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Cele mai bune practici în îmbunătăţirea învăţării socio-emoţionale în şcoala primară prin gândirea computaţională

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BEST PRACTICES FOR ENHANCING SOCIO-EMOTIONAL LEARNING IN PRIMARY SCHOOLS THROUGH COMPUTATIONAL THINKING

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Abstract

Computational thinking is a structured, cognitive process centered on decomposition, pattern recognition, and algorithm development, which is used for problem solving in a logical and organized manner. This approach offers a perfect environment for developing logical thinking and interdisciplinary competencies, while helping children scaffold their social and emotional skills through activities that promote collaboration and reflection.

In this context, the *Computational Thinking in Enhancing Primary Students' Social-Emotional Learning Skills* Erasmus project developed a methodology for solving socio-emotional problems that are often encountered in primary school.

The results of the project include an adapted curriculum for primary school, especially for grade 4, accompanied by a teacher's guide and digital stories, which provide

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students with contexts for events awareness that can influence their socio-emotional development. Practical application is facilitated by the workbook, which contains detailed examples that explain the working methodology and the interpretation of critical situations from the digital stories. The article includes the results obtained from the pilot implementation of the project methodology, conducted within School No. 1 Buftea in Ilfov County. It features a detailed example of the working methodology and interpretations of critical situations in digital stories using the computational thinking method – a complete model that can be replicated in a similar educational context.

Keywords: computational thinking, digital stories, piloting, primary education, socio-emotional learning.

Rezumat

Gândirea computaţională este un proces cognitiv structurat, centrat pe decompoziţie, recunoaşterea tiparelor şi elaborarea de algoritmi, utilizat pentru a aborda probleme într-un mod logic şi organizat. Aceasta oferă un cadru esenţial pentru dezvoltarea gândirii critice şi a competenţelor interdisciplinare, sprijinind totodată îmbunătăţirea abilităţilor sociale şi emoţionale ale copiilor prin activităţi care promovează colaborarea şi reflecţia.

În acest context, proiectul Computational Thinking in Enhancing Primary Students' Social-Emotional Learning Skills *a dezvoltat o metodologie pentru rezolvarea problemelor de natură socio-emoţională întâlnite frecvent în clasele primare.*

Rezultatele proiectului includ un curriculum adaptat pentru clasele primare, în special pentru clasa a IV-a, alături de un ghid dedicat profesorilor şi poveşti digitale menite să le ofere elevilor contexte de conştientizare a unor evenimente care pot influenţa dezvoltarea lor socio-emoţională. Aplicarea practică este facilitată de caietul de activităţi, cu exemple detaliate care explică metodologia de lucru şi interpretarea situaţiilor critice din poveştile digitale.

Articolul include rezultatele obţinute în urma implementării pilot a metodologiei proiectului în cadrul Şcolii nr. 1 Buftea din judeţul Ilfov. De asemenea, lucrarea prezintă un exemplu de metodologie de lucru şi interpretare a situaţiilor critice din poveştile digitale prin metoda gândirii computaţionale – un model complet, care poate fi replicat într-un context educaţional similar.

Cuvinte-cheie: *ciclu primar, gândire computaţională, învăţare socio-emoţională, pilotare, poveşti digitale.*

1. Project overview and objectives

The COMPUSEL project (2021-1-TR01-KA220-SCH-000031609) is an Erasmus initiative, proposed by a consortium of universities from Turkey, Romania, Poland, Greece, and Portugal, an NGO, and one enterprise. It was designed to enhance Social and Emotional Learning (SEL) competencies among primary school students while simultaneously equipping educators with specialized training.

The aim of the project was to teach primary school children to structure problems using computational thinking in order to solve them. Within the project, a structured SEL curriculum integrated with computational thinking methodologies was designed and developed, along with digital storytelling, which presented a range of socio-emotional challenges, and was used as a pedagogical tool to facilitate critical discussions between students and educators. Through this approach, the project sought to cultivate essential SEL competencies, including self-awareness, self-regulation, social awareness, interpersonal relationship skills, and responsible decision-making. Teacher training was focused on computational thinking to strengthen SEL skills, with the help of resources developed within the project framework.

The research design of the COMPUSEL project was based on a mixed-methods approach – qualitative and quantitative methodologies. Content development was informed by descriptive research techniques, including systematic literature reviews, document analysis, participatory workshops, and interdisciplinary collaboration.

The piloting sessions were informed by iterative testing and feedback cycles; data collection included observations, surveys, and interviews with teachers to assess the effectiveness and relevance of the resources. In parallel, experimental research methods were employed to evaluate the effectiveness of the intervention, including structured interviews with educators and survey-based assessments of student learning outcomes. The consortium is currently analyzing the data in a more complex manner, and as a result, the available data is but partially presented.

2. Integrating SEL and CT into the primary school curriculum - outputs and implementation

2.1. The role of SEL and CT in education

The COMPUSEL project integrates several key concepts to enhance primary students' social-emotional learning (SEL): skills, particularly through the synergy of SEL, computational thinking (CT), and digital storytelling. These foundational elements collectively support the development of both cognitive and affective competencies, enabling students to systematically approach challenges and refine their problem-solving abilities across diverse contexts. Theoretically, Social-Emotional Learning (SEL) adopts a strengths-based perspective, viewing development as an opportunity for growth (Ross & Tolan, 2017). From a theoretical standpoint, SEL emphasizes the promotion of specific skills and behavior change through teaching and practice, often within structured classroom environments, drawing from frameworks such as Social Cognitive Theory, Problem Behavior Theory, Social Learning Theory, and the Health Belief Model (Payton et al., 2008). In practice, SEL primarily focuses on social and academic outcomes within developmental contexts, highlighting the need for empirical research to explore its strengths, limitations, and unique contributions across different age groups. A recent review provides a more in-depth analysis of these approaches and underscores the need for further empirical investigation (Tolan et al., 2016). According to CASEL (Collaborative for Academic, Social, and Emotional Learning), **Social-emotional learning** is the process through which individuals develop the knowledge, skills, and attitudes needed to recognize and regulate emotions, achieve goals, cultivate empathy, build and maintain positive relationships, and make responsible, caring decisions (Collaborative for Academic, Social, and Emotional Learning, 2020). It refers to the concept of developing social-emotional skills to make students more effective in learning (Guerra & Bradshaw, 2008). It plays a crucial role in students' ongoing development and their ability to integrate successfully both in school and in real-world situations. Therefore, SEL encompasses the ability to recognize and manage one's emotions, solve problems, build relationships, and demonstrate empathy.

Computational Thinking (CT) is a structured approach to problem-solving that enhances students' analytical abilities. The COMPUSEL project used computational thinking as an instructional strategy in its curriculum development. Computational thinking consists of four key elements:

- **Decomposition:** Breaking down complex issues into smaller, manageable components.
- **Abstraction:** Identifying essential elements while omitting extraneous details.
- **Pattern recognition:** Recognizing commonalities across different problems.
- **Algorithmic thinking:** Creating step-by-step processes for effective problem resolution.

Computational thinking, as a problem-solving approach, is applicable across various disciplines (Yadav et al., 2014). Similarly, Bundy (2007) highlights the success of using computational thinking in different fields and emphasizes its importance as a fundamental skill. Therefore, integrating computational thinking systematically can enhance social-emotional learning, enabling students to develop more intentional and informed progress.

The connection between Socio-Emotional Learning (SEL) and Computational Thinking (CT) is an integrated approach that develops both cognitive skills, such as problem-solving and collaboration, and emotional skills, such as empathy, emotional regulation, and resilience, fostering a balanced learning environment that prepares students for both technical and interpersonal challenges in the digital age (Dumitrache et al., 2022).

In a digital context, storytelling remains rooted in traditional narrative structures but expands through the use of multimedia elements, such as images, sound, video, and interactivity, as an activity that fosters critical thinking, creativity, and literacy (Ohler, 2013). The project employs digital storytelling as an interactive medium to present real-life SEL challenges. These narratives align with SEL curriculum objectives, allowing students to engage in problem-solving exercises using computational thinking methodologies. The stories serve as dynamic educational tools that enhance communication skills, resilience, and motivation.

2.2. Project results in practice

The COMPUSEL project states that computational thinking can enhance Social-Emotional Learning (SEL) skills in primary school students. This is achieved through the project results and several methods, including:

- **Instructional strategy** – Computational thinking is used as an instructional strategy to enable primary school students to develop SEL skills by making connections in the world around them.
- **Problem-solving** – It helps students tackle problems with confidence. By learning to structure problems in a way that allows them to be solved, students can master an art of thinking applicable to complex challenges in all aspects of their lives.
- **Breaking down complexity** – Computational thinking involves decomposition, which requires breaking down complex problems or systems into smaller, more manageable shares.
- **Focusing on important information** – Abstraction, another element of computational thinking, involves focusing on important information and ignoring irrelevant details.
- **Recognizing similarities** – Pattern recognition involves looking for similarities among and within problems.
- **Developing step-by-step solutions** – Algorithmic thinking involves developing step-by-step solutions to problems or rules to follow to solve problems.

The COMPUSEL Curriculum is the first project result and is designed in a modular manner, with its five modules dedicated to a particular SEL component as follows:

- **Module 1** focuses on self-awareness through analyzing positive and negative behaviors and recalling personal experiences of helping others.
- **Module 2** focuses on self-management, including managing emotions and using stress management techniques. Students discuss digital stories and complete worksheets to explain how they would act in similar situations.
- **Module 3** focuses on social awareness, where students analyze scenarios and identify respectful behaviors and dialogue. Activities include role-playing and discussions about respect.

- **Module 4** focuses on relationship skills, emphasizing conflict resolution, teamwork, and communication. Activities include the "Broken Telephone" game and improvisational drama.
- **Module 5** focuses on responsible decision-making, where students evaluate the consequences of decisions and consider ethical standards. Activities include analyzing digital stories and completing worksheets to explain how they would overcome challenges.

The project integrated digital storytelling as a pedagogical tool to enhance students' SEL competencies through computational thinking strategies. Digital stories were developed according to the objectives outlined in the SEL curriculum, compiled, translated into the consortium languages (TR, RO, GR, PT), and adapted to ensure accessibility across partner countries. The digital stories were further enriched by educational technology specialists, who were responsible for typesetting, graphic design, interactive elements, and animations.

The teachers' guide, the third project result, provides a variety of activities designed to integrate CT with SEL. The activities involve a problem-centred approach, focusing on real-life situations related to SEL dimensions. Specific activities and strategies are used and recommended in both the curriculum and the guide.

The teachers' guide notes that Social-Emotional Learning (SEL) themes can be integrated into academic lessons across multiple disciplines, such as Math, History, Natural Sciences, and Language Classes. However, general integration is possible and recommended**.**

2.3. Implementation results

The effectiveness of the project was assessed through a structured piloting phase, which aimed to evaluate the impact of the developed curriculum and teaching materials.

The collected qualitative and quantitative data were systematically analyzed to assess the effectiveness of project outputs. Insights derived from interviews and questionnaires informed potential refinements to project outcomes, and where necessary, modifications were made to optimize curriculum design and pedagogical strategies. Project team members actively monitored classroom implementation, engaged in discussions with educators, conducted classroom observations, and facilitated knowledge exchange sessions.

The teacher trainings were organized in all partner countries to offer teachers detailed information and guidance on implementing the project in their schools. With a theoretical and practical approach, the training combined the theory with hands-on activities, enabling teachers to become familiar with the COMPUSEL approach and work with tools developed by the project.

The piloting phase lasted between four and six weeks, involving 4th-grade students in most partner institutions and in 2nd-grade students in one. It was conducted by one or more teachers (in specific cases) who previously participated in the training seminar.

All students completed the **Social Emotional Learning Questionnaire (SELQ)** prior to the intervention and again following its conclusion. The SELQ comprises 32 items aimed at assessing five fundamental social-emotional competencies: self-awareness, self-management, social awareness, relationship skills, and responsible decision-making. The questionnaire responses were measured on a 3-point Likert scale, ranging from 1 (strongly disagree) to 3 (strongly agree). Besides filling this questionnaire, teachers who conducted the pilot observed the students and addressed supplementary questions.

Moreover, a semi-structured interview was conducted with the classroom teacher.

2.3.1. *Experiences from the field*

The pilot program at the University of Lodz delivered positive results, highlighting its effectiveness and impact. Digital stories emerged as one of the most engaging aspects of the program. A female teacher enthusiastically shared:

> For me, digital stories are the most attractive part of the program. In an age where children are constantly exposed to screens and visual stimuli, these tools are incredibly well-suited for engaging them. The short format keeps even younger students focused. I often use YouTube videos to illustrate topics, but finding the perfect fit can be challenging. The ready-made digital stories and worksheets are a game changer.

Teachers observed a noticeable increase in student curiosity and engagement. One teacher (female) humorously remarked:

> Some students are so unique that no program seems to fit them! But overall, yes, they were more curious and involved. The variety in teaching methods—watching a story, group activities, pair work—kept them engaged. I enjoyed the approach too!

The evaluation results suggest that the COMPUSEL program is a promising tool for developing students' social-emotional skills through computational thinking. Training teachers in the methodology and encouraging its integration into their classrooms can be highly beneficial.

Notably, students reported the greatest difficulties in responsible decision-making and self-awareness, indicating these areas require special attention. Gender differences did not appear to influence the development of SEL skills. However, this may be due to the specific composition of the pilot group, which was relatively small and lacked gender diversity.

For Çanakkale Onsekiz Mart University, the piloting at Ticaret Borsasý Primary School in Çanakkale showed a significant contribution of computational thinking to social-emotional learning and fostering self-awareness among students. According to the teacher, social-emotional learning helped children understand themselves more deeply, and this self-knowledge enabled them to approach problem-solving with greater ease. The teacher explained that when students face larger problems, breaking them down into smaller, more manageable parts empowers them to feel confident in addressing and overcoming challenges.

The teacher observed a marked improvement in the students' ability to solve problems, particularly in the context of emotional regulation and anger management. Students, including those with behavioral challenges, demonstrated increased self-awareness and emotional control. The teacher shared that some students routinely asked, “Teacher, do you think I’ve improved?”—a reflection of their growing self-awareness. Furthermore, a student noted in a recent survey that they had reduced conflicts and were now able to express themselves more effectively to peers, illustrating the social-emotional benefits of the program.

The teacher also discussed the role of digital storytelling and reported that after listening to the digital stories, students frequently shared personal experiences related to the themes explored in the narratives. Although the teacher noted some technical limitations, such as the low sound quality and the need for more engaging storytelling, the overall impact of the stories was deemed positive.

The findings provide strong support for the effectiveness of the COMPUSEL curriculum in promoting social-emotional learning and computational thinking skills among primary school students. The teacher’s reflections corroborate the statistically significant improvements observed in students’ SEL skills, as measured by pre- and post-test assessments. The teacher’s feedback, based on direct classroom observations, further strengthens the argument that the program effectively integrates computational thinking with social-emotional learning, particularly through the use of digital storytelling. Despite the brief duration of the program’s implementation, the results represent an important step in providing empirical evidence of the curriculum’s impact.

In the piloting organized by Altera Vita, Greece, students participated in three lessons featuring scenarios developed as part of the project. The sessions were facilitated by three teachers and were incorporated into the school’s regular teaching schedule, taking place during homeroom and subject lessons. The evaluation results highlight that the use of the COMPUSEL methodology can significantly contribute to the development of students’ social-emotional competencies. The positive outcomes from this pilot indicate that teacher training in the COMPUSEL methodology is valuable and should be encouraged for broader implementation within teaching activities.

One key observation was that the areas of **responsible decision-making** and **self-awareness** presented the greatest challenges for students, both at the start of the program and after the training. This suggests that these areas should receive particular attention in future applications of the curriculum, as students expressed more difficulty in mastering these skills compared to other socio-emotional competencies.

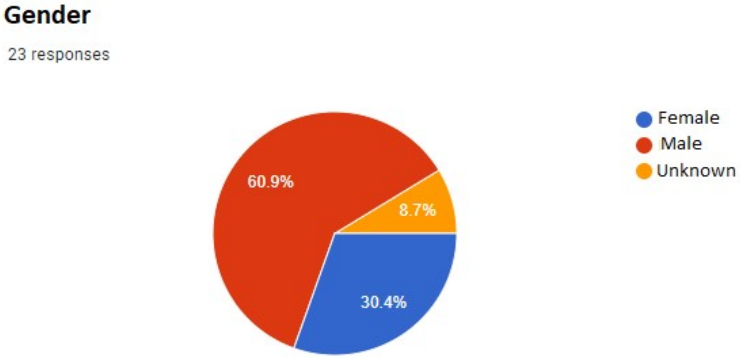
Notably, no gender differences were found in either the baseline social skills or the improvement in these skills following the program, suggesting that the COMPUSEL curriculum is equally effective for all students, regardless of gender.

Following the initial seminar at the University of Évora, nine educators volunteered to participate in the piloting phase and demonstrated the significant potential of the COMPUSEL program in enhancing primary school students' social-emotional learning, particularly in the areas of self-awareness, self-management, social awareness, and relational skills. Since responsible decision-making did not show any marked improvement, this becomes an area ripe for further investigation and refinement in subsequent phases of the program. The teachers' observations and feedback confirmed that integrating digital storytelling and computational thinking positively influenced student engagement and motivation, suggesting that these teaching methods can be effective tools for fostering SEL competencies. Moving forward, addressing the identified challenges and continuously incorporating feedback from educators and students will be crucial for optimizing the program's overall effectiveness.

The University of Bucharest implemented COMPUSEL findings at School No. 1 in Buftea. The teacher, following in-depth discussions on the curriculum's components, decided to begin the training process one month after the introductory seminar. After careful consideration, the teacher opted to integrate the COMPUSEL curriculum into the civic education lessons, believing this subject best aligned with the program's goals. The teacher's 4th-grade class consisted of 30 students, aged 11. However, not all students were present for both the pre-test and post-test evaluations of their socio-emotional learning (SEL) abilities. Ultimately, 18 students were present at both time points, allowing for a more focused analysis of their individual development. To ensure anonymity while tracking individual progress, each student was assigned a unique number, which they wrote on their questionnaires.

2.4. Reflections and results on implementation at the University of Bucharest

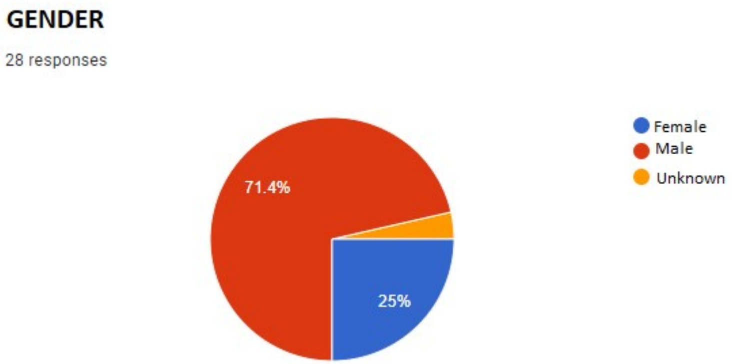
The results of the Pre-Test included 23 respondents (14 males, seven females, and two with unknown gender), but we could follow and identify, in the sense of establishing individual development, only the first 18 children.



Source: Dumitrache & Manolache, 2024

Figure no. 1. *Gender distribution for Pre-Test respondents at School No. 1 Buftea in Ilfov County*

The results of the Post-Test, which included 28 respondents (20 males, seven females, and one with unknown gender), are displayed in the figure below.



Source: Dumitrache & Manolache, 2024

Figure no. 2. *Gender distribution for Post-Test respondents at School No. 1 Buftea in Ilfov County*

The questionnaire items and the obtained responses are presented in Table no. 1.

***Table no. 1**. Pre- and Post-test results for School No. 1 Buftea in Ilfov County*

SEL Items		PRE-TEST ($N = 23$)			POST-TEST ($N = 28$)		
		Disagree *n* (%)	Undecided *n* (%)	Agree *n* (%)	Disagree *n* (%)	Undecided *n* (%)	Agree *n* (%)
SELF-AWARENESS							
1.	I can accurately explain how I feel about an event.	1 (4.3)	10 (43.5)	12 (52.2)	3 (10.7)	5 (17.9)	20 (71.4)
2.	I am aware of how I behave in the face of events.	4 (17.4)	0 (0)	19 (82.6)	0 (0)	2 (7.1)	26 (92.9)
3.	I easily ask others for help when I need it.	2 (8.7)	6 (26.1)	15 (65.2)	3 (10.7)	6 (21.4)	19 (67.9)
4.	I can easily express what I like and don't like.	2 (8.7)	6 (26.1)	15 (65.2)	2 (7.1)	9 (32.1)	17 (60.7)
5.	I am aware of the good qualities I possess.	1 (4.3)	7 (30.4)	15 (65.2)	1 (3.6)	6 (21.4)	21 (75)
6.	I know the areas wherein which I want to improve myself.	1 (4.3)	6 (26.1)	16 (69.6)	2 (7.1)	6 (21.4)	20 (71.4)
SELF-MANAGEMENT							
7.	I complete my tasks on time.	2 (8.7)	9 (39.1)	12 (52.2)	3 (10.7)	12 (42.9)	13 (46.4)
8.	I break down big tasks into smaller steps to complete them.	2 (8.7)	5 (21.1)	16 (69.6)	5 (17.9)	7 (25)	16 (57.1)
9.	I plan before starting a task.	2 (8.7)	4 (17.4)	17 (73.9)	2 (7.1)	10 (35.7)	16 (57.1)
10.	Even if I encounter distractions while working, I can maintain focus on the task at hand.	2 (8.7)	9 (39.1)	12 (52.2)	3 (10.7)	9 (32.1)	16 (57.1)
11.	I can calm myself when faced with a stressful situation.	5 (21.7)	9 (39.1)	9 (39.1)	8 (28.6)	9 (32.1)	11 (39.3)
12.	I can manage disagreements with my friends respectfully.	2 (8.7)	9 (39.1)	9 (39.1)	2 (7.1)	9 (32.1)	17 (60.7)
SOCIAL AWARENESS							
13.	I understand other people's feelings.	2 (8.7)	4 (17.4)	17 (73.9)	2 (7.1)	7 (25)	19 (67.9)
14.	I listen carefully when others talk.	2 (8.7)	6 (26.1)	15 (65.2)	1 (3.6)	5 (17.9)	22 (78.6)
15.	The feelings and thoughts of others are important to me.	3 (13)	11 (47.8)	9 (39.1)	7 (25)	10 (35.7)	11 (39.3)
16.	When others disagree with me, I respect their opinions.	4 (17.4)	8 (34.8)	11 (47.8)	4 (14.3)	9 (31.1)	15 (53.6)
17.	I appreciate the achievements of others.	1 (4.3)	4 (17.4)	18 (78.3)	0 (0)	6 (21.4)	22 (78.6)
18.	I express gratitude when someone helps me.	1 (4.3)	1 (4.3)	21 (91.3)	1 (3.6)	1 (3.6)	26 (92.9)
19.	I am kind and polite to the people around me.	1 (4.3)	3 (13)	19 (82.6)	1 (3.6)	4 (14.3)	23 (82.1)

SEL Items	PRE-TEST ($N = 23$) Disagree *n* (%)	Undecided *n* (%)	Agree *n* (%)	POST-TEST ($N = 28$) Disagree *n* (%)	Undecided *n* (%)	Agree *n* (%)
RELATIONSHIP SKILLS						
20. I make friends easily.	2 (8.7)	10 (43.5)	11 (47.8)	3 (10.7)	12 (42.9)	13 (46.4)
21. I help my friends when they need it.	1 (4.3)	0 (0)	22 (95.7)	1 (3.6)	0 (0)	27 (96.4)
22. I object when my friends are treated poorly.	3 (13)	5 (21.7)	15 (65.2)	2 (7.1)	2 (7.1)	24 (85.7)
23. I work collaboratively with my friends.	1 (4.3)	2 (8.7)	20 (87)	1 (3.6)	0 (0)	27 (96.4)
24. I find solutions to problems through cooperation with my friends.	1 (4.3)	5 (21.7)	17 (73.9)	2 (7.1)	6 (21.4)	20 (71.4)
25. I can defend myself without upsetting others.	3 (13)	7 (30.4)	13 (56.5)	1 (3.6)	15 (53.6)	12 (42.9)
26. In conflicts, I seek solutions where everyone can benefit.	2 (8.7)	10 (43.5)	11 (47.8)	4 (14.3)	5 (17.9)	19 (67.9)
27. I take a leading role in classroom activities.	8 (34.8)	11 (47.8)	4 (17.4)	8 (28.6)	14 (50)	6 (21.4)
RESPONSIBLE DECISION-MAKING						
28. When making decisions, I evaluate alternative options and strive to make the most appropriate choice.	1 (4.3)	4 (17.4)	18 (78.3)	1 (3.6)	4 (14.3)	23 (82.1)
29. I consider how the decisions I make will influence others.	3 (13)	8 (34.8)	12 (52.2)	5 (17.9)	13 (46.4)	10 (35.7)
30. I take into account the positive or negative consequences of the decision I make.	2 (8.7)	4 (17.4)	17 (73.9)	1 (3.6)	8 (28.6)	19 (67.9)
31. I make sure that the decision I make do not endanger the safety of others.	1 (4.3)	7 (30.4)	15 (65.2)	3 (10.7)	4 (14.3)	21 (75)
32. I make the decision I believe is fairest, even if others disagree.	4 (17.4)	6 (26.1)	13 (56.5)	7 (25)	5 (17.9)	16 (57.1)

Source: Dumitrache & Manolache, 2024

Based on the children's responses before and after the test, it is evident that while many initially had few socio-emotional challenges, the slight decreases in some post-test values suggest an improvement in their reflective abilities. Meanwhile, the slight increases in certain values indicate a positive shift in their attitudes toward socio-emotional issues. The most notable improvement is seen in their relationships with peers, which position them as good team players and favor cooperation rather than leadership abilities (as seen in the overall improvements in the relationship skills item response). When it comes to perceiving themselves as group leaders, the responses remain largely neutral, with only four children identifying themselves in this role in the pre-test and six children identifying themselves as such in the post-test.

In a semi-structured interview, the teacher noted that the modules were most effectively integrated during the civic education lessons, which provided an ideal context for discussing behaviors and emotions. Additionally, the modules were successfully incorporated into Romanian language lessons, where students engaged with various materials, including readings, videos, and discussions.

The teacher observed a noticeable change in some students' approaches to problem-solving, particularly in conflict situations that are common in group settings. Before the intervention, students would often react impulsively based on momentary emotions. However, following the program, they began to break down conflicts into smaller, manageable components, allowing them to find solutions more effectively. The children also became more focused on addressing the main issue, rather than getting distracted by secondary concerns. This shift in behavior highlighted the positive impact of the program on their socio-emotional development.

She also reported that the first story from Module 1, which addressed behavior towards animals, was particularly well-received by the students. Given the children's strong affection for animals, they were highly engaged with this story, which resonated with their personal experiences.

Role-playing activities in Module 3 were the most popular among the students. The teacher noted that pair and team-based activities generally sparked greater interest and enthusiasm, allowing the students to be fully engaged with the material and with each other.

While the teacher did not believe the students fully grasped the concept of computational thinking, she observed that they began applying two of its foundational steps—decomposition and abstraction—when resolving conflicts. This suggests that, although their understanding may not have been complete, they started to engage with key computational thinking strategies in a practical context.

Reflecting on her experience, the teacher described the activity as highly enriching. She appreciated the useful resources it provided for her civic education and Romanian language classes and found it valuable in helping her approach problem situations with greater insight. The program also served as an example of how various learning activities can be designed and delivered in a more engaging and meaningful way.

The teacher identified one main challenge: the need to move quickly past the films in order to complete the associated worksheets and debates. This limited the opportunity for students to reflect more deeply on the technical aspects of the films themselves. Despite this, the teacher adapted the activities to ensure that the core learning objectives were still met.

The teacher suggested several improvements to enhance the activities. These included clearer voice-overs for the characters, with less distracting background music, and more realistic animation and character movements. The students themselves also mentioned these points, highlighting areas where the digital stories could be made more engaging.

The implementation of the COMPUSEL curriculum at School No. 1 in Buftea demonstrated promising results in fostering socio-emotional development and computational thinking skills in students. While challenges existed, particularly due to the short implementation period, the teacher's reflections and the results of the pre- and post-test evaluations suggest that the curriculum had a positive impact on students' problem-solving abilities and interpersonal relationships. Moving forward, extending the program's duration and refining certain aspects of the digital materials could further enhance its effectiveness in promoting social-emotional learning.

3. Digital stories methodology and interpretation through computational thinking

The wealth of resources built into this project enables any educator to incorporate computational thinking, starting with digital stories to enrich and explore SEL, considering that social, emotional, and cognitive skills are crucial for the holistic development of students. It is a combination of challenging scenarios and practical strategies designed to integrate the dimensions of SEL and the principles of CT in a learning environment that should be inclusive and equitable.

Educators and students will discover:

1. Problem-centered approaches: Engaging scenarios focused on real-life situations related to the dimensions of SEL, encouraging active participation and problem-solving.
2. CT-oriented problem solving: Guidance in applying Decomposition, Abstraction, Pattern Recognition, and Algorithmic Thinking to address social and emotional challenges (https://e-learning.compusel.eu/course/view.php?id=7).
3. Diverse learning techniques: A variety of activities and learning methodologies, from role-playing scenarios to visual mapping exercises, to promote an engaging and immersive learning experience (https://compuseleu.com/wp-content/uploads/2023/11/Module-2-Worksheet-3-COMPUSEL.pdf).
4. Practical application ideas on integrating CT dimensions into SEL skills, accompanied by real-world examples and practical implementation strategies for educators.

We propose to educators who wish to implement the stories and activities from the COMPUSEL project with primary school students to consider the following:

- Allocate time for viewing, analyzing, and reflecting on the images and texts provided.
- Work with students on the "moments" or stages of organizing computational thinking.
- Associate the stages of computational thinking with encouragement, support, and motivation for the students.
- Social and emotional learning is enhanced as a result of going through and learning computational thinking.

Leveraging the experiences from the COMPUSEL project in an elective course at the school level would address the needs of parents and students concerning emotional management and dealing with problems across various areas.

4. Conclusions

The COMPUSEL project represents a pioneering integration of computational thinking with social-emotional learning (SEL), advancing an interdisciplinary pedagogical framework that brings together both technical proficiency and socio-emotional competencies in education. By leveraging digital storytelling as an interactive medium, students engaged with authentic computational challenges intricately tied to emotional intelligence and social interaction, fostering a holistic learning experience. The initiative yielded a modular, adaptable curriculum aligned with established educational frameworks, facilitating scalability and integration across various institutional settings while expanding computational pedagogy through novel methodologies and cross-sectoral collaborations.

The project demonstrated a significant impact on educational practice at multiple levels. At the consortium level, over 100 educators participated in training sessions and implemented the curriculum either totally, as part of the implementation process, or partially, as a supplementary resource to enhance existing instructional materials and strategies. This experience engaged approximately 2,000 students who demonstrated measurable gains in collaborative aptitude and emotional intelligence. At the pan-European level, the initiative fostered transnational pedagogical exchange, engaging over 500 educators through professional development forums and instructional workshops. Globally, the digital platform amassed an extensive user base exceeding 10,000, underscoring the universal applicability and efficacy of the COMPUSEL framework in computational and socio-emotional skill development (Candeias & Felix, 2024).

Specifically, the piloting phase and its activities, which were conducted by the targeted groups, were well received, and improvements were observed in children. This was proven through questionnaires and the conducted structured interviews, as well as the large number of beneficiaries.

The project's impact in Romania was felt on multiple levels, starting with raising the teachers' awareness on SEL and computational thinking and their integration in the curriculum. The teacher training and the resources that were created within the project inspired them to search integration opportunities apart from the project.

Regarding the impact on students, observations made by the teacher showed improvements in the children's behavior in school, including increased collaboration, better conflict resolution skills, and a more positive attitude towards learning and peer interactions. Before the implementation of the program, students often reacted impulsively based on their immediate emotions. However, after participating in the program, they started to break down conflicts into smaller, more manageable parts, which helped them find solutions. Additionally, the children became more focused on addressing the core issue, rather than being distracted by secondary matters. This change in behavior demonstrated the positive influence of the program on their socio-emotional development.

From the pre- and post-test questionnaire, the results showed small increases in values, with the most significant increase in the area of relationships with their peers.

The more interesting values refer to them seeing themselves as undecided group leaders, that perceive themselves as good team players as seen in the relationship skills items in the questionnaire.

Research limitations include the short implementation period (4–6 weeks), sample size constraints, which limited statistical analysis and restrictive and summarized templates for project reports. However, a more detailed analysis is the focus of further project activities.

The COMPUSEL model embodies a versatile and scalable educational paradigm, with robust potential for transposition into secondary and higher education domains. By deepening computational engagement and contextualizing SEL within more intricate social paradigms, the model can cultivate advanced problem-solving acumen and emotional dexterity among older students. Beyond conventional academia, its digital storytelling methodology offers cross-disciplinary utility, enriching curricula in the humanities and professional sectors where socio-emotional intelligence is paramount, such as healthcare, management, and customer relations.

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