means are graphed in Figure 2. As one would expect, there is a delay period before the experimental treatment starts to exhibit a beneficial effect in the cognitive, emotional, and behavioral engagement measures.

Table 5. *Differences of least squares means adjusted for baseline covariate for both dependent variables (e.g., teacher and student reports) under each of the three dimensions of SE*

Univariate Comparisons			Cognitive Engagement			Emotional Engagement			Behavioral Engagement		
Student reports											
Month	Group	_Group	Estim	SE	|t|	Estim	SE	|t|	Estim	SE	|t|
T1	Control	Intervention	.2091	.0671	3.12**	.2092	.0903	2.32*	.2452	.1676	1.46
T2	Control	Intervention	.3467	.0528	6.56***	.4360	.0852	5.12***	.6712	.1554	4.32***
T3	Control	Intervention	.4843	.0667	7.26***	.6628	.0903	7.34***	1.0971	.1674	6.55***
School and Teacher reports and Students journals											
T1	Control	Intervention	.1687	.0577	2.92**	.2941	.1343	2.19	-.7250	.1396	5.19***
T2	Control	Intervention	.4806	.0401	11.98***	.3101	.1289	2.40*	-.8774	.1160	7.56***
T3	Control	Intervention	.7926	.0577	13.74***	.3272	.1341	2.44*	-1.0299	.1394	7.39***

Note: See Table 2. *p < .05 **p < .01; ***p < .00

1.3.4. *Standardized Effect Size*

Adopting the approach described by Vallejo et al. (2019), Cohen's d local effect sizes are reported in Table 6 for significant group-by-times interaction effects, as appropriate for multilevel modeling analysis. These values were calculated separately for T1, T2, and T3.

Table 6. *Standardized effect size for differences of least-squares means adjusted for baseline covariate effects of each of the outcome variables at the evaluated values of time*

		Cognitive Engagement		Emotional Engagement		Behavioral Engagement	
Group	Time	Student Reports	Teacher Reports	Student Reports	Student Journals	Student Reports	School Reports
IG vs CG	T1	.394	.346	.474	.583	.310	-.826
IG vs CG	T2	.654	.987	.985	.615	.849	-.999
IG vs CG	T3	.914	1.627	1.498	.646	1.367	-1.173

Note: According to Cohen's guidelines, *d* values of 0.2, 0.5, and 0.8 are considered small, medium, and large effect sizes, respectively.

1.4. **Discussion**

The present study aimed to evaluate the effectiveness of a story-tool school-based intervention focused on promoting SE amongst fourth graders. The design followed a longitudinal CRT with an intervention and control group, and data were analyzed using a multilevel approach (MMRM). Consistent with literature recommendations (Fredricks et al., 2004; Sinatra et al., 2015), we examined the three SE dimensions (i.e., cognitive, emotional, and behavioral), evaluating each through two different measures. Measures were gathered in four moments to better capture the impact of the intervention over time.

Current results support our first hypothesis, showing the effectiveness of the intervention in promoting participants' cognitive, emotional, and behavioral engagement. The control group maintained similar or slightly decreasing scores while the intervention group improved in the three dimensions across time (except in the school report measure for behavioral engagement). Data is consistent with previous studies reporting the benefits of students' enrollment in educational interventions using story-tools to enhance their competencies (Pereira et al., 2019; Rosário et al., 2016). Hence, the use of story-tools in educational contexts is further supported and may shed some light on current findings. First, the intervention promoting students' cognitive, emotional, and behavioral engagement occurred in a natural setting (Pino-James et al., 2019). Second, using a narrative grounded on the SRL framework allowed the promotion of metacognitive reflection and

vicarious learning (i.e., the characters' struggles and doubts were used to discuss students' behaviors), which may have contributed to enhancing students' SE. Moreover, grounded on previous research showing that students are more likely to engage in hands-on activities (Shernoff, 2013), participants were offered various opportunities to learn and practice problem-solving skills on daily problems or select SRL strategies to approach classroom tasks. Importantly, while engaging in the programs' activities, students had the opportunity to discuss and reflect metacognitively on the plot of the story in relation to their own behavior (Núñez et al., 2013; Rosário et al., 2019). For example, students were invited to think about their feelings towards school, set personal goals, discuss school and classroom rules, work in groups, and help each other solve problems.

The intervention had a positive impact on the three dimensions over time, which is aligned with literature reporting the internal reciprocal and reinforcing dynamic of the three dimensions (Hong et al., 2020; Li & Lerner, 2013). Each dimension may have contributed to strengthening the other two; training SRL strategies might have led to increased emotional and behavioral engagement, but discussions in class and students' feelings of belonging to the group may have also contributed to enhancing cognitive and behavioral engagement. Finally, behavioral engagement's increase throughout the intervention (e.g., following the class rules) is also likely to have positively influenced students' behaviors in the other two dimensions. Overall, SE improved with inputs of each dimension, providing a richer picture of the process of students' involvement in school. This finding supports Archambault & Dupéré's (2016) claim about the relevance of studying the three dimensions simultaneously to get a better grasp of the engagement process. Overall, these findings contribute to the engagement literature as this program seems to be a relevant tool to promote elementary students' SE.

Furthermore, we were also interested in learning whether the impact of the intervention differed according to individual (i.e., gender) and family background (i.e., parental educational attainment) characteristics. Girls in the control group showed higher cognitive and emotional engagement than boys, whereas no differences were found in the experimental group. Contrary to previous studies, we found no gender discrepancies regarding behavioral engagement (Archambault & Dupéré, 2016; Lietaert et al., 2015). Therefore, we may conclude that the program benefited the boys more than the girls in their cognitive and emotional SE. This finding is consistent with previous studies indicating that, in elementary school, girls tend to experience higher levels of self-regulation (Zimmerman & Martinez-Ponz,1990) and higher engagement (Archambault & Dupéré, 2016) than boys. In sum, girls' higher competence to self-regulate their behavior may be sustaining their positive emotions towards schoolwork, teachers, and peers. Also, their sense of belonging and positive emotions towards school

may contribute to triggering their cognitive engagement, as these two dimensions share a reciprocal relationship (Li & Lerner, 2013). Overall, this finding is consistent with the work of Pietarinen et al. (2014), who found that cognitive and emotional engagement are constructed in social interactions.

Interestingly, the intervention was more efficacious for boys than for girls, particularly for the emotional dimension; this result was more notorious in the students' journal measure. The array of activities set in sessions were focused on hands-on training (e.g., working as a group to solve problems, promoting positive interactions and relationship skills; activities of emotional awareness and regulation), which may have contributed to increasing boys' perception of their interest and enjoyment towards schoolwork. This finding is likely to merit researchers' attention because students' self-perceived emotional engagement influences their well-being in school (Pietarinen et al., 2014). In fact, students' positive feelings towards schoolwork may positively impact the way they approach tasks and behave in school (Hong et al., 2020; Li & Lerner, 2013). Following current and recent data (Degroote et al., 2020), educational interventions may wish to intentionally promote emotional engagement, with a particular focus on improving boys' competencies.

Lastly, we hypostatized that the intervention would be more effective for students whose parents showed higher PEA. However, this was not verified in either of the cases examined, neither when considering PEA as a main factor (isolated) nor as a secondary or moderator factor (interaction with the intervention). This result was unexpected because low PEA is likely to undermine SE (Fredricks et al., 2005; Suh et al., 2007). However, a recent study on the effects of school mobility and dropout rates on non-mobile high school students found that students whose parents had low PEA showed higher emotional engagement than their counterparts with at least one parent holding a higher education diploma (Degroote et al., 2020). Still, current non-expected results warrant further investigation. Studies on family background (e.g., parental educational attainment, income, free lunch, material hardship, SES) and SE are likely to differ on the components evaluated, cut-off points, and overall definitions. This variability may help explain the mixed results. In sum, PEA had no influence on students' SE nor hindered intervention gains for students whose parents have low PEA, which is a promising result since family background characteristics are not amenable of change.

Data indicate that this intervention extends the use of SRL-based narratives to promote SE. Current findings have various implications for practice. For example, teachers and educators may consider using this intervention in elementary school as a tool to prevent early signs of apathy, boredom, and lack of interest in school. Moreover, implementing this intervention may be of particular importance for boys showing low emotional engagement. For example, grounded on the current

findings, educators could consider setting activities and creating in-class opportunities for these students to express their feelings about and to experience positive emotions while doing schoolwork. Furthermore, school administrators could consider implementing training for teachers aiming to capacitate them to promote SE (e.g., through story-tools).

1.5. **Strengths, Limitations, and Future Research**

Current data shows the effectiveness of the intervention and contributes to strengthening the claim that early interventions are crucial to promote SE. By aiming the intervention at a young age group, educators take advantage of acting before students start showing low engagement signs, which is expected to help increase the positive effects of the intervention. Moreover, equipping students with a set of strategies to improve SE may help them maintain their school involvement throughout schooling. Altogether, these findings contribute to the engagement literature by stressing the role of students in the engagement process. The literature lacks intervention studies on SE following robust designs and analytics; this study adds to the literature by analyzing the effectiveness of an intervention to promote students' SE by using a CRT design and a multilevel approach to data. Moreover, to further capture the multidimensionality of the SE construct, we used two measures of distinct nature and source of information to evaluate the three dimensions of SE. Results emphasize the benefits of combining instruments to strengthen the trustworthiness of the data and to better capture the distinct facets of the construct.

Despite the strengths and contributions of the present research, study findings should be interpreted cautiously while considering some limitations. SE dimensions were evaluated through multi-informant and multi-method measures, and accordingly, data were analyzed using multi-level approaches. Nevertheless, SE is a complex dynamic process in need of further exploration. For example, future studies could consider using observational measures to capture the processual nature of the construct. Additionally, the variable PEA may not have captured the full variability of the phenomenon, which may help explain current results. For example, future research may include other variables pertaining to the family background context (e.g., material hardship, income, socioeconomic status). These variables might help shed some light on the relationship between SE and family background. Finally, the absence of follow-up measures prevents considering the long-term intervention effects, beyond the intervention. Future investigations could consider including follow-up measures; however, the statistically significant differences and the strong effect sizes of current results indicate the promising value of the intervention. Moreover, conducting longer interventions might be important to learn the impact of this program on SE throughout time.

In conclusion, the current study advances research by providing evidence that this intervention could be a relevant tool in promoting favorable engagement trajectories in elementary school. Importantly, when designing interventions, gender considerations are key. Interventions to promote emotional engagement amongst boys in elementary school may be a powerful way to increase their school engagement trajectory and promote academic achievement. We hope current findings may help educators implementing early interventions to prevent low engagement signs.

1.6. **References**

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Table 7. *SRL strategies and SE behaviors embedded in the story-tool*

	Examples of the story-tool	**Examples of SRL strategies**	**Examples of SE behaviors**
Cognitive dimension	"To better understand the problem, *Blue* drew it on the floor, he had learned that schemes are solution-friendly." (chapter 13, p. 62) "The goal was far, and they had to divide it into small steps." (chapter 5, p. 25)	Setting goals, summarizing, organizing	Metacognitive strategies, willingness to invest, flexibility in problem solving
Emotional dimension	"We are the seven colors of the Rainbow, and we are all important. We cannot leave *Yellow* behind." (chapter 3, p. 15) "Alone we will not be able to solve this problem. To find him we need help." (chapter 2, p. 13)	Self-control, self-reward, seeking help, anxiety, and frustration management	Identification with and belonging to school
Behavioral dimension	"There is always a way, *hipps*. Whoever does not give up, will succeed." (chapter 3, p. 15-16) "Then, to avoid problems, we distributed the total time across tasks." (chapter 6, p. 27)	Planning and monitoring, time management	Following rules, participation, effort, attention, time invested/time on task

CHAPTER 2
A TOOL-KIT TO HELP STUDENTS FROM LOW SOCIOECONOMIC STATUS BACKGROUND: A SCHOOL-BASED SELF-REGULATED LEARNING INTERVENTION

NOTE: AZEVEDO ET AL., SUBMITTED

2. A TOOL-KIT TO HELP STUDENTS FROM LOW SOCIOECONOMIC STATUS BACKGROUND: A SCHOOL-BASED SELF-REGULATED LEARNING INTERVENTION

Abstract

Socioeconomic status has been a long-time discussed topic due to its implications into all spheres of an individual's life. In fact, its impact on children's school path is well documented. However, despite extant research indicating strong relationships between students' socioeconomic status, use of self-regulated learning strategies, and academic achievement, research on interventions addressing these topics is limited. This investigation aimed to examine the effectiveness of a ten-week, school-based, narrative-based, program to promote self-regulated learning strategies and academic performance among fourth graders from low socioeconomic background. Twelve classes were randomly assigned to the intervention and control group; the students from low SES backgrounds in each group were enrolled in the study. A quasi-experimental study with three measurement moments was conducted. Data were gathered from self-reported questionnaires and an on-task measure. Findings indicate that the program was efficacious in promoting the use of self-regulated learning strategies and academic performance in children from a low socioeconomic background. This research paper discusses both practical implications and future research guidelines.

Keywords: socioeconomic status, academic performance, self-regulated learning, intervention, elementary school

2.1. Introduction

Growing up in a low SES background has a wide range of negative effects on the livelihood of children (APA Task Force on socioeconomic status, 2007; von Stumm & Plomin, 2015). For example, children from a low SES background are likely to show compromised sustained attention (Tomalski et al., 2013), lack of use of self-regulated learning (SRL) strategies (Pappas et al. 2003; Vandevelde et al., 2017) and low academic achievement (e.g., American Psychological Association, 2017; Berkowitz et al., 2017). Notwithstanding, these relationships are non-deterministic (OECD, 2016, 2019), opening opportunities for educational interventions. Extant research reports that equipping students with SRL competences empowers their ability to control personal and environmental influences on their behavior, and provides the tools necessary to navigate school challenges and SES constraints (Rosário et al., 2016, 2017; Zimmerman, 2000). SRL is understood as a process involving self-setting goals

and maintaining behavior towards attaining those goals (Zimmerman, 2008). Grounded on SES and SRL bodies of literature, the current study investigates the extent to which a school-based SRL intervention targeting elementary school children from low SES background is efficacious in promoting SRL and academic performance.

2.1.1. *Impact of SES on Academic Achievement*

The impact of SES on children's cognitive development (e.g., Hackman & Farah, 2009), academic achievement (e.g., O'Connor et al., 2019; Sirin, 2005), and use of SRL strategies (Pappas et al., 2003; Vandevelde et al., 2017) is well documented. Consistent with these findings, the investigations of Evans and Rosenbaum (2008) alerted that childhood poverty may hinder the development of self-regulation competencies and further affect the gap on achievement resulting from family income differences. For example, Portuguese data show that students' SES background explains 14.2% of the variation in mathematics scores (OECD, 2013b). Additionally, when compared with counterparts from high SES backgrounds, children from low SES backgrounds tend to have less access to educational resources, parental support, and learning opportunities (Bradley & Corwyn, 2002). Overall, SES limits the available resources and shapes the environment where children develop (Dietrichson et al., 2017).

A line of inquiry revealed an additional aspect while analyzing the academic expectations towards students from low SES backgrounds. Findings indicated that families from low SES (Rodríguez-Rodríguez & Guzmán, 2019), as well as teachers of children from low SES backgrounds (e.g., Auwarter & Aruguete, 2008) tend to set lower academic expectations for their children, or their students, than those set for counterparts from high SES households. Finally, Stumm and Plomin (2015) investigated whether SES disadvantages were cumulative over time. They found that children from low SES backgrounds scored poorly in early intelligence testes when compared with counterparts from high SES backgrounds (i.e., a 6-point difference at age 2). Overtime, this difference was amplified (i.e., average 16-point difference at age 16), confirming the long-term cumulative influence of SES on cognitive development. All considered, low SES background is associated with a cycle of disadvantage (e.g., low cognitive and social skills at school entry, Dietrichson et al., 2017; slow development of learning skills, Crespo et al., 2019; Morgan et al., 2009). What is more, this cycle, along with a lack of parental support (Bradley & Corwyn, 2002), translates into low academic achievement (OECD, 2016), which may have consequences for children's educational future and livelihood thus contributing to the intergenerational transmission of disadvantage (van Zwieten et al., 2020).

2.1.2. *Overcoming Low SES Constraints Through Self-regulated Learning*

Despite the strong positive relationship between SES and academic achievement (e.g., Berkowitz et al., 2017), some students from low SES backgrounds manage to overcome the net of associated negative constraints and have been excelling in international assessment programs (e.g., PISA; Schleicher, 2019). These data suggest SES as a non-deterministic factor (OECD, 2016, 2019) and conveys the message that surpassing a disadvantaged background is feasible (Dietrichson et al., 2017). However, being able to overcome educational disadvantages requires adequate skills and proper training (e.g., training on SRL strategies). There is a robust corpus of literature showing that students trained on SRL experience successful educational trajectories and school success (e.g., Rosário, Núñez, et al., 2010). Moreover, extant research has stressed that the ability to focus or shift attention voluntarily and inhibit behaviors are key skills needed to succeed in school (Evans & Rosenbaum, 2008), and that these set of skills are likely to be improved when trained (e.g., Núñez et al., 2011). Finally, the investigation of Vandevelde et al. (2017) found that mastering key SRL skills is expected to help students from low SES backgrounds manage factors that negatively affect their school progress and outcomes.

2.1.3. *Theoretical Framework*

Zimmerman's SRL Model (2000, 2002) provides a relevant theoretical framework for the current study. According to Zimmerman (2008), SRL is a cyclical and dynamic learning process through which students regulate their school behavior. This process is comprised of three phases: forethought, performance or volitional control, and self-reflection. Each phase informs the next one creating a sequential loop. In the forethought phase, students are expected to set goals consistent with their self-motivational beliefs. For example, students struggling to self-regulate their learning are likely to set outcome goals and display low self-efficacy and intrinsic task interest. The development of processes within the forethought phase will inform the performance phase. Following the former example, students struggling to self-regulate their learning are not likely to use strategies metacognitively consistent with the goals set, and are not expected to display efforts towards, nor monitor, the ongoing task. Finally, in the self-reflection phase, students are expected to use self-reflection strategies and adjust their behaviors to attain goals (Zimmerman, 2002). Following our example, students struggling to self-regulate their learning are likely to attribute results to factors other than the strategies used. This behavior will prevent them from using adaptive strategies responsive to outcomes, and eventually achieve success.

Grounded on Zimmerman's cyclical model, the PLEE model (i.e., Planning, Execution,

Evaluation) adds a recursive loop to each phase. PLEE model claims that each phase of Zimmerman's cyclical model has embedded within the same sequential loop (Rosário, Högemann, et al., 2019). For example, in the planning phase students set a plan for the task (e.g., select a "to-do" list as a time management strategy for the day), then execute this to-do list (e.g., list all the tasks for the day); and finally, evaluate the final to-do list (e.g., check if all tasks are included and manageable for the time available). The recursive nature, throughout and within each phase of the cycle, informs the subsequent phase, thus reinforcing the self-regulatory logic (Högemann et al., 2017; Pereira, Rosário, Lopes, et al., 2019). Overall, literature has shown that students who learn SRL strategies (e.g., goal-setting) and train the use of these strategies in class, improve control of, while becoming responsible for, their academic path (de Boer et al., 2018; Núñez et al., 2013).

2.1.4. *Purpose of the Study*

Children from low SES backgrounds are prone to show poor SRL skills (Pappas et al., 2003; Vandevelde et al., 2017) and low academic achievement (American Psychological Association, 2017; Berkowitz et al., 2017). Prior studies show that low SES affects several learning processes (e.g., sustained attention, planning; Hair et al., 2015; Noble et al., 2015); but also that low SES is not a deterministic factor of unsuccessful outcomes as international reports advocate (OECD, 2016, 2019). Moreover, previous research suggests that if children from disadvantaged backgrounds are offered hands-on training on SRL strategies, similar to those of their counterparts from advantaged households, they would improve their academic achievement (e.g., Andrzejewski et al., 2016). As a consequence, the performance gap between both groups would decrease up to 20% (OECD, 2013a). In sum, a non-deterministic approach to the impact of SES on people's livelihood presents an opportunity for setting educational interventions with children from low SES background.

The recent systematic review and meta-analysis by Dietrichson et al. (2017) examined academic interventions for elementary and middle school students from low SES backgrounds. Globally, data reported that it is feasible to improve these students' achievement through instructional interventions (e.g., cooperative learning, feedback). Notwithstanding, and to the best of our knowledge, research on school-based interventions focused on promoting SRL with children from low SES backgrounds is limited. Literature has been reporting data from a well-established research line using narratives as a platform to teach and promote SRL using general populations. For example, Rosário et al. have been exploring the impact of using narrative-based interventions to promote SRL and improve school success; findings advocate the merits of these tools (e.g., Högemann et al., 2017; Rosário, Núñez, et al., 2017; Rosário, Núñez, et al., 2020). However, to the best of our knowledge, no research

has explored the role of narrative-based interventions in promoting SRL competencies and academic success among students from low SES backgrounds. We believe that students from low SES backgrounds are likely to benefit from this training while improving their SRL skills and school performance. Grounded on the previous propositions, the current research aims are twofold: (i) to examine the impact of a narrative-based intervention focused on the promotion of SRL and academic performance in elementary school aged children from low SES backgrounds; and (ii) to learn whether, in addition to low SES conditions, the initial level of SRL strategies affects the students' outputs. Due to the possibility of interference of the SRL pretest scores and gender on results, both were controlled in the present study. The relation between students' gender and different aspects of the SRL process (e.g., use of SRL strategy) has been explored by several studies (e.g., Metallidou & Vlachou, 2007). However, data on gender differences regarding SRL yield mixed results. While some studies report higher use of SRL strategies for girls (e.g., Lee et al., 2019; Vandevelde et al., 2013), others found no differences or reported inconclusive data (Metallidou & Vlachou, 2007; Virtanen & Nevgi, 2010).

Previous studies did not address SRL training in elementary school children from low SES backgrounds, nor did they explore the distinct effects of the training with consideration to the initial levels of SRL (e.g., Dietrichson et al., 2017; Friedrich et al., 2013); still, acknowledging extant research, two hypotheses were set. Students enrolled in the program are expected to report a higher use of SRL strategies and better academic performance than their counterparts (see De Corte et al., 2011; Dignath et al., 2008). Additionally, following literature on the Matthew effect (e.g., Walberg & Tsai, 1983) the effects of the intervention are expected to be larger for students with the highest pre-test scores on SRL (see Otto & Kistner, 2017). In sum, we believe that providing academic opportunities for students from low SES backgrounds will contribute to levelling the educational playing field (Cross et al., 2018; OECD, 2013a).

2.2. **Method**

The present study is part of a larger project focused on examining the impacts of school-based interventions, addressing the promotion of SRL processes and strategies on students' variables (e.g., use of SRL, academic performance, school engagement). This independent study analyzed data regarding 90 students from low-SES backgrounds. Data were analyzed according to methodologies fit to address the research questions and are drawn from a unique database.

2.2.1. **Participants**

Following the Portuguese regulations, the present study was submitted and approved by the Portuguese Ministry of Education and the ethical committee of the Universidade do Minho. Afterwards, meetings were held with the directors of 12 public schools from the north of the country to explain the overall objectives of the study. Finally, the school administrators and teachers from nine of the public schools agreed to participate in the study. Parents' written consent was solicited through a letter informing about the study. All participants presented their parental consent forms signed and agreed to enroll in the investigation.

In the current study, the twelve classes from the fourth grade in the 9 schools were randomly assigned to the intervention or control group (see section 2.2.2) and students from low SES background in these classes (see the paragraph below) were invited to participate. In total, participants in this study consisted of 90 (34 girls) fourth graders, aged between 9 and 11 (M = 9.72, SD = 0.71).

Although there is no consensual definition or theoretical rationale for measuring SES (Ali et al., 2005), both family income and parental educational attainment are commonly used to inform SES (Elliott & Bachman, 2018). Family income may be considered a straightforward indicator of material resources and is closely related to poor academic achievement (Morrissey et al., 2013), while educational attainment levels are associated with occupational position and complexity, which are often associated with income (Mirowsky & Ross, 2005).

Considering that SES must be tied to cultural specificities (DGEEC, 2016), information on families' income level and parents' educational attainment were used to characterize SES. While analyzing family income, Portuguese data indicated that the minimum wage annual salary was of 8890€ in 2020 (Presidência do Conselho de Ministros, 2019). Families with annual incomes below this figure are eligible for special assistance programs. For example, in the public school system, students from families with an accumulative income of up to 5.898.48€ per year (see Pereira, Rosário, Silva, et al., 2019) are eligible for free lunches, a pack of school materials (e.g., pencils and notebooks), and textbooks for each grade level. In the nine public schools enrolled in our study, 24% of the students were eligible for receiving free lunch and the school materials pack. Students' eligibility for this assistance program are certified at the beginning of each school year by the secretariat of the schools after analysis of family social security data. The 90 fourth grade students enrolled in the current study were eligible for this assistance program. Data on parents/guardians' education levels were collected by the school secretariats and were measured on a scale of 1 to 6 (1 = *elementary school…*; 4 = *high school…*; 6= *master's degree*). Parents/guardians' educational levels were then recoded into four

categories: elementary school or less, junior high, high school, or graduate degree. Finally, using these categories, parental education was coded as the highest educational level of either parent/guardian. Data on the families' educational levels have shown that 44% completed only elementary school, 27% junior high, 20% high school, and 9% completed a bachelor's degree. These data were compared against data from the families of students in the fourth grade in the nine elementary schools. From these parents/guardians, 4% completed elementary school, 29% junior high, 36% completed just high school, and 31% completed a bachelor's degree. Considering data on these two indicators of SES (i.e., family income and parents' educational level), this sample of students from low SES backgrounds was found to be eligible to enroll in the current study.

2.2.2. *Design and Procedure*

This research followed a longitudinal quasi-experimental design, with an intervention and control group. The classes not the students were randomly assigned to an intervention group; eventually the students from low SES backgrounds in these classes were enrolled in the study. Finally, 51 students were enrolled in the intervention group and 39 in the control group. Children in the intervention group participated in all steps of the program, and children in the control group followed curriculum as usual. The national curriculum does not approach SRL strategies, and the teachers of the control group stated that they had no previous training in SRL. Acknowledging ethical considerations, by the end of the study, the 39 children in the control group were offered a compact version of the program. The intervention program was delivered on a weekly basis over the course of 10 60-minute sessions, all of which were video recorded (see Treatment integrity section). Sessions were developed by the first author, a researcher with knowledge and experience in delivering school-based educational courses on SRL. The measures were collected in three moments: before (week 0), during (week 5), and at the conclusion of the intervention (week 11).

2.2.3. *The Story-tool: Yellow's Trials and Tribulations*

The current intervention program is grounded on the narrative, *Yellow's trials and tribulations* designed for children under the age of 10 (Rosário et al., 2007). This story-tool narrates the adventures lived by the colors of the rainbow while searching for Yellow, who suddenly disappears from the rainbow. The colors of the rainbow set out on a quest to find Yellow, because we are all important and no one should be left behind. Throughout the adventure, the colors meet new friends and learn useful SRL strategies to overcome the obstacles encountered throughout their quest. These SRL strategies are embedded into the plot of the story, and students were encouraged to learn and progressively

transfer this knowledge into their daily lives' challenges (Rosário, Núñez, et al., 2017; Schunk, 1998). The learning through reading and discussion of the story (e.g., analysis on the characters' feelings and behaviors to overcome obstacles) allow children to experience vicarious learning (Bandura, 1986) within a growth framework. In sessions, students are given the opportunity to practice metacognitive reasoning, divergent thinking, and learn problem-solving strategies used in situations similar to theirs (e.g., how to set a plan and select the strategies likely to help students attain a goal). Importantly, stories constitute a powerful educational tool (e.g., Isbell et al., 2004) to deliver knowledge (Jones & Crow, 2017), and allow for reflection about the learning strategies followed to attain learning goals (Rosário, Núñez, et al., 2017).

2.2.4. *Intervention Program*

Sessions of the current program followed the instructional sequence adopted in previous investigations using story-tools (Núñez et al., 2013; Rosário, Núñez, et al., 2017; Rosário, Núñez, et al., 2020). The protocol was as follows: all sessions, except for the first, were initiated by recalling the previous session. Afterwards, researcher and students took turns to read one chapter per session (see Appendix 2). Small breaks were taken during the reading to ensure students were following the story plot and apprehending the general SRL messages built into the narrative (see Högemann et al., 2017; Rosário, Núñez, et al., 2017). At the end of each chapter, students were invited to discuss and analyze the content read. Discussions were driven by students' spontaneous comments and by intentional inquiry aimed to promote a goal-directed reflection. Subsequently, individually or in groups, students were asked to perform a consolidation task to promote SRL strategies and to discuss ways to apply learning to real-life situations. As a take home message, students were invited to create a slogan describing what they had learned in the session.

2.2.5. *Treatment Integrity*

Several procedures were adopted to assure the treatment integrity of the implementation of the protocol. Specifically, prior to the intervention, the researcher assigned to delivering the program received a dossier with session record sheets. This material was expected to help monitor the steps for each session (e.g., activities for the session, take home message), and to track the activities as they were completed. Moreover, the researcher reported on the session record sheet how the protocol was followed, and if not, explain any deviations. Throughout the implementation of the intervention, a weekly briefing between the first author and the senior researcher was held to discuss project issues and adherence to the protocol (e.g., activities developed). Researcher's reported data revealed an

adherence to protocol of 93% (range 89 - 97). Additionally, an expert on SRL watched 30% of the sessions using the same session record sheets. Data from the video observations showed that the researcher completed a mean of 90% of the activities (range 85-95). This result indicates a high treatment integrity for the program.

2.2.6. *Instruments and Measures*

2.2.6.1. **Use of Self-regulated Learning Strategies**

The SRL Strategies Inventory (see Núñez et al., 2013; Rosário, Núñez, et al., 2010) assesses SRL strategies with nine items representing the three phases of the SRL process: Planning (e.g., "I make a plan before I begin an assignment/activity. I think about what I am going to do and what I need to complete it."), Execution (e.g., "I select a calm place where I can be concentrated to study.") and Evaluation (e.g., "I compare the grades I received with the goals I set for that subject."). The items were scored on a five-point Likert format (1 = never to 5 = always). In this study, the Cronbach's alphas for the three moments (pretest, intermediate and posttest) were .88, .79 and .85, respectively. The appropriateness of factor analysis was supported by Bartlett's test of sphericity, which provides an indicator of the strength of the relationships among variables. Bartlett's test of sphericity, χ^2 (36) = 169,451, $p < .001$, indicated that correlation structure is adequate for factor analyses. Moreover, we conducted the Kaiser-Meyer-Olkin (KMO = .799), and found that the sampling was adequate for the analysis (Pallant, 2007; Tabachnick & Fidell, 2007). To explore the factorial structure of the SRL Strategies Inventory, the nine items of the instrument were subjected to an exploratory factor analysis with varimax rotation. The maximum likelihood factor analysis, with a cut-off point of .50 and the Kaiser's criterion of eigenvalues greater than 1, yielded a one-factor solution as the best fit for the data, accounting for 38.4% of the variance.

2.2.6.2. **Academic Performance**

School grades are a controversial topic of discussion for educators (Malone et al., 2020). For example, Pulfrey et al. (2011) argues that school grades, rather than stimulating students interest in learning, tend to be more effective in promoting their motivation to avoid receiving low grades. Moreover, grading does not appear to provide effective feedback likely to inform students on ways to progress (Rosário, Högemann, et al., 2019). Acknowledging this concern, we used writing compositions to measure the variable academic performance. Reasons were threefold: (i) previous research connecting writing and learning shows that writing tasks, particularly those requiring

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metacognition and agency, helps to improve students' learning and favors their academic achievement (e.g., Bangert-Drowns et al., 2004; Miller et al., 2018). Moreover, (ii) developing robust writing competencies is important to children's future success. For example, many employers include this competence in the set of criteria that help them to decide about hiring and promotion in skilled jobs (Freedman et al., 2016). Finally, (iii) writing compositions are likely to capture the changes in students' performances over a short period (Graham et al., 2014).

All participants received individual notebooks at the beginning of the intervention to write their compositions. Moreover, the themes for the narratives (e.g., "Describe the adventures of the gray colored pencil that came out of its case and went on an adventure around the world. It colored everything it found in gray without thinking of the consequences, until...") were provided by the first author to students in both groups.

Identifying features included in the writing compositions regarding students (e.g., participants experimental condition) was hidden. Afterwards, two researchers received training to score the compositions. A standardized rating scale for Portuguese language (see Rosário, Högemann, et al., 2019), including topics such as: (i) organization, (ii) coherence, and (iii) sentence structure, was used. As part of the training, these researchers independently scored a sample of narratives (not used in this research) and discussed any disagreements. At the end of the training, researchers read each of the 273 compositions to gain an overall impression on the general narrative. These compositions had been typed, and punctuation, spelling, and capitalization were corrected to reduce bias on the scoring process, as literature suggests (Graham et al., 2007; Rosário, Högemann, et al., 2019). Finally, all compositions were independently scored on a 13 item 5-point *Likert* scale (1 = low quality; 5 = high quality) by one researcher, and 30% by a second researcher (Appendix 3 presents two examples of the coding scheme). The inter-rater agreement was of .87, which is considered almost perfect (Landis & Koch, 1977).

2.2.7. *Analytic Plan*

2.2.7.1. **Design and Data Analysis Strategy**

A quasi-experimental design with three moments (pretest, intermediate and posttest) was followed. The missing values (1.44%) were treated through the multiple imputation procedure. Data were analyzed in three steps. First, the psychometric properties of the measures and their descriptive were examined. Second, the hypothesis addressing the effect of the intervention on the dependent variables (i.e., use of SRL strategies and academic performance) was analyzed. Third, the second

hypothesis, regarding the differential effects of the intervention considering the pre-test scores of the variable use of SRL strategies (i.e., low, medium, and high), was analyzed. To this aim, we identified the three levels considering the scores in the 33rd and 66th percentiles. In the current study, the classes, not the students, were randomly assigned to an experimental condition. Still, we did not find statistically significant differences between subjects in treatment groups on the dependent variables prior to the intervention. Moreover, the pretest scores of the dependent variables and gender were included as covariates. Finally, aiming to analyze differences in the intervention and control groups throughout the program, we examined the behavior of the variables in both groups in two moments (intermediate and post-test). Statistical analyses were conducted with SPSS 24. The effect sizes of the intervention were computed from Lenhard and Lenhard (2017) as follows: ($d < 0.20$ = no significant; d between 0.20 and 0.50 = small effect; d between 0.50 and 0.80 = medium size effect; d > 0.80 = large effect size).

2.3. **Results**

2.3.1. *Descriptive Statistics*

Table 8 presents descriptive data (mean, standard deviation, skewness, and kurtosis) and the correlation matrixes for both groups (intervention and control), regarding the three-time measurements (pretest, intermediate, and posttest). Data show a statistically significant positive relationship between the three measures from the same variable, particularly for the intervention group, and no correlation was found between both dependent variables, particularly in the case of the control group. Focused on the control group, no relationship was found between gender and the measures for the two dependent variables; for the intervention group this relationship was positive and statistically significant, but weak. Finally, data from skewness and kurtosis indicate that data set is normally distributed.

Table 8. *Pearson correlation matrices (two-tailed), for control and intervention groups and descriptive statistics in the three temporal measures (pretest, intermediate, posttest)*

	1	2	3	4	5	6	7
Control Group (n = 39)							
1. Gender	—	.158	.229	.071	-.180	.206	.112
2. SRL-T1		—	.728**	.645**	.177	.009	.205
3. SRL-T2			—	.799**	.069	-.120	.286
4. SRL-T3				—	-0.032	-.222	.183
5. AP T1					—	.167	.298

	1	2	3	4	5	6	7
6. AP T2						—	.425**
7. AP T3							—
M	1.360	3.252	3.182	3.228	20.310	19.850	18.870
SD	0.486	0.409	0.460	0.483	3.396	5.570	5.222
Skewness	0.612	-0.249	0.352	-0.459	0.299	-0.095	-0.141
Kurtosis	-1.717	-0.205	-0.612	0.833	0.125	-0.459	0.022
Intervention Group (n = 51)							
1. Gender	—	.346*	.168	.232	.031	.283*	.167
2. SRL-T1		—	.687**	.585**	.340**	.130	.003
3. SRL-T2			—	.643**	.085	-.044	-.205
4. SRL-T3				—	.307*	.034	-0.005
5. AP T1					—	.277*	.360**
6. AP T2						—	.682**
7. AP T3							—
M	1.390	3.232	3.283	3.595	19.650	19.570	22.570
SD	0.493	0.459	0.498	0.354	4.004	5.100	4.531
Skewness	0.455	0.048	-0.011	0.016	0.295	0.137	-0.609
Kurtosis	-1.868	-0.180	-0.550	-0.144	-0.667	0.337	0.987

Note: Gender (1 = boys, 2 = girls); SRL (min: 1; max: 5), AP (Academic Performance) (min: 13; max: 65); T1 (pretest), T2 (intermediate), T3 (posttest).
p < .05, **p* < .01

2.3.2. *Effect of the Intervention on the Use of SRL Strategies and Academic Performance*

No statistically significant differences between the intervention and the control groups were found in the pretest measures of both dependent variables (i.e., use of SRL and students' academic performance). Additionally, the variable gender was significantly related to the use of SRL strategies ($F_{(1,87)}$ = 6.876, $p < .01$, η_p^2 = .073, d = 0.56), but not with academic performance. Grounded on these findings, we ran two ANCOVAS (one for each of the dependent variables) in order to analyze the effect of the intervention. Data was collected in two waves along the intervention (intermediate and posttest). Covariates were gender and the pretest score for each of the dependent variables.

Table 9 presents data for these analyses. Results show no differences in the gender association

with the variables use of SRL strategies or academic performance at intermediate and posttest measure. On the contrary, pretest scores (use of SRL strategies and academic performance) were found to be associated with both dependent variables at the intermediate and posttest measure. Regarding the effect of the independent variable, data indicate that the intervention did not show statistically significant effects on the intermediate measure for any of the dependent variables (cf. Figure 3). However, we found a positive and statistically significant effect of the intervention on both dependent variables (i.e., use of SRL strategies and academic performance) at the posttest. The effect size is large for SRL and academic performance; the former scored higher.
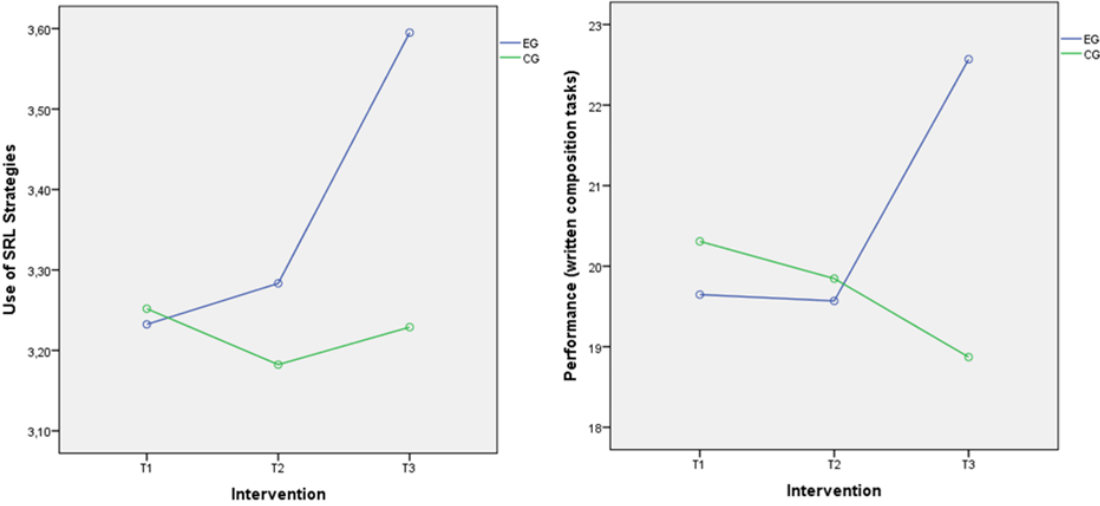
Figure 3. Effect of the intervention on the use of SRL strategies and performance at intermediate (T2) and posttest (T3).

Table 9. *Results of ANCOVAs for SRL and Academic Performance*

		Intermediate assessment (Time 2)				Posttest assessment (Time 3)			
	df/error	*F*	*p<*	η^2	*d*	*F*	*p<*	η^2	*d*
Use of SRL									
Gender	1/86	0.001	0.973	0.000	0.000	0.027	0.870	0.000	0.000
SRL_T1	1/86	77.621	<.001	0.474	1.898	45.406	<.001	0.345	1.454
Group	1/86	2.462	0.120	0.028	0.339	27.913	<.001	0.245	1.139
AP									
Gender	1/86	6.616	0.012	0.071	0.553	2.475	.119	0.028	0.339
AP_T1	1/86	5.766	0.018	0.060	0.518	11.270	.001	0.116	0.724
Group	1/86	0.018	0.894	0.000	0.000	16.301	<.001	0.159	0.869

Note: Time 1 (pretest), Time 2 (intermediate), Time 3 (posttest); Control Group (*n* = 39), Intervention Group (*n* = 51); SRL_T1 (SRL pretest scores), AP (Academic Performance), AP_T1 (Academic performance pretest scores).

2.3.3. *Analysis of the Interaction between Pretest Levels of SRL and Intervention*

Three sub-groups were composed within the intervention and control groups using the initial levels of students reported use of SRL strategies (low, medium, and high). Table 10 presents the means and standard deviations of the three sub-groups in the intervention and control groups on the posttest measures of both dependent variables: use of SRL strategies and academic performance. Two ANOVAS with two independent variables, pretest levels of students' reported use of SRL strategies (low, medium, and high) and condition (control, intervention), were run. Gender was used as a covariate.

Table 10. *Means and standard deviations of intervention and control sub-groups (use of SRL strategies: low, medium, high) on posttest use of SRL strategies and academic performance*

	Use of SRL Strategies		AP	
	M	*SD*	*M*	*SD*
Intervention Group				
Pretest SRL_Low	3.4134	0.3070	23.19	5.409
Pretest SRL_Medium	3.5077	0.3270	22.00	5.079
Pretest SLR_High	3.8462	0.2724	22.21	3.066
Control Group				
Pretest SRL_Low	2.9920	0.6090	17.89	4.314
Pretest SRL_Medium	3.0643	0.2912	18.79	6.033
Pretest SLR_High	3.7071	0.28984	19.82	4.622

Findings are as follows. First, data showed that gender is not associated with the variability in the two dependent variables. Secondly, statistically significant differences with large effect sizes were found in the intervention and control groups for both dependent variables; note that the effect size was larger for SRL. Third, as expected, statistically significant differences were found between the three subgroups regarding the use of SRL strategies on the posttest ($F_{(2,83)} = 21.234$; $p < .001$; $\eta^2 = .338$; $d = 1.43$). Data indicate that students in the three subgroups improved in the reported use of SRL strategies at the end of the intervention. On the contrary, in the posttest, we did not find statistically significant differences in the three sub-groups on academic performance ($F_{(2,83)} = 0.018$; $p > .05$; $\eta^2 = .000$; $d = 0.000$). This suggests that the slope of the three sub-groups was significantly distinct

(higher for students with low SRL). Finally, the interaction between the two independent variables was not statistically significant, neither for the variable use of SRL strategies ($F(2,83) = 1.703$; $p > .05$; $\eta^2 = .039$; $d = 0.40$), nor for academic performance ($F(2,83) = 0.606$; $p > .05$; $\eta^2 = .014$; $d = 0.24$). Data indicate that the three subgroups in both conditions showed similar trends in both dependent variables.

Table 11 presents the differences between the subgroups (low, medium, and high), regarding the use of SRL strategies in both dependent variables after the intervention. As Figure 4 illustrates, the highest gains in the use of SRL strategies after the intervention were associated with students in the subgroups of low and medium levels of SRL (in both cases the effect size is high). When the initial score on SRL is high, the effect size of the intervention is medium. For the variable of academic performance, we observed a similar trend, i.e., the highest gains in academic performance after the intervention were associated with students in the subgroups of low and medium levels of SRL. However, the difference between both variables is that the effect size for the subgroup of medium level of SRL is medium and not high.
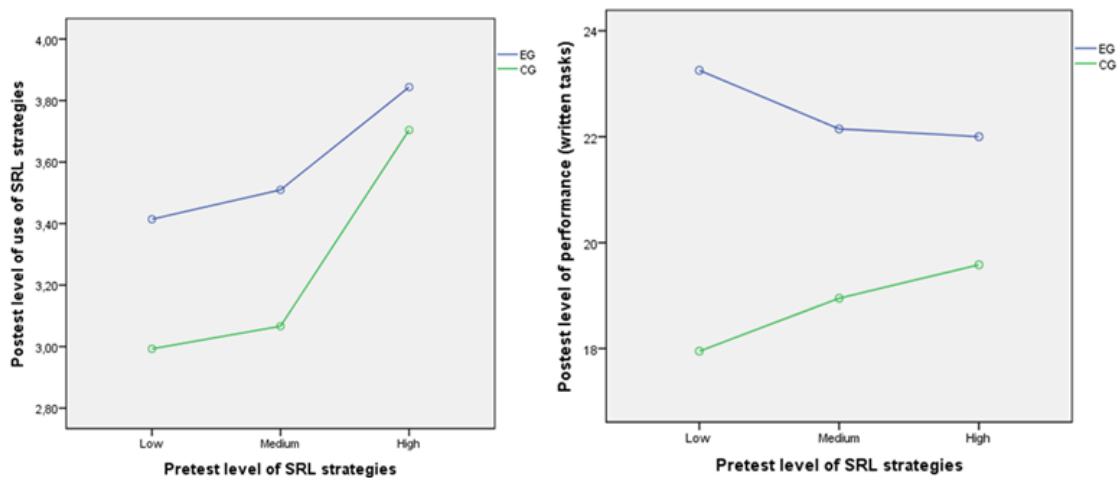
Figure 4. Interaction between the reported use of SRL strategies (pretest) and the effect of the intervention (posttest).

Table 11. *Effect size of differences between low, medium, and high intervention and control groups in use of SRL strategies and academic performance*

	d_{Cohen}	Glass' Δ	CLES
Use of SRL Strategies			
Intervention vs Control SRL_Low Groups	0.874	0.692	0.732
Intervention vs Control SRL_Medium Groups	1.431	1.522	0.844
Intervention vs Control SRL_High Groups	0.496	0.483	0.637
AP (Writing Composition Tasks)			
Intervention vs Control SRL_Low Groups	1.083	1.229	0.778
Intervention vs Control SRL_Medium Groups	0.576	0.532	0.658
Intervention vs Control SRL_High Groups	0.609	0.517	0.667

Note: CLES (Common Language Effect Size).

2.4. **Discussion**

The current study reports on the design, implementation, and effectiveness of an intervention on SRL designed for children enrolled in elementary school from low SES backgrounds. The study was driven by the following theoretical propositions: (i) children from low SES backgrounds face educational inequalities (e.g., OECD, 2013b); (ii) these children are predisposed to display poor SRL strategies (e.g., Vandevelde et al., 2017); (iii) despite the negative effects of SES on the livelihood of children from low SES backgrounds (e.g., von Stumm & Plomin, 2015), these relationships are non-deterministic (OECD, 2016, 2019). Finally, (iv) the promotion of SRL skills is related to successful paths in education (e.g., Rosário, Núñez, et al., 2010).

Overall, current findings regarding our first hypothesis show that students from low SES backgrounds enrolled in the intervention improved their use of SRL strategies and academic performance. These two findings will be further discussed. First, there is little research on interventions targeting the promotion of SRL strategies in students from low SES backgrounds, which prevents direct comparison of current results with previous ones (e.g., Andrzejewski et al., 2016). For example, Vandevelde et al. (2017) investigated an approach mediated by student tutoring in attempts to enhance SRL skills in children from low SES backgrounds, but they did not find significant positive effects of the intervention.

The use of story-tools as a methodology to enhance SRL strategies as followed in the current

research may help to explain our positive findings. In fact, story-tools have proven to be efficacious in promoting SRL competencies (e.g., Azevedo et al., 2019; Pereira, Rosário, Lopes, et al., 2019; Rosário, Núñez, et al., 2020); however, this line of research has no available data on students from low SES, which prevents data comparison. We believe that current findings, namely data showing that students significantly improved the use of SRL strategies by the end of the intervention, may be related to the use of the methodologies and strategies tailored to meet these students' needs. We highlight two aspects that may have contributed to this outcome: the use of vicarious learning (e.g., Roberts, 2010), and the metacognitive reflection approach (e.g., de Boer et al., 2018).

During program sessions, students were invited to discuss the challenges faced by the characters of the story-tool and their behaviors, while reflecting on how to transfer this knowledge to their own school problems and livelihood. Participants may have valued this vicarious learning experience (Roberts, 2010), as they may struggle to cope with school challenges and overcome the limitations that arise as an associated result of their socioeconomic background (Morrissey et al., 2013). This finding is consistent with data reporting that intentional training on SRL provides students with tailored tools likely to help them control their learning and manage their motivational and cognitive processes to achieve self-set goals (e.g., Zimmerman, 2008).

Additionally, sessions were designed to foster personal and group metacognitive reflection (see de Boer et al., 2018). For example, the whole-group discussions on the topics learned, the activities targeting knowledge transfer, and the processes developed to build the take-home message may have helped students to deepen their understanding of the SRL strategies and increase authorship of their own learning path (Pereira, Rosário, Lopes, et al., 2019). Most importantly, participants were offered various opportunities to learn how to assume control of their lives and share life experiences with peers from similar backgrounds (e.g., difficulties to cope with adversities and inequalities in relation to schoolwork, but also ways to overcome them by assuming an agent role). This variety in tasks is consistent with literature recommendations (e.g., Rosário, Núñez, et al., 2017; Schunk, 1998) and aimed to promote participants' flexibility and knowledge transfer. For example, having the opportunity to learn and practice a SRL strategy (e.g., planning) in different contexts and activities (e.g., planning how to approach a math exercise; planning a picnic) allowed participants to diversify their experiences and to learn when and how this learning strategy could be useful to help them attain their goals. In fact, prior research has reported that students are likely to use and transfer strategies into other contexts when they perceive instrumentality to help them progress (Azevedo et al., 2019; Núñez et al., 2013). What is more, the hands-on approach that was followed (e.g., practice of SRL strategies) may

have helped students to reflect metacognitively on their own challenges (e.g., ask for help to complete homework; deal with parents' low expectations), and improve their SRL competencies. Most importantly, reflecting on their learning processes may have contributed to helping students understand that their coming from a low SES background does not constrain their ability to achieve success. As Manuel (fictitious name) shared in a session,

> [Everyday] I arrive at school earlier than my classmates because my mom has to work very early. I do not like this, but with Yellow I realized that, by being early at school, I could review the topics of the subjects I was struggling with.

Regarding the second aspect to be discussed, data show that participants' gains in SRL translated into improvements in academic performance. This result is consistent with previous findings, showing close relationships between children's SRL behaviors and academic achievement (e.g., de Boer et al., 2018; Dignath et al., 2008); and adds to the literature by stressing the need to train students from low SES backgrounds on SRL to help them improve their academic performances. Moreover, the effect of the intervention on academic performance at posttest was large. The strategies trained over the program were not content focused, yet students had the opportunity to train the strategies across a diversified set of hands-on activities (e.g., work on and write a problem solution; write their feelings regarding classroom rules).

In what concerns the control group, Figure 3 shows that these students decreased on average their scores throughout time on both outcome measures. One explanation for this may be that time accentuated the possible difficulties arising from their background which strengthens the relevance of the current intervention.

Importantly, as results show, the intervention produced significant effects at post-test, but not at the intermediate phase. This is consistent with previous data (e.g., Núñez et al., 2013; Rosário, Núñez, et al., 2017) alerting that learning, developing a metacognitive knowledge on, and effectively using SRL competencies requires time. Thus, the time of implementation is a crucial element to consider when designing interventions. Altogether, current findings provide further evidence that constraints associated with low SES are not deterministic factors for students' performance (OECD, 2016, 2019).

Finally, our second hypothesis was focused on learning whether the initial level of SRL strategies affected the outputs in this intervention. Prior research addressed interventions analyzing the effects of SRL interventions on high and low achievers, regardless of their SES background. Thus, comparisons of current with previous data should be taken cautiously. Still, current data is consistent with prior

research. Results show the program to be effective for children irrespective of their initial level of SRL (i.e., low, medium, or high) (De Corte et al., 2011; Otto & Kistner, 2017). In addition, our results indicate that training was more effective for students with low or medium SRL initial levels, possibly due to their greater margin for improvement. This latter finding is consistent with the work by De Corte et al. (2011) and Friedrich et al. (2013), but is not aligned with recent data from Otto and Kistner (2017), which indicate that the effects of the intervention were larger for high achievers.

Data on our second hypothesis, underline the need for educators to pay particular attention to students from low SES backgrounds with low or moderate SRL competences. In sum, children from low SES background benefited from intentional SRL training designed to help them develop their own "tool-kit" of strategies. Moreover, students who enrolled in the intervention significantly improved their academic performance, outperforming their counterparts in the control group. This finding indicates that this intervention could contribute to help reduce the achievement gap experienced by students from low SES background (Andrzejewski et al., 2016; de Boer et al., 2018). As this participant comment suggested,

> I use PLEE [see Theoretical framework section] when I go for my acrobatics competitions. For example, I have to prepare my bag and make sure I don't forget anything. When I am nervous, I think what I have learned with *Yellow: Who does not give up will succeed*. I use it when I have to remember my choreographies and while I am doing my school tests. (Laura, fictitious name)

2.5. Strengths, Limitations, and Future Directions

Despite preliminary, these promising results indicate that this intervention could be a valuable tool to address the learning challenges faced by children from low SES backgrounds, thus adding to the SRL corpus of literature. The current study has several strengths, for instance, the use of a school-based intervention with a story–tool, and of writing compositions utilized to measure the variable of academic performance. Regarding the latter, prior research indicates that the use of school-grades as a measure of academic achievement may be controversial (Mullola et al., 2010). In fact, school grades may not be sensitive enough to detect changes in school achievement over a short period of time. Conversely, writing compositions are likely to have been sensitive enough to capture changes on students' performance over said short period.

Limitations of this study pinpoint promising paths for future research. The present study assessed SRL strategies through self-reports, which may not have fully captured the complexity of the on-task challenges within the learning environment (Zimmerman, 2008). Future investigations may

consider data-triangulation of off-task (i.e., self-reports) and on-task (e.g., learning diaries with students' reflections on their own learning process, Panadero et al., 2016) instruments. This strategy is likely to help further capture the procedural nature of SRL as well as the potential of the story-tool in improving SRL strategies in students from low SES backgrounds (see Panadero et al., 2016). What is more, whilst the intervention yielded positive results, future studies could investigate its long-term effects by planning experimental designs with follow-up measures. Future investigations could also consider extending this research by training school teachers to be able to identify students struggling with SRL in early stages and provide them with tools fit to their specific needs. Moreover, acknowledging the strong relationships between family income, parental education, and school achievement (Hair et al., 2015), parents could be involved in future intervention designs. Training parents' SRL competencies may improve their skills, and consequently enable them to have the tools necessary to stimulate their children's SRL competencies.

2.6. **Conclusions**

Literature discusses low SES and its correlates due to their impact on academic progress and school outcomes. A growing body of research shows that effective, tailored, and theoretically guided educational interventions can improve SRL strategies (e.g., Rosário et al., 2016) and subsequently student academic performance (e.g., de Boer et al., 2018). The current study contributes to this body of literature by showing that through the development of a narrative-based intervention focused on the training of SRL strategies, students from low SES backgrounds are empowered with SRL competencies and experience a positive impact on their school success. Current findings are promising, however, SES and its associated complications to individuals' lives in various facets, constitute a complex and urgent societal problem that calls for further research, hopefully to expand on these findings.

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2.8. **Appendix 2**

Table 12. *Intervention program organization*

Session (Book chapter)	Objectives and skills
1 (chapter 1)	Adequate identification of feelings. Recognize the value of effort and commitment in the learning process.
2 (chapter 2-3)	Define planning (i.e., thinking before doing something). Know how and when to conduct a plan. Plan activities in different contexts (e.g., plan how to approach a math exercise).
3 (chapter 5)	Define goal setting (i.e., specific, realistic, measurable). Learn how to set goals and how to divide them in smaller steps. Establish educational and personal goals.
4 (chapter 6)	Identify, define, and apply the three phases of the PLEE model (i.e., Planification, Execution and Evaluation) to tasks.
5 (chapter 7)	Promote peer and collaborative work. Reflect on the challenge and gains of working in group.
6 (chapter 9)	Identification of the students most common behaviour problems (e.g., disobedience, lying). Reflect on the consequences of their behaviour in short- and long-term.
7 (chapter 10)	Analyse the steps of the problem-solving process. Practice the implementation of those steps using specific tasks.
8 (chapter 15)	Behaviour analysis and responsibility assumption. Promote monitoring of self-set goals (i.e., is it going according to plan?). Reflect on the consequences of the absence of planning.
9 (chapter 16)	Discuss the importance of failure for success. Promote the ability to learn from failures and improve next steps, i.e., Evaluation.
10 (chapter 17)	Reflect on the importance of persistence and effort. Evaluate the process and outcome of the story.

Table 13. *Example of the coding scheme for two topics of the composition assessment*

Topic	Codes	Description	
	1- Low quality	The student includes one of the following topics: what happened to who; how; where; why. The story ends abruptly.	
2. Organization of the text – Conclusion	2- Low-medium	The student includes two of the following topics: what happened to who; how; where; why.	
	3- Medium	The student includes three of the following topics: what happened to who; how; where; why.	
	4- Medium-high	The student adequately concludes the story mentioning all the following topics: what happened to who; how; where; why.	
	5- High quality	The student adequately concludes the story mentioning all the following topics: what happened to who; how; where; why. The text perfectly flows.	
13. Spelling errors (for every 50 words)	1- Low quality	+ 7 errors	
	2- Low-medium	5-6 errors	Note: An error that appears several times is counted only once. Words with more than 1 error, count as 1 error.
	3- Medium	3-4 errors	
	4- Medium-high	1-2 errors	
	5- High quality	0 errors	

CHAPTER 3
FROM THE HOSPITAL BED TO THE LAPTOP AT HOME: EFFECTS OF A BLENDED SELF-REGULATED LEARNING INTERVENTION

3.   FROM THE HOSPITAL BED TO THE LAPTOP AT HOME: EFFECTS OF A BLENDED SELF-REGULATED LEARNING INTERVENTION

Abstract

Hospitalization poses diverse challenges to school-aged youth well-being and their educational path. Some inpatients, due to the hospitalization duration, frequency or the needed recovery period at home, may struggle when returning to school. To help youth cope with this challenge, several hospitals have been implementing educational interventions tailored to the school-aged children and adolescents needs. Nevertheless, pediatric inpatients with short stays and/or with a recovery period at home usually do not benefit from these interventions. Therefore, the present study implemented a blended intervention (i.e., face-to-face and online) with the aim of training self-regulated learning competences with hospitalized school-aged adolescents with short hospital stays. The intervention was delivered on a weekly basis for eight individual sessions using a story-tool. Results showed the efficacy of the intervention in promoting adolescent's use of, perceived instrumentality of, and self-efficacy for self-regulated learning strategies. Overall, there was a diferentiated impact according to the participants' age, grade level, grade retention, and engagement in the intervention. These findings support previous research indicating that hospitals can play an important role as educational contexts even for inpatients with short stays. The blended format used to deliver the self-regulation learning training also may be an opportunity to extend these interventions from the hospital to the home context.

Keywords: hospitalization, school-aged children and adolescents, self-regulated learning, school engagement, blended learning, technology, intervention

3.1. Introduction

Being hospitalized, either for extended periods or repeated admissions, poses great challenges to school-aged children's school experience [1], social well-being, and continued educational opportunities [2]. It might also increase the risk for school failure and disengagement from school [2]. Recognizing this impact, several hospitals have been implementing interventions, e.g., [3,4], to address the pediatric inpatients needs (e.g., health-education and curricular content). However, many of these interventions are not available for all inpatients because hospital stays are short and, in some cases, there is a recovery period at home before returning to school [5,6]. In view of this scenario, technology may play an important role [7] in supporting the educational interventions provided to hospitalized

youth [8], specifically those with short hospital stays. The present study describes and evaluates a blended intervention on self-regulated learning (SRL) for hospitalized school-aged youth.

3.1.1. *Hospitalization: Consequences and Impact in General*

Literature on the adverse impact of hospitalization, e.g., [9–11], either short or long term, on children and adolescents' lives is vast. Extant research indicates that hospitalization can be a stressful and traumatic experience for children [12–17] and adolescents [18], with extended implications for the family, e.g., [12,19,20]. Caires et al. [21] refer three main stressors in this context: (i) the distancing of the child from their main life contexts; (ii) the considerable changes in their routines; and (iii) the perceived menace regarding their clinical situation and necessary medical procedures. Incontestably, hospitalization constitutes a disruption on the normalcy of the children and adolescents' everyday lives, placing them at risk of becoming socially isolated from their school community [22], friends, and family [23]. What is more, upon discharge, returning to normalcy may be a challenge [10,24]. Acknowledging the influence that contexts play in child and adolescent development, it becomes crucial to learn the possible consequences that hospitalization may play in their development [20]. A study by Burns-Nader [25] examined children's anxiety, and feelings of dependency, towards either a doctor's appointment or a short hospitalization. Results suggested that, despite the short-term duration of the hospitalization, children still reported feeling more anxious and dependent during this event than in a consultation. Amongst the reasons that could explain children's anxiety regarding hospitalization are contact with strange people, distance from home and family, and the high vulnerability and uncertainty about their health condition in the future [26]. Importantly, the time of admission seems to be the period where patient stress is heightened, which may help explain the anxiety levels exhibited by youth even in short-term hospitalizations [27]. Furthermore, literature indicates that children whose health situation involves short, frequent and/or prolonged hospitalizations, or even recovery periods at home, have fewer opportunities for the stimulation of competences transversal to their daily activities [8,10]. These opportunities for training transversal skills are fundamental for behavioral, emotional, and cognitive self-regulation. This suggests that it is essential to reduce hospitalization time to allow children to return to their normative life contexts [28], and use the hospitalization period, whenever possible, as an opportunity for health recovery and training competences.

3.1.2. *Hospitalization: Impact on the Educational Path of the Adolescent*

In the U.S., about two-thirds of school-aged children miss school due to illness/accident [29],

implying an involuntary withdrawal of school activities that can impact and delay their learning process [30]. In Portugal, it is estimated that school-aged children and adolescents are hospitalized 20,000 days per year [31]. Moreover, in Portugal, in 2017, there were on average 3400 hospitalizations of children between 5 and 9 years old, 7100 of children between 10 and 14, and 9500 of adolescents between 15 and 17. The average length of a hospital stay in Portugal, in 2015, was 3.8 days (5 to 9 years of age), 4.4 days (10 to 14 years of age), and 5 days (15 to 19 years of age) [32]. Furthermore, data from the OECD encompassing all types of internment show that among OECD countries, the average length of hospital stays was approximately 8 days in 2017 [33]. Specifically, Portugal has a general average length of 7.3 days, with Turkey in the lower end with 4.2 days, United States with 5.5 days, and Japan with 16.2 days at the higher end [34].

School represents a significant part of a youth's life [35]. Thus, being hospitalized and missing school has consequences to children's and adolescents' educational path, e.g., [1,35]. For example, literature has mentioned that hospitalized youngsters are more likely to experience learning difficulties [30], which may compromise their academic motivation [36] and entail emotional struggles (e.g., higher risk of psychosocial problems) [37]. Additionally, hospital stays may increase the risk of students disengaging from school, e.g., [2], mostly due to absence from school [38]. This is particularly important, because school disengagement may lead to early school dropout or educational underachievement [23]; academic failure, e.g., [1,39,40]; a lower likelihood of completing compulsory education [41]; or entering university [42]. Lastly, hospitalization may occur during critical transition points, such as starting school or key stages of learning and development, such as the onset of adolescence [2].

3.1.3. *Hospitals as Learning Places*

Hospitals are firstly a health space, but they can also be an educational place [43]. Specifically, pediatric hospitals may play an important role in the developmental and educational well-being of their inpatients by creating inpatient-centered environments embedded with educational opportunities [8,44]. Researchers, stakeholders, and hospital staff recognize the need to provide youth with opportunities to feel that, despite their school absence, they can still learn and practice school subject contents [2,45], thus reducing their isolation [46]. In fact, research identified the need to develop educational programs to mitigate the negative impact of school absence due to hospital stays. These programs should contribute to the maintenance of the relationships of the inpatient with their peers, e.g., [47], and promote students' motivation [48–50], SRL strategies, and school engagement [8,51]. Moreover, as the literature shows, to minimize the emerging difficulties during school re-entry, children

should keep connected with academic and social activities, e.g., [52,53]. This highlights the significant role that engagement with education plays in this process [54]. Thus, by offering educational services, pediatric hospitals promote a continued link with learning [2,43], and maintain some kind of normalcy for their inpatients [55].

3.1.4. *Adolescents and Technology*

Information and communication technologies (ICT) have become an everyday tool among the current generation of children and adolescents when approaching education and learning, socialization, and leisure, both in the school and home contexts [56]. Therefore, the potential of these technologies has been explored in traditional and non-traditional educational settings [2].

In light of the educational needs of hospitalized youth and the importance of ICT among this population, research has been examining the use of technologies to keep youth connected to the school, social, and academic activities [46] through alternative approaches to learning [2,57]. In fact, off-the-shelf technologies are already being used [7] by youths in hospitals [2] and at home while recovering [58]. These technologies may help maintain engagement with the established educational path [59], ease learning, and promote well-being [47,57]. A literature review by Maor and Mitchem [7] confirmed that using technologies to withstand for the hospitalized youth's academic path, as well as to impact on their well-being, are helpful (e.g., the "PEEBLES" program [60]). In this line of thought, the authors reinforce their claim that the use of technology in the hospital context could be an important tool to engage adolescents in learning [61]. Most of these studies used technology to maintain the connection between the hospitalized youngsters and their learning context [49,50,53,62], promoting their motivation to learn and facilitating their return to school. Most importantly, these ICT-based interventions help children engage in learning while in a nontraditional educational setting [49,63,64].

Despite the usefulness of these technologies, researchers warn of the existence of challenges or barriers when using technologies to support the learning needs of hospitalized youth, e.g., [65–67]. Specifically, pediatric patients highlight the following challenges: internet accessibility [50,61,64], technology-based struggles (e.g., maintenance), and lack of privacy [57]. When technologies may be used to facilitate the connection between the hospitalized youngster and the school, teachers also show a reluctance to use them [67]. Moreover, parents have concerns particularly regarding online safety [7] and exposure of the hospitalized child to their classmates [68]. Thus, some researchers alert to the importance of other context-related variables that should be considered when designing interventions. For example, the vulnerabilities and unpredictability of the hospital context, challenges related with the hospital settings, and the handling of health issues (e.g., hospital routine procedures)

[7,55,62]. So, designing and using ICT in the pediatric ward must consider the idiosyncrasies of this specific setting [62].

However, there is still a gap in research regarding how technology can be used to meet the educational and well-being needs of hospitalized youngsters [2]. A systematic review on game technologies for pediatric patients reported that only 16% of the studies using game technology in the hospital context had education as a purpose (i.e., offer information about hospital procedures, educational courses, or a way of connecting with the patient's classroom) [69]. In fact, most of these technologies target specific conditions either for children undergoing specific medical procedures (e.g., venipuncture, a potentially fearful treatment) or for children suffering from a specific pathology (e.g., cancer) [69]. Lastly, despite the existing studies that use technology as a learning tool to support children, there is a lack of studies targeting hospitalized youngsters' school engagement and academic skills promotion.

3.1.5. *The Present Study*

Hospitalization is likely to have a negative impact on children's and adolescents' lives [35,70]. These negative consequences may be amplified for adolescents. Adolescence is commonly known as a critical time in an individual's life [71,72] comprising significant physical, psychological, emotional, and cognitive changes [73,74]. Such changes imply achieving key developmental tasks that pose challenges and are favorable to vulnerabilities and risks [72,75], one of which is the youth's risk of decreasing their school engagement [71,76,77] or becoming disengaged from school [71,78]. By itself, when hospitalized, disengagement with education due to hospitalization [63] adds to the equation. This is a concerning scenario since disengaged students are likely to experience academic distress [79]. Normalizing these adolescent's lives [45] and ensuring they remain engaged in learning opportunities could be a crucial factor in meeting their needs.

School-aged children's educational needs while hospitalized include the difficult connection with school, the need for academic support, low school engagement, and lack of self-regulation strategies [80,81]. Taking into consideration that (i) the average length of hospital stays in Portugal is small (4 to 5 days) [32], and (ii) that, in some situations, there is an insufficiency in tackling the difficulties evidenced by the hospitalized youth regarding study methods needed to cope with school demands, the present study was designed to overcome this difficulty by extending the intervention on SRL after hospital discharge. This type of accompaniment is especially pertinent when patients receive discharge but must stay at home for a period of time for a full recovery.

Therefore, the current investigation delivered an intervention program in a blended learning

format [82,83]. Blended learning integrates face-to-face and online instructional activities aiming to improve and support learning [84]. Despite some challenges presented by this format [85], there is a continued interest in these environments since they offer opportunities for optimizing learning [86]. Besides, Lack's [87] and Wu's [88] reviews on performance outcomes concluded that there is little difference between students who enroll in online or blended courses and those who take face-to-face courses. Anchored on the premise that learning is a continuous process, blended learning should have synchronous and asynchronous moments [83] in which the SRL competencies play a crucial role, e.g., [8,51,89].

All considered, the present study aimed to equip pediatric patients with SRL skills, through a blended format. This training aimed to assist adolescents deal with hospitalization challenges, health issues, recovery, and re-entry into school, and, thus, promote their engagement with school tasks. Our study addressed three main aspects: (i) the negative impact of hospitalization on adolescents and its influence on engagement with school; (ii) the expectation that every setting may be transformed in a learning space; and (iii) the expectation that a blended format can be used to deliver programs to hospitalized adolescents with short hospital stays.

3.2. **Materials and methods**

3.2.1. *Context of the Study*

The inpatient unit where the study was developed is a specialized ward for diagnosis, treatment, and monitoring of youngsters' health conditions. This is a small unit with 30 beds, distributed in two aisles: one for young children (0 to 5 years old) and another for older children and adolescents (6 to 17 years old). The length of the stays varies mainly according to patient's age and health condition, since this unit is not designed for youngsters with chronic illnesses or extreme health conditions. Younger children (0 to 5) stay on average 5 days (SD = 4.63; MIN = 1, MAX = 53), and older children and adolescents (6 to 17) stay on average 4 days (SD = 4.17; MIN = 1, MAX = 58).

3.2.2. *Participants*

Hospitalized adolescents attending the 7th, 8th, and 9th grades were invited to enroll in the present study. Two main reasons guided the option of recruiting inpatient youngsters from these grades: (i) compared to younger fellows, adolescents' level of autonomy in using technology on their own is higher, this being a requirement by online learning environments [90]; and (ii) the learning (e.g., study time management, internal, and external distractors) and developmental demands (e.g., deep adolescence changes and peer group pressure) adolescents face during these school transition years

may pose potential risks to overcome. Fifty-seven youngsters were invited to participate and 20 accepted to enroll (attrition rate 65%); still, only 13 initiated the program (attrition rate 35%), and 10 completed the program (completion rate 77%). The main reasons for not enrolling in the program were related to difficulties to meet ICT inclusion criteria, for example, a lack of internet at home, not having a computer/laptop, or not having one with a camera. Moreover, despite accepting to participate, seven youngsters withdrew from the program before the sessions started due to schedule incompatibility. Of the remaining 13 youngsters who initiated the sessions, three gave up completing the program, one after Session 1, another after Session 3, and the third after Session 6. These dropouts were either due to reasons related with schedule incompatibility (n = 1) or to the inadequacy of the activities to their personal characteristics (e.g., lack of identification with the activities) (n = 2). Participants' ages ranged between 12 and 16 years with a mean age of 13.7 (SD = 1.25). Of the 10 youngsters who completed the program seven were male (70%).

3.2.3. *Theoretical Framework*

The current program followed a model rooted in the social cognitive framework, according to which SRL involves three cyclical and interdependent phases. This cyclical model [91,92] is the foundation of the PLEE (Planning, Execution, and Evaluation) model [89,93], characterized by its recursive nature. Two paths of logic organize the three phases: (i) this process begins with the Planning phase through Execution to Evaluation, and (ii) each phase is informed by the same cyclical logic, containing the three phases in themselves, thus reinforcing the self-regulation logic. The Planning phase precedes the performance of the task and refers to the moment when it is expected that students define their goals and select learning strategies to help them achieve their goals. In the Execution phase the pre-established plan is implemented and monitored. Lastly, the Evaluation phase involves the analysis of the achieved outcome accounting for the established goals. The resulting information is critical to feed and initiate a new cycle and the subsequent tasks.

Assuming an agent role in their learning process enables students to take responsibility and control over their educational path, especially when facing difficulties [80]. Training in SRL strategies provides students with the necessary skills to influence their own cognitive and behavioral functioning [94]. In fact, students who use self-regulation strategies control their cognition, motivation, learning environments, and behaviors through cognitive and metacognitive processes [95]. Furthermore, students trained in SRL strategies (e.g., goal setting) show high school engagement levels and high academic performance [51,96,97].

3.2.4. *Description of the Program*

The present program used a set of educational narratives extracted from *Testas'* *(Mis)adventures* five-book collection [98–102]. This collection was designed to promote 5th through 9th graders' strategic learning through intentional training of SRL strategies. This story-tool collection was developed to support the student's learning and training of SRL strategies and is based on the conviction that SRL can be promoted through narratives and modelling [103]. Thus, chapters have embedded the SRL strategies and, through the reading and analysis of the chapters' contents with the help of a tutor, students learn vicariously. Throughout the books, the main character *Testas* describes how he handles health and school challenges (e.g., time management, memorizing, establishing goals, and asthma) and learning contents, how he helps his schoolmates, and describes his own process of exploring and using self-regulation strategies. Therefore, *Testas* functions as a close behavioral model, although being at the same time distant enough to allow the readers to reflect upon the use of learning strategies and build their own SRL model.

For the purposes of this intervention, all five books from the *Testas' (Mis)adventures* collection [98–102] were read by three researchers who selected the chapters and the activities most suitable for the intervention. The set of chapters and activities was carefully chosen to guarantee a logical sequence so that the theoretical framework could be fully addressed (see Table 14). Furthermore, the chosen activities pertained to academic, health, and daily life content to meet students' learning needs.

Table 14. *Content and SRL strategies organization throughout the programs' sessions*

Sessions	SRL strategies and contents addressed	Examples of activities
Session 1 *Hi! I'm Testas*	- Presentation and definition of session rules - Reflection about the learning process and the youngster's role as a student	- Questions about how the youngster perceives himself/herself as a student
Session 2 *Testas' efforts to explain the PLEE model*	- Initial exploration of the cyclical PLEE model - Transference of the PLEE model to the health context - Planning and management of study time	- Organize *Testas'* explanation of an asthma management situation according to the PLEE phases - To do list - Timetable organization

Session 3 *Planning with Testas*	- Establishing goals (specific, realistic, and assessable) - Long- and short-term goals - Exploration of internal and external distractors	- Establish goals - The Oscars of distractors
Session 4 *I'm Execution, the worker/the working one*	- Reflection about difficulties and obstacles through varied contexts - Definition of strategies to control internal and external distractors and improve attention	- What are my difficulties? - The distracted manual
Session 5 *Let's start executing*	- Introduction to study strategies such as information organization (e.g., summaries), note taking strategies, study strategies (e.g., memorization techniques)	- Notebooks are important - What I should or shouldn't do when taking notes
Session 6 *Test anxiety: remedy is demanded*	- Notebook organization - Preparation strategies for tests - Test anxiety and strategies	- Consolidation activity: Identify the strategies used by each student - Acute test anxiety
Session 7 *Evaluation: D. Antonieta's party gone wrong*	- Plan evaluation regarding different contexts (e.g., personal life, school) - PLEE phases consolidation activity	- Which error did D. Antonieta commit? - Errors as opportunities to re-plan - Consolidation activity: Identify each phase in popular sayings
Session 8 *It's time to say goodbye*	- PLEE phases consolidation activity - Good-bye activity	- PLEE phases in Pancho's story - It´s time to say goodbye. What do you want to say to *Testas*

3.2.5. *Procedure*

Before undertaking the research, the project was approved by the University of Minho Ethics Committee for Research in Social and Human Sciences (CEICSH) (CEICSH 032/2019). CEICSH considered that the project followed requirements for good practice in human research in accordance with the Declaration of Helsinki. Prior to data collection, participants and parents/caregivers gave their

written consent. Codes were assigned to identify the participants to protect confidentiality of the data.

The intervention program was organized in eight weekly individual sessions of approximately 60 minutes each. The development of the blended learning program occurred first in the hospital (face-to-face modality) and proceeded later at home (online modality). Each youngster had, at least, one session while staying hospitalized in the ward and then, after hospital discharge, the program was completed online by using Skype.

Sessions were conducted by two researchers trained on SRL who followed the established protocol. The program sessions were organized in a three-step sequence: (i) discussion and reflection about the chapter (which was delivered to the student before the session took place, except for the first session); (ii) solving practical tasks; and (iii) final reflection on the addressed contents and their application to the student's personal and academic life. During the weekly sessions, the chapters were usually read beforehand by the participants, and the activities provided the opportunity for the youngsters to acquire, practice, and reflect upon their own learning process and the use of SRL strategies.

Repeated measures assessment was carried out in sessions one, four, and eight. Between sessions, a text message was sent to the youngster reminding him/her of the next session by posing a small challenge (e.g., "Hi, how is the reading of the text going? Try to underline the most important ideas (*Testas*'s thought: *Underline? Why so much work? Ok, ok, if I'm told to do so, that's because it must be anyhow useful...*)"). Even though both researchers followed the established protocol, the practical examples provided were tailored to each student and, whenever necessary, some topics were further and deeper approached.

3.2.6. *Implementation Fidelity*

After each session, both researchers completed a report on adherence to the established protocol. A weekly briefing was set in order for researchers to describe the session steps followed, discuss constraints and difficulties faced, and talk about the impact of the activities on students' development. These weekly meetings were supervised by the program coordinators to ensure that the guidelines were followed and guarantee that the program application was as similar as possible. Analysis of the fidelity reports and meetings revealed an agreement of 95%.

3.2.7. *Instruments and Mesures*

3.2.7.1. **SRL Strategies Inventory**

SRL strategies inventory [89,96] assesses the use of SRL strategies through nine items

pertaining to the three PLEE phases: Planning (e.g., I plan before I begin writing. I think about what I want to say and how I need to write it); Execution (e.g., I select a calm place where I can be concentrated to study); and Evaluation (e.g., When I receive a grade, I think of what I can do to improve). Each item is scored on a five-point Likert scale ranging from one (never) to five (always). Cronbach's alpha of the scale was 0.84.

3.2.7.2. **Self-Efficacy for SRL**

Students' belief in their capabilities to regulate their own learning through a variety of learning strategies was assessed by means of a 10-item questionnaire [89,103]. Each item begins with the phrase "How well can you..." completed with statements such as "...use strategies to comprehensively memorize the study material" or "...establish school goals for each subject and a plan to achieve those goals". These items were responded according to a five-point Likert scale ranging from one (not very well) to five (very well). Cronbach alpha of the scale was 0.89.

3.2.7.3. **Perceived Instrumentality of the SRL Strategies**

This questionnaire access instrumentality or perceived utility of the SRL strategies in the academic context through 10 items. Each item begins with the phrase "How useful you think it is to you to..." completed with the same statements as the Self-efficacy for SRL questionnaire. These items were responded according to a five-point Likert scale ranging from one (not very useful) to five (very useful) [89]. Cronbach's alpha of the scale was 0.81.

3.2.8. *Data Analysis*

Table 15 provides the descriptive statistics for SRL, self-efficacy (SE), and perceived instrumentality (INST) across time. In general, findings from the Shapiro–Wilk test (fit for small samples [104,105]) indicate that all variables were reasonably normally distributed; in fact, the examination of the skewness and kurtosis statistics indicated that all values were within the range of ± 2 [106]. For this reason, the parametric statistic was used. A Pearson correlation was used to analyze the relationships between the quantitative variables, while a Student's t-test for related samples was used, for example, to examine the maturation effect. The analysis of the effect of the intervention in distinct subgroups comprised by the variables age, school year, grade retention, and engagement in intervention was conducted by analyzing the interaction (time (pre and post measures) x group) with a partially repeated measures ANOVA (DMPR) using gain scores (GS). DMPR allows to evaluate which group changes significantly over time and the GS analysis informs whether groups are distinct regarding time [107].

Following the What Works Clearinghouse [108] recommendations, the magnitude of the findings was evaluated using the value of the statistical significance (p value), the d of Cohen, and the improvement index. The improvement index (% Nov) indicates the percentage of non-overlapping of data in the groups in comparison or of the measures being compared within the same group [91]. Following Cohen [109], a "small" association is defined as $\eta p2 = 0.010$ (equivalent to Cohen's $d = 0.20$), a "medium" association is $\eta p2 = 0.059$ (equivalent to Cohen's $d = 0.50$), and a "large" association is $\eta p2 = 0.138$ (equivalent to Cohen's $d = 0.80$). The % Nov as follows: <7% insignificant distance; approximately 33% = medium; 57.4% = large; and >51% = very large. Finally, correlations equal or higher than 0.70 were considered relevant [110,111]. The analyses were run using SPSS V25 (IBM, Armonk, NY, USA).

3.3. **Results**

Results of the current study are presented in five sections. In the first three, relevant information is provided to assess whether there are enough guarantee conditions for the analysis of our main hypotheses, while in the last two the effect of the intervention is examined. Specifically, information is provided regarding the sample, the experimental reactivity, and the regression to the mean, as well as to the presence, or not, of experimental maturation. After checking the above, findings on the effectiveness of the intervention are presented (section 3.4). Finally, as complementary analyzes, data on the effect of the intervention on SRL, SE, and INST depending on other variables, such as age, grade level, grade retention, and engagement in intervention, was examined (section 3.5).

The corresponding data are presented in three Tables (i.e., Tables 15–17). Table 15 provides the descriptive statistics for the variables SRL, SE, and INST in the three moments, and for each of the subgroups formed according to the variables age, grade level, grade retention, and engagement in intervention. The evaluation of the equivalence in the pretest measures has been established based on the criterion recommended by What Works Clearinghouse [112].

3.3.1. *Description of the Profile of the Sample and Exam of the Relationships between the Variables Taken*

Participants were students struggling to learn and succeed in school. For example, out of the 10 participants, half had repeated a school year. Acknowledging this educational scenario, we grouped the current sample according to age (A1 = 12–13 years old ($n = 4$); A2 = 14–16 years old ($n = 6$)), grade level (GL1 = 7 ($n = 6$); GL2 = 8–10 ($n = 4$)) and grade retention (NGR = students with no grade retention ($n = 5$); GR = students with grade retention ($n = 5$)). The four students in A1 were enrolled in

the 7th grade and half had repeated one school grade. The six students in A2 were engaged in different grade levels (7–10), and half had repeated a school year, two of them twice. Moreover, age and grade level showed a moderate and negative correlation with SRL1 and ($r = $ -0.568; $p = $ 0.087 and $r = $ -0.423; $p = $ 0.224, respectively) and SE1 ($r = $ -0.612; $p = $ 0.060 and $r = $ -0.692; $p = $ 0.026, respectively), but not with the same variables in the following moments (e.g., SRL2 and SRL3) nor with any measure of the variable INST (see Table 15).

Table 16 presents descriptive statistics for the variables SRL, SE, and INST for the three moments; correlation of the age and grade level variables with SRL, SE, and INST in the three temporal moments; correlation of SRL, SE, and INST in the first and last moments; the Student t-test for related samples (Mid-Pre); and the Student t-test for related samples (mean of the pre and mid measurements and post-intervention measure: Post-m2Pre).

Table 17 presents the results of the partially repeated measures ANOVA and the analysis with change scores (variables between groups: age, grade level, grade retention, and engagement in intervention).

Table 15. *Descriptive statistics of the variables SRL, SE, and INST for the whole sample in the three measurement occasions, and for each one of the subgroups formed according to the variables age, grade level, grade retention and engagement in intervention*

	Pre	Mid	Post	Mid-Pre	MD$_g$ Pre	MD$_g$ Mid	m2Pre	Post-mMid
SRL								
TS	3.83(0.70)	3.93(0.25)	4.4(0.43)	0.09(0.63)			3.87(0.42)	0.53(0.32)
A1	4.19(0.28)	3.84(0.24)	4.25(0.40)	−0.35(0.18)	0.60	0.13	4.01(0.24)	0.23(0.26)
A2	3.59(0.82)	3.98(0.27)	4.52(0.44)	0.38 (0.65)			3.78(0.51)	0.73(0.14)
GL1	3.93(0.76)	3.83(0.27)	4.28(0.47)	−0.09(0.58)	0.23	0.22	3.87(0.48)	0.40(0.33)
GL2	3.69(0.69)	4.06(0.16)	4.61(0.29)	0.36 (0.67)			3.87(0.37)	0.73(0.18)
NGR	4.04(0.53)	3.93(0.27)	4.38(0.49)	−0.11(0.30)	0.42	0	3.98(0.33)	0.39(0.25)
GR	3.62(0.85)	3.93(0.26)	4.44(0.41)	0.30 (0.72)			3.77(0.51)	0.67(0.24)
ENG1	3.19(0.85)	3.88(0.33)	4.30(0.45)	0.68 (0.69)			3.53(0.54)	0.77(0.25)
ENG2	4.08(0.59)	3.97(0.12)	4.47(0.29)	−0.11(0.53)	0.96^	0.04	4.02(0.33)	0.45(0.29)
ENG3	4.15(0.28) ^	3.92(0.38)	4.44(0.68)	−0.23(0.32			4.03(0.29)	0.41(0.38)
SE								
TS	3.92(0.69)	4.04(0.44)	4.44(0.36)	0.12 (0.63)			3.98(0.48)	0.46(0.49)
A1	4.35(0.64)	4.05(0.66)	4.30(0.41)	−0.30(0.24)	0.71	0.012	4.20(0.63)	0.10(0.32)
A2	3.63(0.60)	4.03(0.30)	4.53(0.32)	0.40 (0.26)			3.83(0.33)	0.70(0.45)
GL1	4.17(0.62)	4.02(0.51)	4.32(0.35)	−0.15(0.37)	0.61	0.05	4.09(0.53)	0.22(0.44)
GL2	3.55(0.69)	4.08(0.38)	4.63(0.31)	0.52 (0.79)			3.81(0.38)	0.81(0.36)
NGR	3.86(0.44)	3.84(0.43)	4.40(0.42)	−0.02(0.52)	0.12	0.40	3.85(0.34)	0.55(0.36)
GR	3.98(0.93)	4.24(0.39)	4.48(0.33)	0.26 (0.77)			4.11(0.59)	0.37(0.63)
ENG1	3.70(1.18)	4.33(0.51)	4.70(0.17)	0.63 (0.80)			4.01(0.81)	0.68(0.64)
ENG2	4.10(0.56)	3.98(0.21)	4.15(0.06)	−0.12(0.57)	0.40	0.35	4.03(0.30)	0.11(0.32)
ENG3	3.90(0.36)^	3.83(0.59)	4.57(0.49)	−0.06(0.35)			3.86(0.45)	0.70 (0.35)
INST								
TS	4.17(0.52)	4.23(0.45)	4.53(0.44)	0.06(0.46)			4.2(0.46)	0.33(0.32)
A1	4.15(0.66)^	4.32(0.68)	4.43(0.54)	0.17 (0.28)	0.33	0.15	4.23(0.65)	0.19(0.14)
A2	4.18(0.48)	4.17(0.27)	4.60(0.40)	−0.01(0.31)			4.17(0.35)	0.42(0.38)

GL1	4.25(0.56)^A	4.27(0.56)	4.42(0.43)	0.01(0.33)	0.20	0.09	4.25(0.53)	0.16(0.25)
GL2	4.05(0.52)	4.18(0.29)	4.70(0.48)	0.12(0.28)			4.11(0.39)	0.59(0.23)
NGR	3.82(0.44)^A	4.06(0.48)	4.46(0.59)	0.24(0.30)	0.70^*[1]	0.34	3.94(0.43)	0.52(0.25)
GR	4.52(0.34)^A	4.40(0.39)	4.60(0.29)	−0.12(0.17)			4.46(0.35)	0.14(0.28)
ENG1	4.73(0.25)^A	4.60(0.35)	4.70(0.36)	−0.13(0.15)			4.66(0.29)	0.03(0.30)
ENG2	3.93(0.43)	4.15(0.37)	4.38(0.26)	0.22(0.41)	0.80^*[1]	0.45	4.03(0.34)	0.34(0.14)
ENG3	3.93(0.46)^A	3.97(0.51)	4.57(0.75)	0.03(0.15)			3.95(0.48)	0.62(0.28)

Note: TS = total sample; A = age. A1 and A2, 12–13 years old (n = 4) and 14–16 years old (n = 6), respectively; GL = grade level. GL1 and GL2, 7th grade (n = 6) and 8th–10th grades (n = 4), respectively; GR = grade retention. NGR and GR, no grade retention and grade retention, respectively (n = 5 in both); ENG = engagement in intervention. ENG1, ENG2 and ENG3, null (n = 3), high (n = 4) and very high (n = 3), respectively; A = standard deviation less or equal in the first measure Pre than in the second one; |MDg| = mean absolute differences between the groups defined by the variables: age, grade level, grade retention and engagement (in this case, between the two most extreme means) in the variables SRL, SE, and INST in the measurements Pre and Mid; ^ = if |MDg| > 0.05ED = if |MDg| is greater than 0.05 standard deviations in absolute value (based on the variation of that characteristic in the pooled sample). The values 0.05SD are (in Pre: SRL = 0.73; SE = 0.72; INST = 0.54) and (in Mid: SRL = 0.26; SE = 0.46; Inst = 0.47); * = statistically significant difference of means applying Benjamini–Hochberg correction for multiple outcome measures tested with multiple comparison groups like Table 16. In this case M = 24; [1] = (p = 0.023; pB-H = .010); rest, see Tables 15 and 16.

Table 16. *Descriptive statistics, correlations, and results for testing the maturation and intervention hypothesis*

	Pre	Mid	Post	Mid-Pre	m2Pre	Post-m2Pre
Descriptive statistics [1]						
SRL	3.83 (0.70)	3.93 (0.25)	4.4 (0.43)	0.09 (0.63)	3.87 (0.42)	0.53 (0.32)
SE	3.92 (0.69)	4.04 (0.44)	4.44 (0.36)	0.12 (0.63)	3.98 (0.48)	0.46 (0.49)
INST	4.17 (0.52)	4.23 (0.45)	4.53 (0.44)	0.06 (0.30)	4.2 (0.46)	0.33 (0.32)

Correlation of the variables age and grade level with the variables SRL, SE and INST in the three measurement occasions

	Grade Level	SRL1	SRL2	SRL3	SE1	SE2	SE3	INST1	INST2	INST3
Age	0.846 **	−0.568 [2]	0.362	0.327	−0.612 [3]	0.246	0.354	0.138	−0.002	0.237
Grade L.	1	−0.423 [4]	0.376	0.222	−0.692*	0.100	0.241	−0.138	−0.072	0.163

Correlation of the variables SRL, SE and INST to each other on the first and last measurement occasion (left and right respectively)

	SRL1	SE1	INST1		SRL3	SE3	INST3
SRL1	1	0.735 *	−0.109	SRL3	1	0.416	0.788 **
SE1		1	0.326	SE3		1	0.783 **

Paired Student's *t*test[5] for mid-pre. Test of the maturation hypothesis

	$R_{\text{Pre-Mid}}$	$\overline{Y}_D$	$\overline{X}_{SD}$	T	p	95% CI$_D$ (ll)	95% CI$_D$ (ul)	$p_{\text{B-H}}$	d [6]	% N$_{ov}$
SRL	0.454	0.092	0.199	0.460	0.656	−0.359	0.543	–	0.151	7.7%
SE	0.427	0.120	0.202	0.594	0.567	−0.337	0.577	–	0.201	14.7%
INST	0.817	0.060	0.096	0.627	0.546	−0.156	0.276	–	0.12	7.7%

Paired Student's *t*test [5] for Post-m2Pre. Test of the effect of the intervention hypothesis

	$R_{\text{m2Pre-Post}}$	$\overline{Y}_D$	$\overline{X}_{SD}$	T	p	95% CI$_D$ (ll)	95% CI$_D$ (ul)		d [6]	% N$_{ov}$
SRL	0.721	0.532	0.100	5.302	0.000	0.305	0.759	0.008	1.252	62.2%
SE	0.339	0.460	0.156	2.956	0.016	0.108	0.812	0.016	1.075	58.9%
INST	0.754	0.330	0.101	3.271	0.010	0.102	0.558	0.025	0.726	43%

Note: Block 1 (top of the Table): descriptive statistics of the variables SRL, SE, and INST in the whole sample in the three measurement occasions. Block 2: correlation of the variables age and grade level with the variables SRL, SE, and INST in the three measurement occasions. Block 3: correlation of the variables SRL, SE and INST to each other on the first and last measurement occasion (left and right respectively). Block 4 and Block 5: Statistics derived from the paired Student's *t*test for Mid-pre related samples, and for Post-m2Pre related samples respectively. Pre, Mid and Post = pre-treatment 1 and 2, and post-treatment measure; [1] = in Table cells mean (standard deviation); Mid-Pre = mean of the change scores between mid and Pre; m2Pre = mean of the two measures Pre; Post-m2Pre = mean of the change scores between Post and m2Pre; [2,3], and [4] = p = 0.087, p = 0.060 and p = 0.224, respectively; y; * and ** = $p < 0.05$ and $p < 0.01$ (2-tailed); [5] = degree of freedom (*df*) = 9; $R_{\text{Pre-mid}}$ y $R_{\text{m2Pre-Post}}$ = Pearson correlation between Pre and Mid, and between m2Pre and the Post, respectively; $\overline{Y}_D$ = difference between means; $\overline{X}_S$ = pooled *standard deviation*; t = *t*test value; p = p value; 95% CI$_D$ =

95% confidence interval of the difference (ll-ul = lower and upper limits respectively); $p_{\text{B-H}}$ = Benjamini–Hochberg correction for multiple outcome measures tested with a single comparison group, $p'_x = {x\alpha}/{M}$ (where x is the rank for px, with x = 1, 2, ..., m; m is the total number of tests, 6 in this case, and α is the target level of statistical significance, 0.05) [113]; [6] = effect size calculated by Cohen's d corrected for paired t-test ([114]; see [115] (p. 228)); % N_{ov} = percent of non-overlap [109] (pp. 21–23) or improvement index [108] (p. 15).

Table 17. *Results of the interaction effect in the mixed-design ANOVA, and results of the analysis of change scores between groups of variables: age, grade level, grade retention, and engagement in intervention*

| | Mixed-design ANOVA (interaction effect) | | Change Scores [B,] | |
	Summary statistics of the model [A]	Simple effects	Summary statistics of the model [C]	MD
	SRL			
Age	F = 16.1; MSE = 0.019; p = 0.004; $d^{[1]}$ = 2.54; % N_{ov} > 90%; 1–β = 0.937; $p_{\text{B-H}}$ = 0.027	A1 = *Post-Pre[D] = 0.231; p = 0.045; $p_{\text{B-H}}$ = 0.050 A2 = *Post-Pre = 0.733; p = 0.000; $p_{\text{B-H}}$ = 0.056	MSE = 0.038; d = 2.58; % N_{ov} > 90%	*A2–A1 = 0.502
	SE			
Age	F = 5.25; MSE = 0.082; p = 0.051; $d^{[2]}$ = 1.49; % N_{ov} = 73.1%; 1–β = 0.522; $p_{\text{B-H}}$ = 0.055	A1 = — A2 = *Post-Pre = 0.700; p = 0.003; $p_{\text{B-H}}$ = 0.022	MSE = 0.164; d = 1.478; % N_{ov} = 70.7%	*A2–A1 = 0.600
Grade level	F = 4.90; MSE = 0.084; p = 0.058; $d^{[3]}$ = 1.40; % N_{ov} = 70.7%; 1–β = 0.647; $p_{\text{B-H}}$ = 0.066	GL1 = — GL2 = *Post-Pre = 0.812; p = 0.004; $p_{\text{B-H}}$ = 0.027	MSE = 0.169; d = 1.427; % N_{ov} = 68.1%	*GL2–GL1 = 0.588
	INST			
Grade level	F = 7.46; MSE = 0.030; p = 0.026; $d^{[4]}$ = 1.73; % N_{ov} = 79.4%; 1–β = 0.801; $p_{\text{B-H}}$ = 0.044	GL1 = — GL2 = *Post-Pre = 0.587; p = 0.001; $p_{\text{B-H}}$ = 0.011	MSE = 0.059; d = 1.762; % N_{ov} = 75.4%	*GL2–GL1 = 0.429
Grade retention	F = 5.20; MSE = 0.035; p = 0.052; $d^{[5]}$ = 1.44; % N_{ov} = 73.1%; 1–β = 0.669; $p_{\text{B-H}}$ = 0.061	GR = — NGR = *Post-Pre = 0.520; p = 0.002; $p_{\text{B-H}}$ = 0.016	MSE = 0.069; d = 1.442; % N_{ov} = 68.1%	*NGR–GR = 0.380
Engagement in intervention	F = 4.41; MSE = 0.029; p = 0.058; $d^{[6]}$ = 1.90; % N_{ov} = 81.1%; 1–β = 0.719; $p_{\text{B-H}}$ = 0.066	ENG1 = *Post-Pre = 0.033; p = 0.817; ENG2 = *Post-Pre = 0.338; p = 0.026; $p_{\text{B-H}}$ = 0.044	MSE = 0.058; d = 2.01; % N_{ov} > 81%	*ENG2–ENG1 = 0.364 *ENG3–ENG2 = 0.279 *ENG3–ENG1

ENG3 = *Post-Pre = 0.617; p = 0.003; $p_{\text{B-H}}$ = 0.022		= 0.583

Note: A = age. A1 and A2, 12–13 years old (n = 4) and 14–16 years old (n = 6) respectively; GL= grade level. GL1 and GL2, 7 grade (n = 6) and 8–10 grades (n = 4), respectively; GR = grade retention. NGR and GR, no grade retention and grade retention, respectively (n = 5 in both); ENG = engagement in intervention. ENG1, ENG2 and ENG3, null (n = 3), high (n = 4), and very high (n = 3), respectively; F, MSE= Interaction effect, F value, and mean square error (MSE), respectively; ^{A}= the df are 1 and 8 in all the comparisons except in ENG which are 2 and 7 for the interaction effect and the *error term* (contrast term) respectively; d^{1-6}= η^2 has been transformed into Cohen's d (according to [109]). The partial η^2 values respectively are 0.667, 0.397, 0.380, 0.483, 0.394, 0.558; ^{B}= t = $\sqrt{F}$ of the Mixed-design ANOVA, in order from top to bottom in the Table, 4.01, 2.29, 2.21, 2.73, 2.28 y 4.41 respectively. The p-value is also the same; ^{C}= the calculation Cohen's d for change scores has been made according to [116] p. 119); ^{D}= in this table is m2Pre (see Table 15); $1-\beta$= the empirical power of the statistical test; * = indicates the highest mean; MD = mean differences; $p_{\text{B-H}}$= Benjamini–Hochberg correction for multiple outcome measures tested with multiple comparison groups, = $(^{i}/_{M})Q$ (where i = the individual p-value's rank; M = total number of tests -in this case, they are 15 for each variable. In total they are 45-, and Q = the false discovery rate (a percentage, chosen by you, the calculation for the critical value with a false discovery rate of 25%) [111]. Rest, see Table 15.

3.3.2. *Evaluation of the Experimental Reactivity and Regression to Mean*

Table 15 shows that standard deviations of SRL1 and SE1 are much higher than those of the SRL2 and SE2. Moreover, we found low correlations between both measures in the first and second measures (i.e., *pre* and *mid*), see Table 17. Analyzing both findings we concluded a strong reactivity in the first measure (i.e., *pre*), but not in the second measure (i.e., *mid*); that is there is no evidence that participants are altering their performance because of the attention that the study focuses on them. Furthermore, regression to the mean is not occurring because variance is not stable in the measures pre and mid. Regarding the variable INST, despite the stability of the variance, we found a strong correlation between the measures pre and mid which prevents regression to the mean. We can conclude no experimental reactivity for this variable.

3.3.3. *Evaluation of Experimental Maturation*

Irrespective of the variables, no statistical differences for the measures *pre* and *mid* were found (see Table 16). Moreover, we found a low effect size for SE (d = 0.20) and an even lower for SRL and INST (d = 0.15 and d = 0.12, respectively). Analyzing these findings together with those of the correlations between the three variables in the measures pre and mid (i.e., strong relationship between SRL and SE, but not with INST) we did not find an experimental maturation effect regarding the variable INST. This means that we found evidence that participants are not improving as a function of the

passage of time independently of treatment. Regarding SRL and SE, the low correlation between the pre and mid measures, and the high standard error mean (XS = 0.199 and XS = 0.202, respectively) when compared with INST (XS = 0.096) may indicate that, within this time frame, participants were behaving distinctly. This result may be due, for example, to participants' grade retention distinct experiences.

3.3.4. *Evaluation of the Efficacy of the Intervention*

We found statistically significant differences for SRL, SE, and INST between the pre, mid, and post measures (SRL: t = 5.302, p < 0.001; SE: t = 2.956, p < 0.05; INST: t = 3.271, p < 0.01; see Table 16), in favor of the posttest in the three variables. We found very high effect sizes for SRL and SE (d = 1.252 and d = 1.075), and high for INST (d = 0.726). Considering this result together with the correlation between the two pre measures and the post measure, we may conclude that the intervention was efficacious in promoting participants SRL and INST. Results were slightly higher for SRL, which may indicate the sensitivity of the measure in capturing the effect of the intervention. Regarding the variable SE, despite the high effect size, the XS has not diminished when compared with the maturation test, and the correlation between the pre, mid measures and the post measure is practically irrelevant. Moreover, the strong correlation between both SE measures, pre and post, with INST and the low correlation between the same measures with SRL may be indicating that the intervention helped students became more SE, but in a complementary way to SRL.

3.3.5. *Evaluation of the Efficacy of the Intervention Considering Age, Grade Level, Grade Retention, and Engagement in Intervention*

Despite a general positive impact of the intervention, data stressed distinct ways participants may improve in their self-regulation processes. To further analyze these differences and deepen our knowledge on the distinct impact of the intervention, we conducted ancillary analysis to examine the engagement of participants in the intervention. The aim was to learn how the effects of the intervention on SRL, INST, and SE could be related to participants' Age, Grade Level, Grade Retention, and Engagement in Intervention.

As previously explained, age, grade level, and grade retention were organized in two levels, and engagement in intervention in three levels. The variable engagement in intervention was built considering three aspects: attendance, punctuality, and homework completion. Participants were gathered in three groups as follows: strong engagement group (E3), including participants who attended all sessions, were punctual, and did all the homework assigned in the sessions (n = 5).

Regular engagement group (E2), comprising students who, despite attending all sessions, were not always punctual, nor did all the homework ($n = 4$). Lastly, the low engagement group (E1), comprising students that attended all sessions but were never punctual and did homework occasionally ($n = 3$). Table 16 shows the results on the effect of the variables age, grade level, grade retention, and engagement in intervention on SRL, SE, and INST.

Data from the partially repeated measures ANOVA (see Table 17) show that age, grade level, grade retention, and engagement in intervention interact in a significant way with the effect of the intervention on the dependent variables (SRL, SE and INST). However, it is noteworthy that the independent variables (i.e., age, grade level, grade retention, and engagement in intervention) influence the three dependent variables differently. Specifically, the effect of the intervention on SRL is related to age ($F = 16.10$, $p < 0.01$, $d = 2.54$); the effect of the intervention on SE is related both with age ($F = 5.25$, $p = 0.051$, $d = 1.49$) and grade level ($F = 4.90$, $p = 0.058$, $d = 1.40$), although in this case the significance is marginal; and the effect of the intervention on INST is related with grade level ($F = 7.46$, $p < 0.05$, $d = 1.73$), grade retention ($F = 5.20$, $p = 0.052$, $d = 1.44$), and engagement in intervention ($F = 4.41$, $p = 0.058$, $d = 1.90$). These results are consistent with those from the partially repeated measures ANOVA (already commented) and those from the change scores (in Table 16 see a comparison of the effect sizes of the relationships).

Finally, we addressed the particular ways how the interaction of the covariates (age, grade level, grade retention, and engagement in intervention) are related with the effect of the intervention on SRL, SE, and INST (see effects in Table 17). The analysis of the variables SRL and SE indicates that the intervention was effective depending on the age of participants. For example, older students scored higher in both variables. Data showed that the measure of SRL is likely to capture differences in students with younger ages as well as in older students, while SE only captured differences in older students (see Table 17).

Regarding the variable grade level, data from SE (marginally statistically significant, see Table 16) and INST ($p = 0.026$) show that students in GL2 benefited more from the intervention than students in GL1; in fact, students in GL1 did not improve their SE and INST.

Data from the variable INST shows that the effect of the intervention is related to the engagement in intervention in the sessions. The more the students were engaged in the program, the more their perception of instrumentality. Moreover, the impact of the program on students displaying low engagement was not statistically significant.

Interestingly, data presented in Table 17 regarding the three dependent variables (SRL, SE,

and INST) show that older students and students in higher grade levels, when compared with younger counterparts, are those who benefited more from the program. Besides, focusing on the variable INST data shows that students with no grade retentions are those who benefited more from the intervention. Finally, we highlight as important findings the high effect sizes and the high improvement index (see Table 17), even in results statistically marginally significant [108].

3.4. **Discussion**

The present study aimed to describe and evaluate a blended learning intervention on SRL for hospitalized school-aged adolescents. The program had two sequential formats: it was delivered firstly face-to-face on-site and, upon discharge, continued online at home. This way, the present program addressed the youth educational needs and considered the context particularities regarding and unpredictability already addressed. The worldwide recommendations [117] regarding development and implementation of programs for pediatric inpatients were also considered.

3.4.1. *Main Results*

Globally, the intervention was efficacious in promoting participants' use of SRL strategies and in improving their perceived instrumentality of SRL strategies. Furthermore, results indicate that adolescents' self-efficacy for SRL improved, but in a complementary way to SRL. These findings extend previous research that reports the benefits of participating in SRL training programs using story-tools, e.g., [51,89,96,118], and in hospital-based psychoeducational interventions [4,8]. Additionally, results are consistent with literature showing that adolescent SRL strategies can be enhanced with appropriate training [79,96] and methodologies (e.g., story-tools and SRL-based activities), even when there are a limited number of sessions [79].

Although the core goal of the intervention was the promotion of SRL competencies, results indicate that adolescents became more self-efficacious in a complementary way to SRL. In fact, the self-regulatory processes are influenced by motivational beliefs [92], self-efficacy being an important variable in SRL [119]. Specifically, the personal use of SRL strategies is related to one's self-efficacy beliefs, i.e., there is a positive relationship between one's perception of competence and the exercise of that competence [120–123]. Moreover, research shows that training in self-regulatory skills can increase students' self-efficacy beliefs [123] and academic achievement [124]. Additionally, to this general approach to data, findings will be further discussed in relation to the learning context and the differential impact of the program.

3.4.2. *Hospital Context*

Literature suggests that SRL is context dependent [125], proposing that the enactment on SRL strategies by a student may be influenced by the singular characteristics of the learning environment. It is important to acknowledge that participants improved their use of and their perceived instrumentality of SRL strategies, engaged in the program while hospitalized, later at home when recovering, and/or subsequently when re-entering school.

Findings of the present study are consistent with previous research that used tailored programs as a mean to address the educational needs of hospitalized youth, e.g., [8,10,126]. Typically, current educational interventions are implemented in the context of Hospital Schools for inpatients with long or repeated admissions [127]. The program implemented acknowledges the need to address the educational challenges faced by adolescents who have a short hospital stay and are discharged to recover at home and/or return to school. Following a preventive approach [8] and the SRL literature recommendations, e.g., [128], the program aimed at SRL competence promotion, highlighting adolescents' proactive role in an ecological environment. Additionally, these SRL competences enable youths to face situations that are crucial for their engagement in education.

3.4.3. *Format of Delivery: Face-To-Face, Online and Blended*

In the field of clinical psychology, several authors have been researching online therapy and comparing it to face-to-face therapy. A systematic review and meta-analysis by Carlbring and colleagues [129] show that both formats are equally effective. Cognitive behavioral therapy delivered online also has been considered a promising way to increase access to the treatment [130], particularly among young patients [131]. Overall, there is a voluminous work on internet-based interventions that support its use for delivering psychotherapy for mental disorders [132].

In recent years, educational psychology has also been exploring the field of online interventions. Cerezo and colleagues [133], and Núñez and colleagues [134], used a virtual format to deliver a training program in SRL strategies for college students with positive impact on their academic success. Even though the participants were from a different educational and developmental level, this corpus of findings together with the present study are promising in that ICT is a viable platform to deliver training in SRL strategies.

To the best of our knowledge there is limited research on blended educational interventions bridging the hospital to home while adolescents are still recovering their health. Findings of the present study add to Spanjers and colleagues' [86] research reinforcing that the blended format offers opportunities to improve learning.

3.4.4. *Differential Impact of the Program*

Despite a general positive impact of the intervention, data stressed distinct ways participants may improve in their self-regulatory processes. Findings showed a differential impact of the program as a function of the age, grade level, grade retention, and engagement in intervention. Analyzing these differences is, therefore, crucial to shed light on how hospitalized or in recovery adolescents self-regulate their learning, perceive SRL strategies usefulness to achieve their goals, and report themselves as self-efficacious in using them.

3.4.4.1. **Age**

The results of the present study indicate that older adolescents showed less SRL competencies and self-efficacy at the beginning of the intervention and were the ones who had better scores on both variables at the end of the program. Hence, older adolescents were the ones who benefited the most with the intervention comparing to their younger counterparts. These results are not consistent with those of previous research. A meta-analysis on self-regulation training programs indicates that younger students benefit more from interventions designed to promote study skill competences [129]. Research also shows that it is easier to teach SRL strategies to younger students as they are on the onset of building their own set of learning strategies and self-efficacy perceptions [79,135]. In fact, SRL strategies are amenable to be taught [48,136], but they require that the student assume an agent role, which is crucial for the development of the SRL process. Personal agency develops throughout life, but it is on the onset of adolescence that students begin to develop agency as they are expected to assume responsibility for their learning process at this stage [137]. Moreover, a robust sense of personal agency is anchored in self-efficacy beliefs in one's self-regulative skill to achieve goals [137]. As current data indicates, younger participants show lower SRL and self-efficacy than their counterparts, which may be indicating that they are in the process of developing an agent role. Younger adolescents also might have been more concerned with their hospitalization [9], whereas older ones, when faced with absence from school and the fear of falling behind, may have been more open to broaden their strategy repertoire. Moreover, it is important to reflect upon the fact that the intervention was, in part, delivered through technology. Older participants may have digital literacy further developed, thus being more ready to learn through a digital means. Digital literacy implies the use of digital tools to communicate effectively with others and create meaning [138], for which metacognitive and self-regulated skills are needed [139].

3.4.4.2. **Grade Level**

Adolescents from higher grade levels, when compared to their counterparts in the 7th grade, showed better scores on self-efficacy and instrumentality whereas those in the 7th grade did not improve on these variables. Participants were likely to perceive their schoolwork as an important way to achieve success as they progressed from the 7th to 10th grade. Current data, in contrast to prior studies, which found that self-efficacy for SRL decreases as youths progress through school, e.g., [140], are consistent with recent findings by Shin and colleagues [141] who found that overall students' perceived instrumentality increased over time. Self-efficacy and instrumentality influence the way students approach their learning process. Specifically, intentional training on learning strategies is closely related to students' self-efficacy beliefs [140] and to its perceived utility to improve the learning process. Instrumentality of SRL strategies and the perceived demands of the learning context play an important role on the learning process [89] and may help explain students' learning process. In fact, adolescents involuntary distancing from school, due to hospitalization, presented additional challenges to the intervention that may have spurred the usefulness of the SRL strategies.

3.4.4.3. **Grade Retention**

Results indicate that students with no grade retentions improved more on their instrumentality when compared to the students that failed at least one academic year. This result poses an educational challenge since students with grade retentions do not seem to be fully grasping the utility of using SRL strategies as a mean to deal with academic challenges (e.g., time management and note taking). Instrumentality is key because students with strong perceptions of instrumentality are aware of the importance of present tasks for future goals, e.g., [142].

The interruption on their normal lives due to hospitalization added new challenges to their academic path; note that these adolescents were students with a record of grade retention, which might have hindered their availability to understand the instrumentality of the SRL strategies they were learning. The SRL contents discussed in the program might also not have met their expectations and immediate academic challenges, possibly focused on recovering their health. Overall, these results call for a careful analysis and alert for the importance of considering the specificities of the participants' academic background in future studies.

3.4.4.4. **Engagement in Intervention**

Interestingly, data show that students improved their perception of the instrumentality of SRL strategies when they were more engaged in the program. Perceiving the usefulness of the SRL

strategies for the learning process is a critical motivational variable for the student's engagement in learning [79,143]. Engagement pertains to the involvement in an activity which entails personal investment and instrumentality pertains to the perception of usefulness. Both may be promoted through the opportunity to experience success while participating in the program [51,96]. Engaging in the program and having the opportunity to learn the nature of the SRL strategies, how, and when to use them effectively, may have also provided adolescents with the opportunity to practice these strategies allowing to perceive their utility. When adolescents understand the instrumentality of using SRL strategies to achieve their self-set goals, they are more likely to use them, e.g., [119], and to achieve success.

3.5. **Limitations, Future Research, and Educational Implications**

The preliminary results of this study should be interpreted with caution considering the limitations and challenges faced along the implementation. Despite the difficulties to enroll hospitalized adolescents, future research could consider gathering a larger sample, using a control group and investigate the long-term effects of this intervention. Future studies could also evaluate the impact of the program in school re-entry; this is an important developmental challenge for hospitalized adolescents that merits further research.

Unlike previous research, which highlights the importance of intervening as early as possible [96,118,135], this study showed that older adolescents improved more than their counterparts. Future research could investigate distinct contextual factors (e.g., ICT platform, hospitalization, home recovery, and blended learning) of the program implementation that may help explain these findings. Literature on the efficacy of SRL training programs is vast, with different populations (e.g., gypsy community), ages (e.g., primary and college students), and formats (e.g., mentoring), e.g., [96]. This study approaches ICT, in a blended format, as a viable mean to deliver interventions focused on training SRL with story-tools. Therefore, in future studies it could be important, besides having a control group (a limitation of this study), to include another two experimental groups: one doing the training program in an online format and another in a face-to-face format. Thus, a comparison of the efficacy of the same SRL training program delivered online, face-to-face, and blended could be analyzed and help enlighten if ICT is a valid educational resource for the training of SRL strategies. Moreover, reflecting on the differential impact of the intervention on SRL in older students, future research could investigate the relation between digital literacy and SRL skills. Acknowledging that instrumentality is key to gear agency, program interventions could focus on this variable as a mean to deal with students displaying low engagement and with grade retentions.

The present results add to the corpus of knowledge by indicating that hospitals may be considered suited educational contexts [43] to deliver interventions focused on the training of SRL strategies [8,72]. Further research is needed to support current preliminary findings, but data indicated that blended formats may be relevant tools to make a bridge from hospital to home/school and address adolescents' educational needs. Equipping youth with SRL strategies repertoire enables them to take responsibility and assume an agent role in their learning process. The ultimate goal of this intervention was to provide students with strategies and an SRL framework to help them overcome obstacles that may challenge their goal attainment and overall health and well-being.

3.6. Conclusions

Despite the challenges involved in conducting research in ecological settings, and the difficulties for testing hypotheses with small samples with high variability, we learned that the current intervention was effective. The strict control of the research design, the absence of threats to internal validity, and the strength of the effect size may help explain these findings. Overall, regardless of the limitations of the study, and in accordance with previous research, our findings alert for the potential of using story-tools to train SRL strategies despite participants' characteristics, context, and delivery format. Finally, this study suggests the need to consider the potential of blended learning to deliver educational training making a bridge from hospital to home.

3.7. **References**

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DISCUSSION

DISCUSSION

Since the beginning of the 21st century, important educational reforms have been defined to respond to the evolution of modern society and promote skills allowing students to deal with the challenges ahead (Kennedy & Sundberg, 2020). However, there is still a need to (i) address the first signs of low engagement in elementary school level due to its later repercussions (Appleton et al., 2008; Bae et al., 2020), (ii) empower children from low socioeconomic status and (iii) hospitalized school-aged youth with skills to help them deal with the ongoing societal challenges. These situations may compromise the acquisition of basic and lifelong skills (e.g., Hill et al., 2008) and affect the way in which students engage with learning, as well as their performance.

Therefore, it is important to design and implement educational interventions to empower children and adolescents to successfully pursue educational paths and to equip them with the skills likely to help them face upcoming challenges. Specifically, this work assesses the efficacy of three narrative-based educational interventions, with an increasing level of specificity, aimed at promoting school engagement and self-regulated learning with distinct populations and contexts.

Além de certo ponto não existe retorno.

Este é o ponto que precisa ser alcançado. - Franz Kafka[1]

In the first study (chapter 1) we found that the universal (tier 1) narrative-based intervention implemented amongst fourth graders to promote their school engagement was effective in enhancing the three dimensions, i.e., cognitive, emotional, and behavioral engagement. This result is of crucial importance because literature alerts for the increasing number of elementary school students showing difficulties in conforming to classroom rules and expectations, resistance to use learning tools in class, and disruptive behaviors (Archambault & Dupéré, 2016). The importance of addressing school engagement is heightened because students with low school engagement may experience indifference and boredom towards schoolwork (Fredricks et al., 2019) and set educational expectations which can translate into poor grades and, ultimately, result in school dropout (e.g., Christenson et al., 2012; Wang et al., 2011). Later on, it may limit their employment options and livelihood conditions (Baert & Picchio, 2021; Hughes et al., 2018). By intervening to promote school engagement through a narrative-based program we trained competencies likely to promote positive learning paths (P. Rosário et al.,

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[1] Beyond a certain point there is no return. That is the point that needs to be reached.

2016; Wang et al., 2021). Specifically, promoting students metacognitive reasoning and cognitive, emotional, and behavioral regulation skills may have positively influenced the way through which they address problems, persevere through challenges, and remain engaged in learning. For example, at the end of the program children were more persistent in solving problems, followed the established rules, and discussed their feelings towards school tasks.

In the first study, we found gender differences. For example, boys were the ones benefiting more from the intervention, particularly regarding their emotional engagement. Activities involving emotional awareness may have helped boys increase their emotional involvement and well-being in school (Pietarinen et al., 2014). This topic is likely to merit researchers' and educators' attention.

O destino destina, mas o resto é comigo. - Miguel Torga[2]

The second study (chapter 2) draws on data reporting that the developmental background is not a constraining deterministic factor for the learning of students from low socioeconomic backgrounds (Dietrichson et al., 2017; OECD, 2019). Findings show that the selective (tier 2) intervention implemented was efficacious in promoting the use of self-regulated learning strategies and academic performance in children from a low socioeconomic background. The relevance of such findings is directly linked to the fact that low socioeconomic status is a long-term societal concern that can negatively affect children. For example, on their cognitive development, academic achievement, and use of self-regulated learning strategies (e.g., Sirin, 2005; Vandevelde et al., 2017). Importantly, these children may find themselves in a cycle of disadvantage affecting their education and future, which is likely to persist throughout their lives (e.g., Dietrichson et al., 2017; van Zwieten et al., 2020). Current findings show that training on self-regulated learning strategies may help to break this cycle.

Several policies (e.g., social aids) have been implemented to ameliorate the conditions and contribute to increasing the level of socioeconomic status of populations. Yet, this is a complex process. Meanwhile, children in these families from low socioeconomic backgrounds need support to develop adequate skills to help them overcome educational disadvantages (Vandevelde et al., 2017). Training these students on self-regulated learning strategies is an effective strategy through which they learn how to manage their cognitive processes and reflect on how to overcome personal challenges. Overall, the strategies taught allow students to, for example, be more consistent in their goal-directed plans,

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[2] Destiny dictates, but the rest is up to me.

more proactive in changing unfavorable circumstances, and be more prone to ask for help when confronted with challenges. In summary, there are some variables that can not be changed, but we can empower children to take charge of their own path.

Importantly, students who benefited more from the intervention were those with low or medium self-regulated learning strategies at the beginning. Educators should pay particular attention to students from a low socioeconomic background and with a low or medium level of self-regulated learning strategies. This preventive lens could contribute to lessening the achievement gap experienced by students from low socioeconomic backgrounds (Andrzejewski et al., 2016; de Boer et al., 2018).

The mindset of Torga extended to the last study as we implemented an intensive (tier 3) blended (i.e., face-to-face and online) self-regulated learning intervention with hospitalized students. The intervention, using a narrative to convey the contents, was efficacious in promoting students' use of, perceived instrumentality of, and self-efficacy for self-regulated learning strategies. Motivated by the educational challenges associated with hospitalization, particularly the risk for hospitalized children disengagement from school (Nisselle et al., 2012), and learning (e.g., Shaw & McCabe, 2008), we addressed the hospital context as an educational setting, where children may have opportunities to improve their competencies while hospitalized (Nisselle et al., 2011). The intervention implemented, responded successfully to the major goal of keeping youth connected with learning activities to ensure they remained engaged with school while dealing with the hospitalization and health constraints.

The finding that this intervention benefited more older students draws attention to the role of agency and responsibility for learning. It also draws attention to the health-related concerns younger students may have which should be addressed in this context. Interestingly, students with grade retentions did not improve in their instrumentality as much as students with no grade retentions. This is an important finding because perceived instrumentality contributes to the way students approach their learning process. In the hospital context, these students may have been more worried about their health issues and the consequences of hospitalization (e.g., being apart from friends, missing soccer trainings) than in understanding the usefulness of the self-regulated strategies they were learning. Future studies and interventions should particularly address this issue.

The overall findings showed that the students enrolled learned the contents taught and translated them into practice while applying the strategies they perceived as useful to tasks. Moreover, their perceived competence increased. Importantly, this process took place during a period where the everyday normalcy of youth was altered, and findings highlight the importance of creating learning spaces in health-related contexts to help children and youth grow in their wellbeing. Finally, this study

advocates the effectiveness of using online learning *per se* - which could be explored in other interventions - but also its usefulness in health contexts. Additionally, the proactive role of students in controlling the way circumstances may impact their lives is strengthened.

E se as histórias para crianças passassem a ser de leitura obrigatória para os adultos? Seriam eles capazes de aprender realmente o que há tanto tempo têm andado a ensinar? - José Saramago[3]

All three chapters present narrative-based interventions. Throughout the story, students can relate with the experiences of the characters and learn from several different situations. Ultimately, the narratives ground students' reflections on the application of strategies to practical educational and daily situations. The story-tools used are anchored in the self-regulated learning framework which sustains the reflection over cognitive, emotional, and behavioral strategies. These strategies are important as they contribute to academic performance, school engagement, and positively solve challenges (chapters 1, 2, 3). Additionally, self-regulated learning strategies have important implications for the future because they provide clues on how to better deal with unexpected changes, learn new content, and develop new competencies. Thus, due to the modern society demands, it would be important that future studies assess the long-term impact of interventions.

The overall findings of the present thesis advocate the importance of using story-tools across educational contexts. The flexible nature of the narratives allows applying them with different purposes, in distinct contexts, and with different populations. Apart from the need to draw interventions upon a clear theoretical framework, and to train teachers in using these programs to empower students with self-regulation skills, other educational agents should be considered. Particularly, hospital administrators should consider including specialized educational support in the pediatric ward resources pack.

Finally, and in light of recent events, i.e., the covid-19 pandemic, it becomes crucial to reflect on the role of school engagement and self-regulated learning for dealing with unexpected setbacks and uncontrollable situations. This challenging pandemic highlights the students' role over their learning process because we "are not simply reactive organisms to environmentally imposed circumstances" (Cleary & Zimmerman, 2012, p. 243). The results of the current thesis show effective ways of

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[3] What if children's stories became mandatory reading for adults? Would they be able to really learn what they have been teaching for so long?

addressing school engagement and self-regulated learning in a preventive way to promote learning skills, positive trajectories, and train students into being future-ready individuals.

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