

CONVERSATIONAL AGENTS IN SCHOOL TO BUILD SHARED AND INTERDEPENDENT FUTURES

AGENTI CONVERSAZIONALI A SCUOLA PER COSTRUIRE FUTURI CONDIVISI E INTERDIPENDENTI



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ABSTRACT

The incessant transformation of the world, the challenges that new generations are called to face to earn a future role in society make it necessary to acquire life skills. Following the theoretical framework of dialogue pedagogies, the PEDI-CAM training research is proposed to provide empirical evidence on the effectiveness of conversational agents in transforming educational contexts into inclusive and sustainable ecosystems.

L'incessante trasformazione del mondo, le sfide che le nuove generazioni sono chiamate ad affrontare per guadagnarsi un futuro ruolo nella società rendono necessaria l'acquisizione delle life skills. Seguendo il framework teorico delle pedagogie del dialogo, si propone la ricerca formazione PEDI-CAM per fornire evidenze empiriche sull'efficacia degli agenti conversazionali nel trasformare i contesti educativi in ecosistemi inclusivi e sostenibili.

KEYWORDS

Conversational Agent, Inclusion, Life skills, School, Dialogue
Agente conversazionale, Inclusione, life skills, scuola, dialogo

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1. Introduction

The relentless transformation of the world and the challenges that new generations must face in order to carve out a future role in society make the acquisition of life skills increasingly necessary. Following the theoretical framework of dialogical pedagogies, this study proposes a research-training approach aimed at providing empirical evidence on the effectiveness of conversational agents in educational settings, with the goal of transforming them into inclusive and sustainable ecosystems.

The urgent need to rethink school and its learning environments in order to enhance human intelligence stems from the rapid changes brought about by the spread of Artificial Intelligence (AI) across all sectors. In just a few years, current knowledge and teaching methods risk becoming obsolete; many of today's professions may disappear, and human intelligence may be replaced by robots and AI algorithms. The lengthy training required to become a professional—an engineer or radiologist, for instance—risks being outpaced by the training of AI algorithms, a process that unfolds in mere seconds. Does this herald the end of work for those with average cognitive abilities, or the birth of new professions requiring adaptability and flexibility—skills not accessible to all? (Alexandre, 2017, p.114).

The solution certainly does not lie in the provision of a permanent universal income. The digital castaways can only be rescued by a thorough reform of the education system that fosters skills aligned with the needs of the labor market. Neuroscience confirms that the inactivity of the brain poses a significant threat to its plasticity and could thus generate populations rendered superfluous.

Training teachers capable of promoting adaptive learning through the use of algorithms contributes to the innovation of a school system which, by focusing on the educational needs of the majority, tends to neglect those of the few. The personalization of learning pathways represents an opportunity to enhance everyone's biological intelligence, making it complementary to AI. This paradigm, which moves beyond the notion of a "war of intelligences," aligns instead with the concept of hybrid intelligence—emerging from the interaction between the irreplaceable carbon-based human brain and the silicon-based machine brain (Casella et al., 2023).

The integration of AI into teaching practices should also privilege collaborative rather than substitutive forms of interaction. The risk that students may passively rely on such technologies—developing dependency or losing confidence in their own abilities—is not unfounded. When used as catalysts for efficiency, creativity, and the development of cognitive processes related to problem-solving abilities

(Habib et al., 2025), AI algorithms can offer significant opportunities for educational systems.

These emerging scenarios are far removed from dystopian, transhumanist visions of a future where embryos are selected for high IQ or where human intelligence is enhanced via intracerebral implants connected to computers. Such trajectories risk a dangerous overlap between the human dimension of the *genitus* and the technical production of the *factus*—the manufactured—of machines (Rapetti, 2022). Technology (*technè*) has always accompanied humanity throughout its journey, but the dehumanizing pressures of a society that has lost its gaze—one governed by technocracy and technical rationality—risk generating new forms of servitude, control, and slavery that erase the multifaceted nature of the human being, most notably their freedom.

The surveillance society considers life itself and people as temporary aggregates of data to be exploited at an industrial scale (Rouvroy & Stiegler, 2016, p.9). "Communicracy" constitutes a new and powerful form of domination which, while satisfying certain needs, simultaneously modifies values and orientations, artificially provoking fears, prejudices, distorted perceptions, and pathological expectations. "[...] physical violence and repression, easily identifiable and interpretable, have been replaced by cultural and emotional surveillance, less visible yet more effective, which employs the consent of the governed to deprive them of rights, power, and dignity" (Sirna & Romano, 2019, p.268).

Assuming that not everything is indexable and that no sentiment analysis can fully grasp the depth of human emotion (Lyon et al., 2020), education must aim to foster in students a critical mindset that allows them to decolonize their thinking and become themselves—cultivating "spaces of freedom and positive sociality" (Sirna & Romano, 2019, p.269).

Thus emerges the crucial role of life skills—competences that do not risk obsolescence but instead "enable individuals to confront and make use of experiences to grow, develop, and feel capable of participating in school, work, and society. These skills encompass the interaction between attitudes, values, behaviors, knowledge, and abilities, whose harmony fosters empowerment and enhances quality of life. While it is true that life skills promote literacy, critical thinking, and communication abilities, it is equally true that they are directly connected to health, psychological, cultural, and social well-being and can be developed throughout life" (Boffo et al., 2022, p.2).

"Dialogue, as demonstrated by Paulo Freire, Martin Buber, Don Lorenzo Milani, and Danilo Dolci, is a tool that—[surpassing transmissive teaching models] —can co-construct knowledge, gradually making learners more aware of their own thinking"

(Ferrero, 2021, p.89). The integration of a conversational agent into teaching practices—by simulating human conversation in real-life contexts—can help transform schools into inclusive and sustainable ecosystems which, by valuing differences, assist all learners in building shared and interdependent futures. The aim of this essay is to highlight the main changes and conditions that must be introduced in educational settings so that a potentially deceptive machine (Natale, 2022) can instead help create an engaging dialogical space (Buber, 2004).

2. Life Skills and Dialogical Education for Building Shared and Interdependent Futures

Italy has recently enacted a law mandating the implementation of pathways within educational institutions aimed at developing life skills and training teaching staff. The objective of the Ministry of Education and Merit, to be pursued through a national three-year experimental program, is to identify and define non-cognitive skills that may contribute to students' educational success. This initiative also aims to offer insights into the most effective methodologies, pedagogical practices, and assessment tools.

Non-cognitive competencies play a crucial role in the school context. For instance, several studies (Botvin & Griffin, 2004; Botvin & Griffin, 2015) highlight the effectiveness of life skills training programs for American adolescents in preventing substance abuse (including drugs, alcohol, and tobacco). Skills such as problem-solving can support adolescents in resisting the influence of media, which often promotes unrealistic and misleading models, thereby fueling anxiety, frustration, and anger. The development of self-management abilities contributes to enhanced self-esteem and self-control—both essential for setting realistic personal growth goals, reducing vulnerability to negative social influences, and avoiding substance dependence or conformity to externally imposed thinking.

Public policy and education systems that focus exclusively on cognitive skills, often measured through IQ, neglect other critical dimensions that influence success in both school and life. Knowledge and emotion are deeply interconnected. Neuroscientific research, moving beyond Descartes' error (Damasio, 1995), has shown that the neurological circuits activated by thought and emotion are, in fact, the same. This biochemical and neural entanglement demonstrates that information flows through the body via neural impulses and chemical signals,

shaped by interaction with the world, weaving together the threads of knowing and feeling in a mutually reinforcing dynamic (Contini, 2009, p.8).

Early interventions to support life skills development are especially vital for children growing up in disadvantaged environments who, due to minimal socio-sensory stimulation, are at risk of impaired brain development (Heckman, 2008). Studies (Beckett et al., 2006; Kreppner et al., 2007) on children raised in Romanian orphanages and later adopted into English families indicate that emotional deprivation can severely limit relational capabilities. In more severe cases, early childhood affective deprivation is linked to lower IQ and attention deficit hyperactivity disorders. Even after adoption into emotionally nurturing environments, the negative effects on brain volume development can persist into adulthood (Mackes et al., 2020; Rutter et al., 2004).

Fostering relationality and inclusion through collaborative activities enables students to move beyond the individualism and competitive aggression of contemporary society. These encounters nurture “empathetic understanding and solidarity. [...] Neuroscience teaches us that, biologically, we are first and foremost in relation with others, to the extent that their actions activate our own neurons as if we ourselves were acting: how can our gaze upon others be indifferent if our neurons are ‘stirred’ by their joy or suffering?” (Contini, 2009, pp. 14–15).

Encouraging the practice of divergent thinking and cultivating a taste for inquiry through engagement with diverse perspectives fosters in students the capacity to resist “a new and powerful form of domination which, while meeting certain needs, also alters value systems and orientations, artificially provoking fear, prejudice, pathological expectations, and distorted perceptions of reality” (Sirna & Romano, 2019, p.268).

For Danilo Dolci and Paulo Freire, dialogue is an empowering tool that, far from promoting adaptation to an imposed and consuming passivity, enables individuals to shape their own life paths and generate impact within their communities. It channels the potential and motivation of learners as a transformative force, an ethical commitment, an openness to new hypotheses and horizons—a source of richness, possibility, and trust in the future (Benelli & Schachter, 2017, p.195).

Though rooted in distinct socio-political contexts—Western Sicily for Dolci, Latin America and Brazil for Freire—both educators adopted participatory and inclusive educational methods to surface transformative resources, capable of altering the trajectories of even the most marginalized individuals. Dolci’s method of reciprocal maieutics, “a collective exploration process grounded in the experience and

intuition of individuals” (Dolci, 1996, p.13), fosters shared knowledge through communal dialogue, which becomes action for change. Freire’s pedagogy of liberation unfolds through a process of conscientization and finds in authentic dialogue a means of engaging with reality. This dialogue “enables individuals to transform both themselves and the surrounding world, awakening their creative potential” (Michellini, 2018, p.4).

Freire draws a critical distinction between integration and adaptation:

“Integration consists in the ability to engage with reality and simultaneously transform it, a capacity grounded in critical judgment. When individuals lose the ability to choose and instead adapt to others’ judgments, they are diminished, having forfeited their freedom. Integration makes one a subject, whereas adaptation renders one passive” (Freire, 1974, note 3, p.49).

Problem-posing education assumes an active role for learners, who are called upon to resolve problems and develop critical thinking, rather than passively repeat predetermined knowledge—as occurs in conformist, banking-style education. As Freire writes, “No one educates anyone else, nor do we educate ourselves in isolation; we educate each other in communion, mediated by the world” (Freire, 2002, p.69). The rigid educator-learner dichotomy is thus dissolved: the teacher, through dialogue, is also taught. Freire refers to this dynamic as teacher-student and student-teacher (*docência-discência*) to emphasize the interconnectedness of teaching and learning (Freire, 2004, p.25).

This dialogical approach is mirrored in Don Lorenzo Milani’s non-directive pedagogy, where the teacher assumes the role of guide and maieutic companion. For Milani, knowledge is a communal research process enacted through participation in dialogue (Manara, 2016). Authentic speech, in his pedagogical vision, has a transformative power—it builds relationships, opens new possible worlds, and is not merely conceptual but imaginative, reciprocal, and generative (Lizzola, 2018, p.22).

UNESCO’s *Reimagining our Futures Together: A New Social Contract for Education* (2021) highlights the urgency of promoting inclusive education. Social, cultural, and economic inequalities risk turning quality education into “a privilege for the few” instead of “a public good to be safeguarded and promoted as a value for both individuals and society” (Calzone & Mazza, 2023, p.209).

Dialogical education regards learning as an interactive process grounded in shared inquiry and discovery. Rather than transmitting fixed content, it relies on the pedagogy of questioning (Ferrero, 2021). Dialogue in educational settings supports

the development of critical thinking, which is indispensable in a world that “seeks to inform, mold, indoctrinate, and instill truths and beliefs, rather than fostering clarity and responsible choice” (Dolci, 1985, pp.266–267).

Martin Buber’s philosophy of dialogue distinguishes two fundamental types of relationship: the I-Thou relationship, based on mutuality and respect, and the I-It relationship, based on objectification (Buber, 1991). The I-Thou educational relationship, rooted in listening and recognition of the learner, offers a compelling response to the challenges of today’s society. Educating students to live relationally and to engage with otherness creates dialogical spaces that enhance their resilience against the dehumanizing tendencies of the current social order.

“The concept of I-Thou in Buber’s philosophical and pedagogical reflection is grounded in recent research, which confirms from neurobiological and evolutionary perspectives that the construction of the self always requires the presence of the other” (Fedeli, 2023, p.89).

Reconceptualizing the human in relational terms and moving away from I-It objectification calls for educational practices that leverage cooperative and mutual-aid models. These should value learners’ diverse interests, preferences, and learning paces as strengths. The teacher is thus called to embrace dialogical lesson structures and adopt an attitude of “openness,” “curiosity,” and “trust,” especially with developing learners who may have limited self-awareness or expressive abilities. Otherwise, the risk is to treat the other not as a Thou, but as an It (Fedeli, 2023, p.90).

Recent studies demonstrate how the integration of conversational agents in teaching can foster dialogical spaces, increase the sharing and exchange of ideas among learners, and support teachers’ work (de Araujo et al., 2024; Bozkurt et al., 2023). However, it must be stressed that the teacher’s role as facilitator, mediator, and guide in constructing an “inclusive classroom-community” (Ferrero, 2021) cannot be replaced by even the most advanced AI technologies.

Successfully integrating a conversational agent into classroom life is a complex challenge. It first requires teachers to embrace a transformation of their professional role, supported by targeted training. Second, students may feel alienated or intimidated by interaction with infallible, hyper-efficient machines (Sadin, 2019, p.19).

3. The Research: Objectives and Methodology Paragraph

The PEDI-CAM training-research initiative (Personalization, Didactics, Conversational Agents, Mentoring) — *Personalization and Educational Innovation through Conversational Agents* — adopted a phenomenological self-study protocol (Loughran et al., 2007; Perla, 2010) grounded in the analysis of teaching practices (Altet, 2003; Vinatier & Altet, 2008; Laneve, 2005; Perla, 2010). A collaborative research-training framework (Perla, 2010) was deliberately chosen, as it effectively fosters the exchange between practitioners' experiential knowledge and the analytical perspective of researchers.

The research aims to provide empirical evidence regarding the effectiveness of conversational agents in inclusive educational contexts, thereby contributing to the development of innovative and inclusive teaching practices that may be adopted in other schools.

The main objectives of the study are:

- To assess the effectiveness of conversational agents in facilitating peer dialogue during cooperative learning activities;
- To explore how conversational agents can support mentoring and the personalization of learning for students with diverse educational needs;
- To analyze the impact of such tools on student motivation and engagement in learning.

The study employs a mixed-methods approach, integrating quantitative data analysis with qualitative perspectives to attain a deeper understanding of the phenomenon.

Participants include students from three lower secondary school classes (Grade 8), organized into cooperative learning groups. The sample ensures balanced representation of students with special educational needs and those without.

Four main instruments were utilized:

1. Conversational Agents – the development of a customized chatbot designed to facilitate group activities and mentoring;
2. Questionnaires – administered before and after the intervention to measure students' motivation, self-efficacy, and engagement;
3. Interviews – semi-structured interviews with both teachers and students to gather qualitative feedback on the use of conversational agents;
4. Observations – systematic monitoring of group interactions during cooperative learning to assess the effectiveness of chatbot-facilitated dialogue.

The research involved 75 students and 18 teachers. Quantitative data were collected via pre- and post-intervention questionnaires, while qualitative data were gathered through semi-structured interviews with teachers and students.

Given the space constraints and the ongoing nature of the research, this article focuses exclusively on the preliminary results from the quantitative pre- and post-intervention data analysis.

The research unfolded across six phases:

1. Preparation Phase: development and testing of the chatbot in collaboration with AI experts and teachers;
2. Training: training sessions for teachers and students on the use of conversational agents;
3. Implementation: integration of the chatbot into cooperative learning and mentoring activities over a six-week period;
4. Data Collection: administration of questionnaires, conduction of interviews, and classroom observations during and after the intervention;
5. Data Analysis: statistical analysis of quantitative data and thematic coding of qualitative interviews and observations;
6. Interpretation and Dissemination of Results, along with the formalization of the intervention model (currently in progress).

4. Data Analysis

The Pre-Intervention Questionnaire (administered before the use of conversational agents) consisted of four domains: Domain 1: Motivation toward learning, Domain 2: Perceived self-efficacy, Domain 3: School engagement, Domain 4: Previous experiences with educational technologies (exploratory questions). The Post-Intervention Questionnaire (administered after the implementation of conversational agents) consisted of five domains: Domain 1: Motivation toward learning (same items as pre-intervention for comparison), Domain 2: Perceived self-efficacy (same items as pre-intervention), Domain 3: School engagement (same items as pre-intervention), Domain 4: Perception of the conversational agent (new items), Domain 5: Mentoring experience. Responses were measured using a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree).

Preliminary findings from the Pre-Intervention Questionnaire analysis indicate:

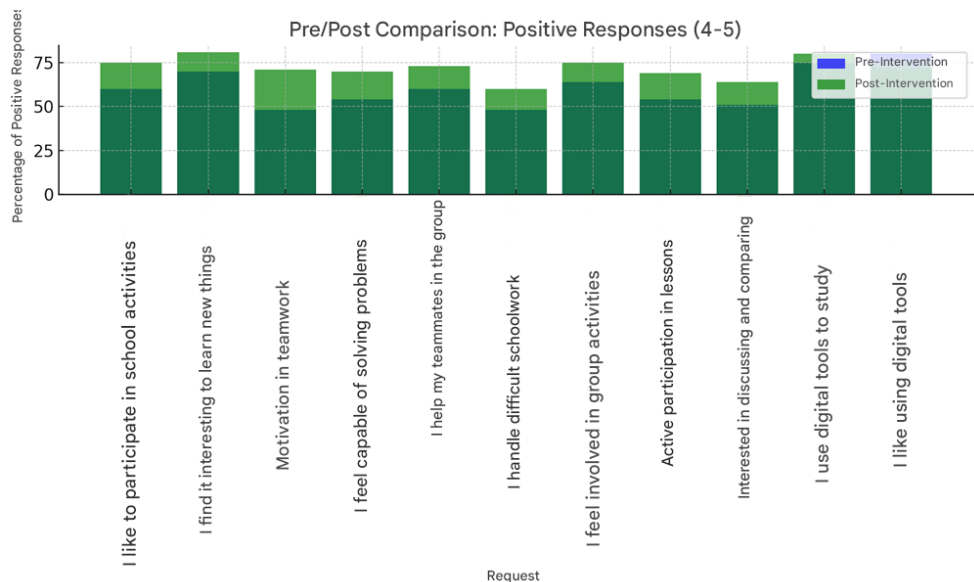
Area	Request	Average	% 1	% 2	% 3	% 4	% 5	% positive responses (4-5)
Motivation	I like to participate in school activities	3,8	5%	10%	25%	40%	20%	60%
	I find it interesting to learn new things	4,0	3%	7%	20%	45%	25%	70%
	Motivation in teamwork	3,5	4%	15%	30%	35%	13%	48%
Self-efficacy	I feel capable of solving problems	3,6	6%	12%	28%	38%	16%	54%
	I help my classmates in the group	3,7	4%	11%	25%	42%	18%	60%
	I handle difficult schoolwork	3,4	8%	14%	30%	35%	13%	48%
Involvement	I feel involved in group activities	3,9	5%	9%	22%	44%	20%	64%
	Active participation in lessons	3,6	7%	13%	26%	36%	18%	54%
	Interested in discussing and comparing	3,5	6%	15%	28%	37%	14%	51%
Technologies	I use digital tools to study	4,1	2%	5%	18%	40%	35%	75%
	I like using digital tools	4,2	1%	4%	15%	39%	41%	80%

The analysis of the Post-Intervention Questionnaire reveals the following:

Area	Request	Average	% 1	% 2	% 3	% 4	% 5	% positive responses (4-5)
Motivation	I like to participate in school activities	4,1	2%	5%	18%	45%	30%	75%
	Motivation I find it interesting to learn new things	4,3	1%	4%	46%	14%	35%	81%
	Motivation in teamwork	4,0	3%	6%	20%	48%	23%	71%
Self-efficacy	I feel capable of solving problems	4,0	3%	7%	20%	45%	25%	70%
	I help my classmates in the group	4,1	2%	6%	18%	46%	28%	74%
	I handle difficult schoolwork	3,8	4%	10%	26%	40%	20%	60%

Involvement	I feel involved in group activities	4,2	2%	5%	18%	45%	30%	75%
	Active participation in lessons	4,0	3%	6%	22%	44%	25%	69%
	Interested in discussing and comparing	3,9	4%	7%	25%	42%	22%	64%
System Utilities	Agent helped to stay focused	4,2	1%	3%	16%	48%	32%	80%
	Agent improved collaboration	4,3	1%	2%	14%	50%	33%	83%
	Agent encouraged a respectful discussion	4,1	2%	5%	18%	46%	29%	75%
	Agent suggested useful tips	4,0	3%	6%	20%	45%	26%	71%
Ease of use	Ease of understanding agent instructions	4,4	1%	2%	12%	48%	37%	85%
	Simple interaction	4,3	1%	3%	14%	48%	34%	82%
	Clear answers from the agent	4,2	2%	4%	15%	46%	33%	79%
Customization support	Agent adapts tasks to my needs	4,0	3%	6%	20%	45%	26%	71%
	I felt personally followed	4,1	2%	5%	18%	48%	27%	75%
	Customized materials/tips	4,0	3%	6%	22%	44%	25%	69%
Emotional experience	More interesting work with agent	4,2	2%	4%	18%	46%	30%	76%
	Greater motivation	4,3	1%	4%	16%	47%	32%	79%
	More safety in the group	4,1	2%	5%	20%	45%	28%	73%
Mentoring	I felt listened to and supported	4,2	2%	4%	18%	46%	30%	76%

Below is a chart comparing Pre-/Post-Intervention responses (positive answers: 4–5):



The pre- and post-intervention survey revealed significant improvements (see Table 1) across all observed domains, confirming the effectiveness of conversational agents as a support tool within cooperative learning and personalized mentoring contexts.

The data collection was carried out on a heterogeneous sample, including both students with special educational needs (SEN) and those without particular learning difficulties, ensuring an inclusive and representative evaluation of the intervention. With regard to the specific areas involved:

- Motivation toward Learning**
 This domain recorded the highest percentage increase (+16%) from pre- to post-intervention. After interacting with the conversational agents, students reported greater interest in school activities and higher satisfaction in participating in group work. This finding supports the idea that interactive digital tools can stimulate intrinsic motivation by offering more engaging, dynamic, and personalized learning opportunities.

- **Engagement in School Activities**

The engagement domain also showed a notable increase (+10%). The use of conversational agents during collaborative activities fostered more active participation and deeper emotional and cognitive involvement among students. In particular, students indicated a greater willingness to engage in peer dialogue, an enhanced sense of group belonging, and improved quality of interaction during group discussions.

- **Perceived Self-Efficacy**

In terms of self-efficacy, data revealed an 8.5% improvement. Following the intervention, students felt more competent in managing complex academic tasks and in providing support to their peers. This result is especially significant from a pedagogical perspective: increased self-efficacy is associated with enhanced academic resilience, collaborative problem-solving, and the ability to tackle educational challenges with autonomy and responsibility.

- **Conscious Use of Technology**

The domain concerning the use of technology showed a 6.5% improvement. Students reported a greater willingness to use digital tools for learning, accompanied by an increased awareness of the benefits of interactive technological resources. This positive trend suggests that the integration of conversational agents can promote a more mature form of digital literacy, particularly when their use is guided by clearly defined educational objectives and aimed at supporting personalized learning pathways.

Area	Improvement (%)	Impact summary
Motivation	+16%	Increased interest in school activities and enjoyment in participating in group work.
Involvement	+10%	Greater active participation, dialogue between peers and a sense of belonging to the group.
Self-efficacy	+8,5%	Strengthened confidence in one's abilities and in managing complex tasks.
Use of technologies	+6,5%	Greater predisposition to the conscious and useful use of digital tools.

Table 1. Summary of Results

The collected data indicate that conversational agents have proven to be effective tools not only in facilitating dialogue and cooperative learning but also in personalizing learning pathways according to the specific needs of students, including those with special educational needs.

Furthermore, the observed positive impact on motivation, self-efficacy, and engagement highlights the potential of conversational agents as innovative didactic mediators, capable of enhancing school engagement and promoting more inclusive, active, and conscious forms of learning.

These results open up interesting perspectives for future educational implementations based on conversational systems, suggesting the need for further investigation into:

- Personalization of agents according to student profiles
- Optimization of interactions to support different cognitive styles
- Synergistic integration with other tools supporting inclusive education.

5. Results and Perspectives

The main objective of this first part of the research was to assess the effectiveness of integrating conversational agents in cooperative learning practices and personalized mentoring, focusing on their impact on motivation, self-efficacy, engagement, and technology use among middle school students, with particular attention to those with special educational needs (SEN).

The data from the pre-post intervention analysis showed significant improvements in all the considered areas:

- Motivation to learn increased by 16%, indicating that conversational agents helped create more engaging and rewarding learning environments. This suggests that the presence of a non-judgmental and always available "dialogic partner" can strengthen intrinsic interest in school activities, especially in cooperative modes.
- Student engagement in learning activities grew by 10%, confirming the potential of conversational agents in supporting forms of active and collaborative participation. Students reported feeling more integrated into workgroups and experienced a stronger sense of belonging, a fundamental aspect in inclusive educational pathways.

- Perceived self-efficacy increased by 8.5%, which is particularly relevant since confidence in one's abilities is a key predictor of academic success. The students involved stated they felt more competent in handling assigned tasks and supporting their peers, demonstrating a positive effect both cognitively and socio-relationally.
- Use of technology also improved (+6.5%), signaling that the integration of conversational agents helped increase familiarity with and positive attitudes toward digital tools supporting learning.

These results align with recent literature on the use of conversational technologies in education (Fryer & Carpenter, 2006; Winkler & Söllner, 2018), highlighting how chatbots and intelligent agents can serve as facilitators of interaction and didactic personalization, understood as recognizing individual differences and diversifying educational goals to promote individual potentials (García Hoz, 2005; Perla, 2013; Amati, 2022).

In particular, the research confirms that the use of conversational agents can have a compensatory effect for students with special educational needs, offering immediate, adaptive, and non-stigmatizing support.

It is important to emphasize how the cooperative mode was particularly suited for integrating conversational agents: interaction with peers, mediated or stimulated by the system, enhanced both group dynamics and individual perceptions of self-efficacy. The agents thus acted not as substitutes for teachers or peers but as catalysts for educational dialogue.

Despite encouraging results, the research has some limitations. The sample size, though balanced in terms of students with and without SEN, is still limited, as is the duration of the intervention (a few weeks), which does not allow for the measurement of long-term effects.

Given the data collected, it is suggested to consider conversational agents as support tools for inclusive practices, especially in the context of cooperative learning and mentoring.

To increase their impact, it is recommended to:

- Personalize the agents' behavior and language more based on student profiles;
- Integrate conversational systems into existing educational platforms to ensure a smooth and coherent experience;

- Assess specific training programs for teachers on the pedagogical use of conversational agents.

In conclusion, the results of this study confirm that conversational agents can represent a promising educational innovation capable of supporting motivation, participation, and student self-confidence, reinforcing the paradigm of cooperative and personalized learning in an inclusive framework (Perla, 2013; Amati, 2022, 2023).

6. Conclusions

Educational institutions, to support everyone in building shared and interdependent futures (UNESCO, 2021) and improve the success opportunities of new generations, will need to undertake a transformative effort in teaching practices, learning objectives, and evaluation methods. Teachers will need to learn and teach with AI. Additionally, current education systems need to focus more on promoting students' creativity and critical thinking (Zhai, 2022), which are essential for solving real-world problems (Zhai et al., 2024). These are life skills that enable the full utilization of AI algorithms, which must always be at the service of human development and well-being.

The idea of an ecosystemic teaching approach is gaining ground, starting from a model of complex knowledge that is actively co-constructed through interaction with the social environment and reflective and co-reflective processes on lived experiences. This approach views the school, classroom, and class as the "result of a fusion of conceptual/instrumental tools, expectations/perceptions, and experiences that allow students and teachers to redefine traditional processes, test new hypotheses, and achieve innovative results in which constructs necessarily overlap" (Pancioli, 2021, p.32).

Differences, as the enactive approach suggests, represent a value; teaching is not a standardized transmission of immutable knowledge but "a journey to take together, of mutual enrichment" (Coin, 2013, p.129) for both teachers and students.

In this scenario, dialogue plays a crucial role, becoming a tool for individual and social growth, "an essential path to participation in democratic life, as a person realizes themselves only if they can express themselves through dialogue with others" (Ferrero, 2021, p.89).

Integrating a conversational agent into school life can contribute to making the dialogic experience more effective, provided it does not replace human dialogue but promotes it and is coherently integrated into an educational project that responds to the human and formative needs of students.

"...the challenge is not to relegate the professor to the rank of 'coach' urging students to use platforms, marginalizing their knowledge, and depriving them of their authority. Nor is it about equipping children and adolescents to 'find their place' in the face of the anticipated omnipresence of artificial intelligence, once again validating ongoing developments. No, the urgency is to offer them all the necessary means to build themselves as autonomous beings, particularly through regular engagement with printed books, which promote attention and the maturation of reflection, to prepare them for the use of critical distance and inventiveness in every circumstance and for life" (Sadin, 2019, p.171).

Author Contributions

The research and editing work is joint between the three authors. For scientific reasons, paragraphs 1 and 6 are attributed to Loredana Perla, paragraphs 3 and 4 to Angelamaria De Feo and paragraphs 2 and 5 to Ilenia Amati.

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