

FORMAZIONE DOCENTI INTEGRATA EMBODIED COGNITION BASED DATI DI RICERCA

INTEGRATED TEACHER TRAINING EMBODIED COGNITION BASED RESEARCH DATA

Valeria Minghelli¹

University of Salerno
vminghelli@unisa.it

Cristiana D'Anna²

University of Salerno
cdanna@unisa.it

Abstract

The school of the 21st century has to face continuous and sudden “emergencies”, from *special educational needs* to the recent and current health emergency, which require constant adjustment of the organization and teacher planning, as well as teacher training.

The theme of *affordances* recalls that of *practical rationality* understood as the ability, of the teacher, to respond in a *co-evolutionary*, systematic and sudden manner to the requests of the physical and social environment. In the ecological vision of *Embodied Cognition* in which brain, body, emotions, and environment co-actively participate in the processes of knowledge, the perception is functional to action, therefore it is important that training offers different perceptual inputs, in order to “guide” the multiple actions to activate in the class context rapid, automatic, better to say *embodied*, decision-making processes to respond to the different and special needs of each pupil. The *Integrated Teacher Training ECb* aims to understand the potential of a design that promotes multimodal cognitive, body, emotional and social involvement in inclusive learning processes. The contribution presents a study on the Integrated Teacher Training ECb experimented in the laboratory of Tfa Course for Support. The results of the research highlight the effectiveness of the implemented training model which produces positive effects on teachers in terms of motivation to participate, perceived effectiveness as a support teacher, development of inclusive teaching skills.

La scuola del XXI secolo deve fronteggiare continue e repentine “emergenze”, dai *bisogni educativi speciali* alla recente e vigente emergenza sanitaria, che richiedono costanti aggiustamenti alla organizzazione e della progettazione didattica, nonché della formazione docenti.

Il tema delle *affordance* richiama quello della *razionalità pratica* intesa come la capacità, da parte del docente, di rispondere in maniera *co-evolutiva*, sistematica e repentina alle richieste dell’ambiente fisico e sociale. Nella visione ecologica dell’*Embodied Cognition* in cui cervello, corpo, emozioni e ambiente partecipano in maniera co-attiva nei processi di conoscenza, la percezione è funzionale all’azione, pertanto, è importante che la formazione offra numerosi input percettivi, al fine di “guidare” le molteplici azioni per attivare, nel contesto classe, processi decisionali rapidi, automatici, per meglio dire *incarnati*, per rispondere alle esigenze diverse e speciali di ciascun allievo. La *Formazione Docenti Integrata ECb* mira a far comprendere le potenzialità di una progettazione che favorisca il coinvolgimento multimodale cognitivo, corporeo, emotivo e sociale nei processi inclusivi di apprendimento. Il contributo presenta uno studio sulla Formazione Docenti Integrata ECb sperimentata nell’ambito dei laboratori del corso del Tfa per il Sostegno. I risultati della ricerca evidenziano l’efficacia del modello formativo implementato che produce effetti positivi sui docenti in termini di motivazione a partecipare, efficacia percepita in qualità di docente di sostegno, sviluppo di competenze didattiche inclusive.

Keywords

Affordances; Embodied Cognition; Integrated Teacher Training; inclusive education Affordances; Cognizione incarnata; Formazione Docenti Integrata; didattica inclusiva

1 Author of paragraphs: “Introduction”; “1. Embodiment and neuroscience: the ECb laboratories to simplify the decision-making processes of the teacher” and “2. Integrated Teacher Training ECb in distance learning experiences”.

2 Author of paragraphs “3. Research questions and objectives”; “4. Data analysis and discussion”; “Conclusion and perspective future”.

Introduction

The school of the twenty-first century is facing an educational emergency deriving from a lot of social, economic, institutional factors, not least the health emergency, which require regular update of the way of understanding and “providing” teaching, in response to a training need that is perpetually in progress. The debate on the inclusive teacher has never closed regarding the never-ending need of each student to be included in the complex school educational system, first, and in the social one, then. The regulatory change around the theme of *Special Educational Needs* (SEN), which began in 2012 and is subject to numerous variations, up to the most recent D.I. 29 December 2020 n. 182, is a bearer of differentiated explicit and implicit contents: if on the one hand, in fact, this normative attention underlines the “duties” of the teacher by “protecting” the rights of students with *SEN*, on the other hand recognizes to the whole school, an essential role in the process of growth and development of the subject. A real challenge, which entrusts the teacher with the responsibility of structuring a context of learning, growth and inclusion that promotes the achievement of educational success and personal bio-psychosocial well-being for each person (WHO, 2001; 2007). At the same time, the need for teachers has been recognized in the last ten years: even in the academic field, in fact, takes hold the debate around the indispensability of thinking in a systematic, effective and replicable way about new educational models for teachers capable of facing the challenges of complexity, recognizing, this time, the “special training need” of each teacher (Damiani et al., 2021).

On all the reflections on the themes of didactics, the phenomenon of teaching/learning, the construct of *continuing education of teachers* (L. 107/2015; European Agency, 2012), translated into the training model we indicate, is placed at a level that we would define “goal”, showing the characteristics of Integrated Teacher Training (Theoretical Practical Experiential Embodied Cognition based (ECb) of being constituted, for teachers, both as an opportunity to find “applicable, replicable and expendable tools”, that practical knowledge and practices that the teacher must possess (Perla, 2011, page 119); and both as an opportunity for a systematic meta-cognitive reflection on strategies, tools, times, contents, on everything that introduces the planning and implementation of the teaching practices themselves; and as a moment of personal growth, not only professional, of acquiring greater awareness, by the teacher, about his own possibilities, potential and abilities.

«The development of ‘inclusive skills’ by teachers and students goes, above all, through the ability to activate profound and authentic processes of change» (Damiani & Gomez Paloma, 2020, p. 101). From this simple and, only apparently obvious, reflection comes the idea of Integrated Training ECb aimed at teachers who, through an integrated, multidimensional, theoretical-practical and experiential education, is conceived as a recursive model, made up of replicable elements, aimed at declining in a transversal and longitudinal manner on the different contents, in multiple areas of training.

The Integrated Teacher Training ECb whose experimentation is underway (Gomez Paloma & Damiani 2015; 2021; Damiani et al., 2021; Minghelli et. al., 2021), again investigated in this paper, aims to provide learners not only with knowledge, but also with new awareness for a planning that is not limited to the mere consideration of progressive times, spaces and contents, but that it takes into account the multiplicity of multimodal involvement underlying the teaching-learning process, which is replicated in an extremely variable manner, according to *non-linear logics* (Sibilio, 2014) among the learners according to the cognitive, bodily, emotional and social dimensions of each one (teachers and learners).

The theme of affordances recalls that of *practical rationality* (Schön, 1993) understood as the ability, of the teacher, to respond in a *co-evolutionary* (Rossi, 2011), systematic and sudden manner to the requests of the physical and social environment. The digital environment, particularly involved in distance learning, offers multiple inputs so that affordances that are useful for future situations are grafted. In the field of educational research, the *educational affordances* can be defined «[...] as the relationships between the properties of an educational intervention and the characteristics of the learner that enable particular kinds of learning by him/her»

(Kirschner, 2002, p.14).

The experiential situations of the ECb laboratories, the final discussions aimed at recursively reflecting on the explicit and implicit affordances that are emerged and perceived, can further benefit from digital mediation. Scientific studies highlight the role of video technology as a training tool for teachers in particular as useful devices to activate moments of reflection on classroom practices (Borko et. al., 2008; Brophy, 2004). Further studies have shown that teachers in pre-service training can benefit from the educational use of digital video (Seidel et al., 2011; Zottmann et al., 2011). The teachers in fact declared that they perceived to pay more attention, determined by greater immersion, resonance and motivation. Some theories on technological mediation re-evaluate the active role of technologies in learning processes (Voogt et al., 2016; Voogt & McKenney, 2017); digital devices, if effectively used in teaching, allow the activation of higher-order cognitive processes (Kramarski & Michalsky, 2010), amplifying the students' ability to understand, communicate and perceive (Angeli & Valanides, 2009, 2015; Ertmer & Ottenbreit-Leftwich, 2010).

Continuous *feedbacks*, a decisive part of the intermediate and final returns provided by the ECb training model, which «have their own affordance, but are also continuously modified by the use» (Limone & Parmigiani, 2017, p. 7), thanks also to the technological implementation of the final video, are able to favor the consolidation of the contents, to grasp the affordances developed during the experiences also at a metacognitive level, enriching them with emotional and motivational connotations strictly linked to the personal experience of each teacher/learner.

In this regard, it becomes essential to implement professional training capable of developing teachers' ability to relate pedagogical technologies with their own pedagogical and content-related approaches (Angeli & Valanides, 2015; Chai et al., 2010), in order to design learning environments that we know how to enhance and make the best use of the potential of technologies.

In light of the state of the art briefly highlighted, emerges the need to experiment with new models of teacher training capable of effectively exploiting the potential of embodied teaching, strongly supported by the most recent research in the field of cognitive neuroscience, through the study and development of methodologies that, through a systemic and integrated approach, are able to effectively use educational affordances and the multimodalities of the teaching-learning process, making the best use of the continuous and dynamic interactions between the activities of the mind, motor system, perceptive and the surrounding environment.

The contribution introduces a study on the ECb integrated training model experimented in the laboratory of training cycle of teacher for the Tfa for support, already implemented and investigated previously in the presence and in blended mode (Minghelli et al., 2021; Damiani et al., 2021), now remotely provided, during the health emergency: even with the distance, we continued, not without effort, to pursue the goal for which the embodied training itself was born, that is the embodiment of the training experience. The research hypothesis is based on the belief that integrated teacher training ECb, even in distance learning mode, can increase the motivation to participate, the ability to choose inclusive strategies and the development of practical skills that can be spent at school, helping to influence positively on the perception of effectiveness of the teacher. The research, conducted through the administration of an entrance and exit questionnaire, pre- and post-integrated ECb training, aims to detect perceptions, opinions and attitudes of teachers in relation to research hypotheses.

1. Embodiment and neuroscience: the ECb laboratories to simplify the decision-making processes of the teacher

Each experience is the result of multiple sensory stimuli which are responsible for the arousal of different parts of our brain: visual, auditory, sensory-motor and limbic/thalamic area. These areas, already connected to each other, establish further connections when they are together excited and when the same experience is repeated several times (Gombrich, 1970). Some scholars (Jarvis, 2006; Jarvis & Parker, 2007) describe learning as a holistic experience that involves the senses as much as the brain.

Damasio identifies in *basic attention*, in *operational memory* and in *somatic states* the neural devices capable of assigning meaning and value to the contents of perceptions and of fostering attention and consolidation in memory. These devices represent «that complex set of processes that lead man to organize his perceptions into factual knowledge, categorize them, derive from this categorization elements to bring forward future behavior of a phenomenon and make decisions: in a word, what is usually given the name of knowledge» (Rivoltella, 2012, p. 49). Cognitivist psychology rejects the idea that the individual is to be considered a passive subject, whose “senses” allow the mere reception of information from the outside world. In this perspective, the cognitive process becomes constructive and selective, strongly dependent on previous experiential experiences, on intentions, emotions and motivations subtended to the cognitive action itself.

Therefore, the importance of conceiving the teaching-learning process as an experience of co- construction of knowledge is outlined, which recognizes the peculiarities of each one’s experiential and cognitive baggage and which is strongly influenced by the predisposition of a multidimensional stimulation capable of favoring the teaching-learning process, amplifying the knowledge of relationships with the environment and with others.

The Embodied Cognitive Science (ECS), in this sense, takes a multi-perspective view recognizing the role of *corporeality*, *intersubjectivity*, *embodied simulation* (Glenberg, 2008a, 2008b; Barsalou, 2010; Paas & Sweller, 2012; Wilson & Foglia, 2011; Gallese, 2003; 2005; 2014) and giving value to the implicit dimensions subtended to the learning processes which, by absorbing and receiving the characteristics of the environment, derive from it new and specific affordances.

«The interconnected dimensions of well-being, emotions and body, influence the cognitive, thinking, decisions, motivations, the sense of initiative and autonomy, also for study and school» (Oliverio, 2009, p. 65). Therefore, the quality of the experiences and the inputs offered by the environment, enriched by the interaction between the body and emotional experiences, are able to nourish the thoughts and learning related to those particular experiences.

Furthermore, in reiterating the concept of “dependent experience” described by Siegel (2001) for which «remembering does not simply mean recalling the ordinary recording of information” but in which «the memory [...] presents characteristics of the initial engram but also elements of memory deriving from other experiences, and [...] is affected by the influences exerted by the context and state of mind in which we find ourselves in the present» (Siegel, 2001, p. 28), the need to structure formative experiences that influence not only the moments of knowledge construction, nor only those dedicated to memorization and learning, but also those favoring the recovery and use of cognitive and relational skills at the service of experience.

Particularly consistent with the principles described here is the construct of the *somatic marker*: that embodied decision-making mechanism described by Damasio, acquired with experience and constantly susceptible to variations in function of endogenous constraints, social and cultural influences, considered capable of “guiding” the individual in the choices of personal conduct «as a sort of wisdom derived from the body» (Caruana & Borghi, 2016, p. 73).

Ecological theory recognizes the central role played by the environment (in addition to the finalization of the action) considered capable of constituting the context of a specific action, providing specific affordances that the sensory-motor process should learn to understand, simplifying the cycle of perception-action (Gibson, 1979). Within our experiences, we perceive in order to act and what we perceive depends on how we intend to act (Glenberg et al., 2013) and «in relation to cognition and action in general, perception is basic and comes first» (Gallagher & Zahavi, 2009, p. 23). «The affordances that a subject is able to perceive in a given object depend on previous experiences, on his current needs, on his awareness of what the given object can make available» (Gomez Paloma et al., 2016, p. 78). Therefore, in this perspective, knowledge and learning acquire a strong perceptual-motor connotation that uses all sensory channels, actively involving the body, its past, present and future in relation to the environment and to the others. In the Gibsonian ecological paradigm, perception is direct, that is, it does not require

mediating representations; it is action in the sense that it is not limited to the passive recording of external stimuli, but consists of a manipulation of inputs conveyed among other things «[...] by eye movements, head movements, and body movements», finally it is itself perception of affordance or «[...] of what objects and the surrounding world offer us and invite us to do» (Caruana & Borghi, 2016, p. 37). Therefore, in the embodied perspective in which the brain, body, emotions and environment co-actively participate in the processes of knowledge and in the vision in which perception is functional to action, it is important that training (theoretical, practical and experiential) offers different perceptual inputs. This is in order to “guide”, albeit in a simulated and reflexive way, the multiple actions to activate, then, in the class context that requires constant and sudden, decision-making processes which are rapid, automatic, better to say embodied, to respond to the different and *special needs* of each pupil.

2. Integrated Teacher Training ECb in distance learning experiences

Aware of the fact that the application of embodied principles cannot and should not be implemented in an absolutist and uncritical way (Damiani & Gomez Paloma, 2020), however, we are convinced of how much the reflections that arise, cannot but influence the themes of education, in the identification of new models and strategies based on integrated logics, which contemplate the multidimensionality of education processes, with the aim of enforce the experiences and promoting the incarnation of contents, styles, behaviors and awareness of the teacher.

To this end, the laboratories provided a different declination of the embodied principles according to the new “distance” learning environment, with the aim of compensating for the gap caused by the pandemic emergency, to the active involvement of bodies in the interpersonal relationships that constitute the fulcrum of the laboratories in presence, and which favor the establishment of intersubjective dialogues that are effective in the co-construction of learning. To this end, even remotely, it was decided to identify the constituent elements of the experiential laboratories in the ECb methodology with the aim of encouraging those processes of consolidation of contents, acquisition of professional skills and new awareness.

The ECb integrated model foresees the structuring of the lessons, according to a recursive order divided into three phases: *theoretical training*, *practical-experiential laboratory*, *final discussion* each recurring in each day. The first theoretical part provides for a transversal discussion of the contents and, pursuing the objective of stimulating the activation of *meaningful learning* (Ausubel, 1978), it consists of continuous references to previous learning, elicitation, reflections with learners with references to their experiences with the aim of putting pressure on the *intrinsic motivation* of each and nourishing the *extrinsic* one (Maslow, 2010) and bringing the contents as close as possible to practical experiences and above all to the needs of the learners. This *recursive* element of the training draws on the experiences of each one, giving back to the teachers the idea of the *educational care* that welcomes, recognizes and emphasizes the specificity of each one and exploits the dimensions of *intersubjectivity* and *intentional consonance* (Gallese, 2007) that are generated within the group, which co-evolves starting from the individuality of the individuals and according to the new relational and contextual variables that are triggered in the process.

The experiential laboratories, making up the core of ECb integrated model, consist of body games also remotely carried out, in which everyone has been actively involved in participating and in which each has taken on a specific role within small groups. Other activities expected in the experiential laboratories are role playing situations, cooperation activities in small groups or in peer-to-peer situations in practical experiences of “observation” of the child in the classroom context. This practical experience of exercise was particularly useful, remotely, to allow the immersion and resonance of the activities carried out with the body in the presence, through the use of videos of real experiences, which allowed the simulation of situations with the child and favored the identification and active participation of teachers/learners greatly.

These activities, in fact, are equally successful in the intent of involving the body, emotional, cognitive and motivational dimensions of teachers/learners in a multimodal way, stimulating

their view, perception, action and exploiting, in dialogue with others, the dimensions of intersubjectivity and empathic closeness.

The final discussion invites teachers to report their perceptions about the laboratories they have experienced, through the use of communication skills typical of active listening, positive feedback and suspension of the judgment, allowing to refine the empathic skills of each teacher and to reflect on importance of promoting fruitful interpersonal interactions. In this moment of training, particularly useful in favoring the acquisition of what we call “integrated skills” (Gomez Paloma & Damiani, 2015), each one reports their perceptions on the actions experienced with others and the personal references that these have provoked in reflecting on the decision-making processes that each teacher activates in the classroom in the context of each educational didactic intervention. In the experiential laboratory and in the final discussion, there is the recursive function, typical of the *reflective teacher* (Schön, 1993; Fabbri, 2007), aimed at stimulating the “personal narration” of each one and the subsequent meta-cognitive reflections on the consequences of the activities experienced in, cognitive, social and emotional terms.

The Integrated Teacher Training ECb «offers teachers to experience, perceive and understand in the first person (emotional-personal dimension), in the group (interpersonal social dimension, of bodies in relation) the very contents of the training (cognitive dimension) of which the teacher is called to promote himself with his students» (Damiani et al., 2021, p. 116).

A final *embodied tool*, also useful for making teachers/learners perceive the concept of educational care, and also in turn capable of triggering recursive reflexive processes with students, is the *final restitution*: a digital artifact «endowed with a dynamic of its own that is not that of inert matter, nor that of organic beings, nor the simple result of their meeting» (Simondon, 2009, p.7), but which takes up and exploits the potential of feedback in the educational and didactic fields and declines them in training with the teachers, giving them back the sense of the shared experience, as well as the reconstruction of situations of effectiveness perceived and lived by each one during the laboratories. The *final restitution* consists in the audio-visual reconstruction of the laboratories through the editing of photos, audio and narrative contents of the individual laboratory experiences. The “final video” is an *autobiographical narration* of the laboratory experiences of each one and constitutes itself an experiential laboratory, which actively involves the emotional participation of the learners, giving them a positive reinforcement capable of underlining the ability of each one to share meaningful experiences, the willingness to get involved, the awareness of becoming an active part of a process of co-construction of knowledge. An expedient aimed at returning teachers/learners to the effectiveness of their commitment and in an indirect and recursive manner of the training model, as well as the effectiveness of the “restitution” itself, which stimulates further reflections on the importance of positive feedback as a tool of recognition, of taking charge of the individuality of each one and of personalization of training courses.

The *final restitution* proved to be particularly significant in the course of the experiences carried out both in presence and at a distance, constituting an opportunity for multisensory stimulation, typical of the ECb approach, which in both situations was useful in combining the cognitive, emotional and bodily emerged dimensions, attributing a sense to the experiences and loading it with a profound meaning strongly connected to the theoretical contents in order to provide teachers/learners with the complete image of the training path that has seen them protagonists of that same transformation that they intend to promote with their students.

«Remembering [...] is never a re-edition of what was once lived, but it is always a construction of the past experience, which outlines the perception of the present allowing us to anticipate the future» (Gomez Paloma, 2009, p. 53) intuitive and immediate the reference to the link between *perception*, *action* and *affordance* that constitute the “bridge” between previous experiences, current ones and future decision-making processes.

4. Research questions and objectives

Embodied cognition therefore proposes a multimodal stimulation within the dynamics of teaching/learning, in the belief that the cognitive dimension can be implemented, supported,

embodied by the bodily and emotional dimensions. The data, in itself, is no longer in discussion. Instead, it is a question of understanding its potential and its advantage over a classic, “disembodied” approach, as well as clarifying the multiple meanings that this idea has taken on. The prescriptive consequence of this idea is that any study / research that avoids considering the body is, at best, incomplete (Caruana & Borghi, 2013).

It becomes essential to experiment with training models that can offer us empirical data to fully understand the learning of teachers in training, trying to understand what facilitates and what inhibits their pedagogical reasoning and how can be enhanced educational, social, and technological affordances for the effective design, implementation, and research of learning environments (Kirschner, 2002; De Rossi & Trevisan, 2018) from an embodied perspective.

This is the synthesis on which the research question is grafted: understanding the potential of an embodied approach, declined in the context of teacher training through the integrated EC-based model.

The study therefore pursues the following objectives:

- investigate the potential of an integrated theoretical-practical-experiential teacher training ECb in the remote laboratory experience;
- understand the repercussions of an ECb training: on the motivation to participate, on the ability to choose inclusive strategies, on the perception of effectiveness of the teacher;
- detect useful information about the teachers/learners’ perception, about the ECb integrated model, to address the future questions of the ongoing experimentation.

5. Participants and research design

The pre-experimental study (Notti, 2008) was implemented with the intent already described above to verify some hypotheses of the ECb integrated model. The research involved a single experimental group, consisting of students involved in the training provided for the Specialization Course for Support for Kindergarten. It is therefore a non-probabilistic sampling (Trincherò, 2004).

About 69 teachers/learners taking part in the course, 65 (94.2%) completed the questionnaire both on entry (T1) and on exit (T2); two survey moments defined to verify the effects produced by the implementation of the training model in terms of didactic effects, motivation and perception of self-efficacy. Table 1 contains the characteristics of the sample.

The research used a qualitative-quantitative approach (La Marca, 2014; Terrell, 2012; Trincherò, 2004), which allowed a statistical analysis of the data and at the same time provided further information useful for a deeper interpretation of the same, in reference to the context and background of the sample. This is also in order to be able to remodulate, if there are discrepancies between quantitative and qualitative data, procedural and methodological aspects, defining the subsequent lines of investigation in the best possible way.

Table 1: Sample Characteristics

Age	M= 39,04	DS= 8,14
Gender	F= 96,6 %	M= 3,1 %
Support teaching experience	Yes= 70,8 %	No = 29,3 %
School grade	Kindergarten = 27,7%	Primary school= 72,3%

6. The tool

The survey tool consists of an *ad hoc* structured questionnaire, following a preliminary pre-test carried out on a previous group of teachers/students attending the same specialization course. This is in order to verify the clarity and order of the items, the choice of the method of closing the questions, the general architecture of the questionnaire, which is the object of the research and to detect any aspects connected to the research object not investigated (Trincherò, 2004; Montalbetti & Lisimberti, 2015).

The administration (T1 and T2) took place online in a self-completed form through the Survey Monkey platform in the period of January-February 2021.

The questionnaire is made up of 23 items which, for a better reading and understanding, have been divided into several sections: *section A*, personal data and general information on the school career (A It.1-6); *section B*, specific information regarding the integrated structuring of the laboratories in terms of the theoretical, practical and experiential part (B It.1-2-3); influence of the three dimensions on the motivation to participate (B It.4-5-6); impact of the three dimensions on inclusive didactic action (B It.7-8-9); integrated three-dimensional training (B It.10); perception of effectiveness (B It.11); effectiveness of integrated training on inclusive teaching (B It.12); *section C*, analysis of the strengths and weaknesses of integrated training (C It.1-5).

For the items in *section B*, object of study in this article, was adopted the *Likert scale* (1932) which allows to attribute a numerical data to qualitative aspects, making possible to quantify the character in question: each subject was asked to express the degree of agreement for each statement with five alternative answer possibilities from “at all” (1) to “a lot” (5).

In the introduction to the questionnaire, was communicated general information on the processing of the data provided and the purposes of the research.

7. Data analysis and discussion

SPSS-23 software was used for data analysis. For each item, were calculated, for both input and output, average, standard deviation, minimum and maximum values (*tab. 2*). Subsequently, after verifying the normality of the data distribution, a hypothesis test (T-Test) was produced with paired data to verify the difference between the means of the variables, the statistical significance, for each item, is highlighted in *tab. 2* which shows in bold a very significant p-value ($p \Rightarrow .001$). The frequencies and percentages are shown in *tab. 3*.

Table 2: Questionnaire T1 (pre) and T2 (post) Integrated Teacher Training ECb
(Descriptive statistics and paired t-test results)

	It1 How much theoretical training was there in the Support laboratory?	It2 How much practical training was there in the support laboratory?	It3 How much experiential training was there in the laboratory for the support carried out?	It4 How much did the theoretical content affect the motivation to participate?	It5 How much did practical experiences influence your motivation to participate?	It6 How much did the experiential laboratories have on your participation?
	<i>T1 (Pre-) It 1</i>	<i>T1 (Pre-) It 2</i>	<i>T1 (Pre-) It 3</i>	<i>T1 (Pre-) It 4</i>	<i>T1 (Pre-) It 5</i>	<i>T1 (Pre-) It 6</i>
N valid	65	65	65	65	65	65
Mean	3,74	2,58	2,62	3,14	3,45	3,23
Std. Dev.	,871	,682	,744	,768	,867	,915
Minimum	2	1	1	1	1	1
Maximum	5	4	4	5	5	5
	<i>T2 (Post-) It 1</i>	<i>T2 (Post-) It 2</i>	<i>T2 (Post-) It 3</i>	<i>T2 (Post-) It 4</i>	<i>T2 (Post-) It 5</i>	<i>T2 (Post-) It 6-</i>
N valid	65	65	65	65	65	65
Mean	3,55	3,57	3,77	3,71	4,05	4,02
Std. Dev.	,730	,935	,862	,824	,717	,739
Minimum	2	1	2	2	2	2
Maximum	5	5	5	5	5	5
	<i>p = .193</i>	<i>p = .000</i>	<i>p = .000</i>	<i>p = .000</i>	<i>p = .000</i>	<i>p = .000</i>

	It7 How much do you think the theoretical contents affect your ability to choose inclusive strategies?	It8 How much do you think practical experiences affect your ability to choose inclusive strategies?	It9 How much do you think the experiential laboratories affect your ability to choose inclusive strategies?	It10 Did the laboratory carried out provide for the integration of the three theoretical, practical and experiential training dimensions?	It11 Has your self-efficacy perception as a support teacher changed as a result of integrated training??	It12 Did the laboratory carried out provide you with effective intervention tools, as a support teacher?
	<i>T1 (Pre-) It 7</i>	<i>T1 (Pre-) It 8</i>	<i>T1 (Pre-) It 9</i>	<i>T1 (Pre-) It 10</i>	<i>T1 (Pre-) It 11-</i>	<i>T1 (Pre-) It 12</i>
N valid	65	65	65	65	65	65
Mean	3,45	3,92	3,60	3,37	3,26	3,15
Std. Dev.	,751	,777	,880	,821	,644	,755
Minimum	1	2	1	1	1	1
Maximum	5	5	5	5	4	5
	<i>T2 (Post-) It 7</i>	<i>T2 (Post-) It 8</i>	<i>T2 (Post-) It 9</i>	<i>T2 (Post-) It 10</i>	<i>T2 (Post-) It 11</i>	<i>T2 (Post-) It 12</i>
N valid	65	65	65	65	65	65
Mean	3,69	4,32	4,25	4,14	3,74	4,22
Std. Dev.	,828	,731	,791	,704	,796	,718
Minimum	2	2	2	3	1	3
Maximum	5	5	5	5	5	5
	<i>p = .084</i>	<i>p = 0.02</i>	<i>p = .000</i>	<i>p = .000</i>	<i>p = .000</i>	<i>p = .000</i>

Table 3: Questionnaire results T1 (pre-) e T2 (post-) Integrated Teacher Training ECB (Frequencies and percentages)

IT1 T1 How much theoretical training was there in the support laboratory?

	Frequency	%
Valid Little	3	4,6
Somewhat	26	40,0
Quite a lot	21	32,3
A lot	15	23,1
Total	65	100,0

IT2 T1 How much practical training was there in the support laboratory?

	Frequency	Percent
Valid At all	1	1,5
Little	31	47,7
Somewhat	27	41,5
Quite a lot	6	9,2
Total	65	100,0

IT3 T1 How much experiential training was there in the laboratory for the support carried out?

	Frequency	%
Valid At all	4	6,2
Little	23	35,4
Somewhat	32	49,2
Quite a lot	6	9,2
Total	65	100,0

IT4 T1 How much did the theoretical content affect the motivation to participate?

	Frequency	%
Valid At all	2	3,1
Little	7	10,8
Somewhat	38	58,5
Quite a lot	16	24,6
A lot	2	3,1
Total	65	100,0

IT5 T1 How much did practical experiences influence your motivation to participate?

	Frequency	%
Valid At all	1	1,5
Little	7	10,8
Somewhat	25	38,5
Quite a lot	26	40,0
A lot	6	9,2
Total	65	100,0

IT6 T1 How much did the experiential laboratories have on your participation?

	Frequency	%
Valid At all	2	3,1
Little	11	16,9
Somewhat	26	40,0
Quite a lot	22	33,8
A lot	4	6,2
Total	65	100,0

IT1 T2 How much theoretical training was there in the support laboratory?

	Frequency	%
Valid Little	3	4,6
Somewhat	29	44,6
Quite a lot	27	41,5
A lot	6	9,2
Total	65	100,0

IT2 T2 How much practical training was there in the support laboratory?

	Frequency	Percent
Valid At all	1	1,5
Little	6	9,2
Somewhat	24	36,9
Quite a lot	23	35,4
A lot	11	16,9
Total	65	100,0

IT3 T2 How much experiential training was there in the laboratory for the support carried out?

	Frequency	%
Valid Little	3	4,6
Somewhat	24	36,9
Quite a lot	23	35,4
A lot	15	23,1
Total	65	100,0

IT4 T2 How much did the theoretical content affect the motivation to participate?

	Frequency	%
Valid Little	4	6,2
Somewhat	22	33,8
Quite a lot	28	43,1
A lot	11	16,9
Total	65	100,0

IT5 T2 How much did practical experiences influence your motivation to participate?

	Frequency	%
Valid Little	2	3,1
Somewhat	9	13,8
Quite a lot	38	58,5
A lot	16	24,6
Total	65	100,0

IT6 T2 How much did the experiential laboratories have on your participation?

	Frequency	%
Valid Little	1	1,5
Somewhat	14	21,5
Quite a lot	33	50,8
A lot	17	26,2
Total	65	100,0

IT7 T1 How much do you think the theoretical contents affect your ability to choose inclusive strategies?

	Frequency	%
Valid At all	1	1,5
Little	3	4,6
Somewhat	31	47,7
Quite a lot	26	40,0
A lot	4	6,2
Total	65	100,0

IT8 T1 How much do you think practical experiences affect your ability to choose inclusive strategies?

	Frequency	%
Valid Little	2	3,1
Somewhat	16	24,6
Quite a lot	32	49,2
A lot	15	23,1
Total	65	100,0

IT9 T1 How much do you think the experiential laboratories affect your ability to choose inclusive strategies?

	Frequency	%
Valid At all	1	1,5
Little	6	9,2
Somewhat	19	29,2
Quite a lot	31	47,7
A lot	8	12,3
Total	65	100,0

IT10 T1 Did the laboratory carried out provide for the integration of the three theoretical, practical and experiential training dimensions?

	Frequency	%
Valid At all	1	1,5
Little	6	9,2
Somewhat	31	47,7
Quite a lot	22	33,8
A lot	5	7,7
Total	65	100,0

IT11 T1 Has your self-efficacy perception as a support teacher changed as a result of integrated training??

	Frequency	%
Valid At all	1	1,5
Little	4	6,2
Somewhat	37	56,9
Quite a lot	23	35,4
Total	65	100,0

IT12 T1 Il laboratorio svolto ti ha fornito efficaci strumenti di intervento, in qualità di insegnante di sostegno?

	Frequency	%
Valid At all	1	1,5
Little	7	10,8
Somewhat	42	64,6
Quite a lot	11	16,9
A lot	4	6,2
Total	65	100,0

IT7 T2 How much do you think the theoretical contents affect your ability to choose inclusive strategies?

	Frequency	%
Valid Little	3	4,6
Somewhat	26	40,0
Quite a lot	24	36,9
A lot	12	18,5
Total	65	100,0

IT8 T2 How much do you think practical experiences affect your ability to choose inclusive strategies?

	Frequency	%
Valid Little	1	1,5
Somewhat	7	10,8
Quite a lot	27	41,5
A lot	30	46,2
Total	65	100,0

IT9 T2 How much do you think the experiential laboratories affect your ability to choose inclusive strategies?

	Frequency	%
Valid Little	1	1,5
Somewhat	11	16,9
Quite a lot	24	36,9
A lot	29	44,6
Total	65	100,0

IT10 T2 Did the laboratory carried out provide for the integration of the three theoretical, practical and experiential training dimensions?

	Frequency	%
Valid Somewhat	12	18,5
Quite a lot	32	49,2
A lot	21	32,3
Total	65	100,0

IT11 T2 Did the laboratory carried out provide you with effective intervention tools, as a support teacher?

	Frequency	%
Valid At all	1	1,5
Little	2	3,1
Somewhat	19	29,2
Quite a lot	34	52,3
A lot	9	13,8
Total	65	100,0

IT12 T2 Il laboratorio svolto ti ha fornito efficaci strumenti di intervento, in qualità di insegnante di sostegno?

	Frequency	%
Valid Somewhat	11	16,9
Quite a lot	29	44,6
A lot	25	38,5
Total	65	100,0

This article takes into consideration the data of section B in order to reflect on the data that emerged in the light of the comparison between the results of the two administrations (T1 and T2). For items B1-2-3 that investigate the integrated structuring of the laboratories in the theoretical, practical and experiential dimensions, the comparison of the pre- and post-data allows to detect a statistically significant difference between the ECb laboratories, and the previous laboratories experienced in the course of training, for items B2 (practical training) and B3 (experiential training), as opposed to theoretical training which does not present important differences. Items B4-5-6 which detect the influence of the three dimensions on the motivation to participate, have very significant differences for each of the dimensions. Specifically, it is important to highlight the result that emerges regarding practical experiences where the figure “somewhat” goes from 38.5% to 13.8% in output, “quite a lot” from 40% to 58.5% and “a lot” from 9.2% to 24.6%; for the item on experiential laboratories, “somewhat” goes from 40% to 21.5%, “quite a lot” from 33.8% to 50.8%, “a lot” from 6.2% to 26.2%. These results, which show how much the data with the “somewhat” value is redistributed on “quite a lot” and “a lot” with a difference of about 20 percentage points, give us the data for which the ECb training model strongly affects the motivation to participate. Consistently to item B1, item B7 which investigates the impact of theoretical contents on the ability to choose inclusive strategies, does not present a significant difference between the pre- and post-: this allows us, together with the data of item B1, to interpret the results confirming how much the embodied laboratory does not intend to sacrifice the theory as a function of an experiential practical implementation, but instead intends to exploit this implementation to strengthen and enhance the theory.

Items B8 and 9 are particularly interesting, which detect the perception of the impact of practical experiences and experiential laboratories on the ability to choose inclusive strategies. The data compared to the pre- and post-test, show that teachers/learners perceive that the practical experiences affect the ability to choose “somewhat” (from 24.6% to 10.8%), “quite a lot” (from 49.2% to 41.5%), “a lot” (from 23.1% to 46.2%); experiential laboratories are perceived as quite influential (from 29.2% to 16.9%), very influential (from 47.7% to 36.9%) and very much influential (from 12.3% to 44.6%). Also, in this case it is necessary to highlight the significant variation in the perception of teachers, after the ECb laboratory about the incidence of practical experiential contents, which effectively respond to the teacher’s training need to acquire inclusive teaching skills that can be truly spent in school.

In item B10, which detects the perception of the integration of the three dimensions, comparing the ECb model in the pre- and post- with the other experienced laboratories, the average increases significantly in the post test. The standard deviation assumes a lower value demonstrating a lower variability of the output data, that is, while at the entry, several learners responded using the lower values “not at all” or “a little” in reference to the theoretical practical experiential integration, these two degrees were not used by any students in the output test: all declare to have perceived the integration of the three dimensions using only the descriptors from “somewhat” to “a lot”: “somewhat” (from 47.7% to 18.5%), “quite a lot” (from 33, 8% to 49.2%), “a lot” (from 7.7% to 32.3%). The data is particularly useful to underline the strength of the model, that is, its ability to implement the integration of the three theoretical, practical and experiential dimensions, which are actually perceived and reported by teachers/learners.

For item B11, which notes how much the perception of effectiveness as a support teacher has changed as a result of integrated training, the results of the entry test change significantly as indicated below: “little” (from 6.2% to 3.1%), “somewhat” (from 56.9% to 29.2%), “quite a lot” (from 35.4% to 52.3%) and the value “a lot” emerges only in the post test for 13.8%. Consistently with the results of items B 8 and 9 described above, the perception of self-efficacy of teachers/learners also grows.

Finally, Item B12 investigates on how much teachers/learners consider the ECb laboratory to be effective in terms of availability in the use of intervention tools, as support teachers. This data also shows a very significant difference in the comparison between pre and post test: at the output the values 1 and 2, used at the input, were not used; the input and output data record

the following percentages “at all” (from 1.5% to 0%), “little” (from 10.8% to 0%), “somewhat” (from 64.6% to 16.9%), “quite a lot” (from 16.9% to 44.6%), “a lot” (from 6.2% to 38.5%).

The ANOVA, carried out to detect any differences between groups, does not show any significant difference between the group of teachers/learners who declare that they have carried out substitutions on the support and the group that instead claims to have no experience in this regard; the same can be said about the comparison between the three groups divided according to the number of years of service carried out. It is possible to understand the data by confirming the effectiveness of the training “apart” from the individual needs or by confirming the potential for individualization and didactic-training personalization of the model, however, overcoming enthusiastic impulses, the data deserves further attention in future investigations.

Conclusions and future perspectives

This work, as amply highlighted, aims to operate on the paradigmatic approach of the teacher training system, integrating it with area of training, exchange, body expression, empathic sharing, collaboration following the simplest, yet the least considered assumption, through which it’s easier to memorize what has been learned through affective participation, active participation, cooperation and co-responsibility (Goleman, 1996).

The research is part of a line of studies aimed at testing the ECb training model in the various training contexts in order to understand its repercussions in educational terms. The research group is working on the systematic evaluation of the model (Damiani et al., 2021), through the identification of replicable elements in line with the embodied framework, as well as on the development of a survey questionnaire that investigates the individual constituent elements of the model.

It is hoped that such a training structure can constitute a valuable tool placed in the hands of future teachers, that can improve the dynamics of interaction and collaboration between the latter and that it can produce a real improvement of the learning contexts, in line with the principles of the *International Classification of Functioning* and Inclusive Education.

A strong point of the ECb training model clearly emerges from the data of this study: the *circularity* of the training intervention thus structured, that offers to teachers the opportunity to experience the effects of what they are asked to implement with the students. If for teachers we will think of useful interventions to promote not only the planning of contents, but the planning of times and spaces, strategies and techniques and, if with them we activate metacognitive and personal reflections on each of these aspects, we will obtain the effect of raising awareness about the effectiveness of the intervention itself.

The ECb training model, which originates from previous research-training experiences (Gomez Paloma & Damiani, 2021) and from pilot experiments conducted over the years, is being enriched with new elements and renewed reflections emerging from the results of the most recent experiences. For these reasons, research grasps in this renewal, the opportunities for the evolution of the model and assumes the risks inherent in exploratory investigations. Here lies the awareness of the critical points of this study, which starting from the considerations about the numerosness and characteristics of the sample and the qualitative-quantitative tools for collecting data, allow to reflect about the impossibility of generalization of the results and the need to expand the sample through the systematic implementation of the model.

The results of the research, however, highlight the effectiveness of the implemented training model which produces positive effects on teachers in terms of motivation to participate, perceived effectiveness as a support teacher, development of inclusive teaching skills.

Furthermore, another strong point can be found in the fact that the ECb training model activated in distance learning, in the research for *vicariant* strategies (Berthoz, 2011), allowed to grasp the potential of affordances in their various forms, integrating and amplifying the *embodied* dimension. Finally, the remote experience has demonstrated in an even more incisive way, “despite and thanks” to the distance itself, the role played by the *final restitution* foreseen at the end of the embodied laboratories which, consistently with the reflections around *digital*

artifacts, demonstrated the ability, typical of technologies, to manipulate the world and perceive it through artifacts and to acquire new information from it (Limone & Parmigiani, 2017) offering new inputs to the future prospects for implementing the model, both in the hypothesis of a return in presence and in blended training situations.

References

- Agenzia Europea (2012). «Teacher Education for Inclusion. Profile of Inclusive Teachers»: www.european-agency.org.
- Angeli, C. & Valanides, N. (2009). Epistemological and methodological issues for the conceptualization, development, and assessment of ICT-TPCK: Advances in technological pedagogical content knowledge (TPCK). *Computers & Education*, 52(1), 154–168.
- Angeli, C. & Valanides, N. (Eds.) (2015). Technological pedagogical content knowledge. Exploring, developing, and assessing TPCK. *New York, NY: Springer*.
- Ausubel, D.P. (1978). Educational Psychology. A cognitive view, Holt, Rinearth and Winston, Inc., New York, 1968. In D. Costamagna (ed. italiana a cura di), *Educazione e processi cognitivi: guida psicologica per gli insegnanti*, Milano, Franco Angeli, 1978.
- Barsalou, L.W. (2010). Grounded cognition: Past, present, and future. *Cognitive Science*, 2(4). <https://doi.org/10.1111/j.1756-8765.2010.01115.x>
- Berthoz, A. (2011). *La semplicità*. Torino: Codice.
- Borko, H., Jacobs, J., Eiteljorg, E., & Pittman, M. E. (2008). Video as a tool for fostering, productive discussions in mathematics professional development. *Teaching and Teacher Education*, 24(2), 417–436. <http://dx.doi.org/10.1016/j.tate.2006.11.012>.
- Brophy, J. (2004). *Using video in teacher education*. Amsterdam, Netherlands: Elsevier.
- Caruana, F. & Borghi, A. M. (2013). Embodied Cognition: una nuova psicologia. *Giornale Italiano di Psicologia*. DOI: 10.1421/73973.
- Caruana, F. & Borghi, A.M. (2016). *Il cervello in azione. Introduzione alle nuove scienze della mente*. Bologna: Mulino.
- Chai, C. S., Koh, J. H. L., & Tsai, C. C. (2016). A review of the quantitative measures of Technological Pedagogical Content Knowledge (TPACK). In M. C. Herring, M. J. Koehler, & P. Mishra (Eds.), *Handbook of Technological Pedagogical Content Knowledge (TPACK) for Educators*, 2nd Edition (pp. 87-106). London, UK: Routledge.
- Damiani, P. & Gomez Paloma, F. (2020). “Dimensioni-ponte” tra neuroscienze, psicoanalisi ed ECSper favorire l’inclusione a scuola nella prospettiva transdisciplinare. *Italian Journal of Special Education for Inclusion*. DOI: 10.7346/sipes-01-2020-08, pp. 91-110.
- Damiani, P. Minghelli, V., D’Anna, C. & Gomez Paloma, F. (2021). L’approccio Embodied Cognition based nella formazione docenti. Un modello formativo ricorsivo per le competenze integrate del docente. *Annali online della Didattica e della Formazione Docente*. Vol. 13, n. 21/2021, pp. 106-128 – ISSN 2038-1034.
- De Rossi, M. & Trevisan, O. (2018). Technological Pedagogical Content Knowledge in the literature: how TPCK is defined and implemented in initial teacher education. *Italian Journal of Educational Technology*, 26(1), 7-23. Ortona, Italy: Edizioni Menabò srl. Retrieved August 17, 2021 from <https://www.learntechlib.org/p/184088/>.
- Decreto Interministeriale 29 dicembre 2020, n.182, *Adozione del modello nazionale di piano educativo individualizzato e delle correlate linee guida, nonché modalità di assegnazione delle misure di sostegno agli alunni con disabilità*, ai sensi dell’articolo 7, comma 2-ter del decreto legislativo 13 aprile 2017, n.66.
- Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of Research on Technology in Education*, 42(3), 255– 284. doi: 10.1080/15391523.2010.10782551.
- Fabbri, L. (2007). *Comunità di pratiche e apprendimento riflessivo. Per una formazione situata*. Roma: Carocci Editore.

- Gallagher, S. & Zahavi, D. (2009). *La mente fenomenologica*. Milano: Raffaello Cortina.
- Gallese, V. (2003). The manifold nature of interpersonal relations: The quest for a common mechanism. *Philosophical Transactions of the Royal Society of London B*, 358 (1431), 517-528.
- Gallese, V. (2005). Embodied simulation: From Neurons to Phenomenal Experience. *Phenomenology and the Cognitive Sciences*, volume 4, pp. 23-48.
- Gallese, V. (2014). Bodily selves in relation: embodied simulation as second person perspective on intersubjectivity. *Philosophical Transactions of the Royal Society of London B*, 369: 20130177.
- Gallese, V. (2007). Dai neuroni specchio alla consonanza intenzionale. Meccanismi neurofisiologici dell'intersoggettività. *Rivista di Psicoanalisi*, 2007, LIII, 1, pp. 197-208.
- Gibson, J. (1979). *The ecological approach to visual perception*. Boston, MA: Houghton Mifflin.
- Glenberg, A.M. (2008a). Embodiment as a Unifying Perspective for Psychology. Advanced Review, *John Wiley & Sons Ltd.*, 1, pp. 586-596.
- Glenberg A.M. (2008b). Embodiment for education. In P. Calvo & A. Gomila (eds.), *Handbook of Cognitive Science: An Embodied Approach*. San Diego: Elsevier.
- Glenberg, A. M., Witt, J. K. and Metcalfe, J. (2013). From the Revolution to Embodiment: 25 Years of Cognitive Psychology, *Perspectives on Psychological Science* 8(5), 573-585.
- Goleman, D. (1996). *Intelligenza emotiva. Che Cos'è, perché può renderci felici*. Milano: Rizzoli.
- Gombrich, E. H. (2003). *Aby Warburg: an Intellectual Biography*, The Warburg Institute, University of London, London 1970; tr. it. di Dal Lago A., Rovatti, P.A. (2003). *Aby Warburg. Una biografia intellettuale*. Milano: Feltrinelli.
- Gomez Paloma F. (a cura di) (2009) *Corporeità, didattica e apprendimento. Le nuove Neuroscienze dell'educazione*, Salerno: Edisud.
- Gomez Paloma, F. & Damiani, P. (2015). *Cognizione corporea, competenze integrate e formazione dei docenti. I tre volti dell'Embodied Cognitive Science per una scuola inclusiva*. Trento: Centro Studi Erickson.
- Gomez Paloma F., Ascione A. & Tafuri D. (2016). Embodied Cognition: il ruolo del corpo nella didattica. *Formazione & Insegnamento XIV*, 1, pp. 75-87.
- Gomez Paloma, F. & Damiani, P. (2021). *Manuale delle Scuole ECS. The Neuroeducational Approach*. Brescia: Scholè. <http://dx.doi.org/10.1098/rstb.2013.0177>.
- Jarvis, P. (2006). *Towards a Comprehensive Theory of Adult Learning*, London, Routledge.
- Jarvis, P. & Parker S. (2007), *Human Learning: an holistic approach*, London, Routledge.
- Kirschner, P. (2002). Can we support CSCL? Educational, social and technological affordances for learning. In P. Kirschner (Ed.), *Three worlds of CSCL: Can we support CSCL* (pp.7-47). Heerlen: Open University of the Netherlands.
- Kramarski, B., & Michalsky, T. (2010). Preparing preservice teachers for self-regulated learning in the context of technological pedagogical content knowledge. *Learning and Instruction*, 20(5), 434-447. doi: 10.1016/j.learninstruc.2009.05.003.
- La Marca, A. (2014). Nuovo realismo e metodi di ricerca misti. *Journal of Educational, Cultural and Psychological Studies, ECPS Journal*, 1(9), 397-416.
- Legge 13 luglio 2015, n. 107, Riforma del sistema nazionale di istruzione e formazione e delega per il riordino delle disposizioni legislative vigenti, *Gazzetta Ufficiale, Serie Generale n.162 del 15-07-2015*.
- Likert, R. (1932). *Technique for the measure of attitudes*, In "Arch. Psycho.", Vol. 22 N. 140.
- Limone, P. & Parmigiani, D. (a cura di) (2017). *Modelli pedagogici e pratiche didattiche per la formazione iniziale e in servizio degli insegnanti*. Bari: Progedit.
- Maslow, A.H. (2010). *Motivazione e personalità*. Roma: Armando Editore.
- Minghelli, V., Orsino, E., Palumbo, C. & Gomez Paloma, F. (2021). Progetto «Una scuola per

- tutti». Una Formazione integrata dei docenti, secondo i principi dell'Embodied Cognition Science, per una Scuola dell'infanzia di qualità. *L'integrazione scolastica e sociale*. Vol. 20, n. 2, maggio 2021. doi: 10.14605/ISS2022104, pp. 50-71.
- Montalbetti, K. & Lisimberti, C. (Eds.) (2015). *Ricerca e professionalità educativa Risorse e strumenti*. Lecce-Rovato: Pensa MultiMedia.
- Oliverio, A. (2009). *La vita nascosta del cervello*. Firenze: Giunti. Notti, A. (2008). *Strumenti per la ricerca educativa*. Salerno: Edisud.
- Paas, F. & Sweller, J. (2012). An Evolutionary Upgrade of Cognitive Load Theory: Using the Human Motor System and Collaboration to Support the Learning of Complex Cognitive Tasks. *Educational Psychology Review*, 24, 1, 2012, pp. 27-45.
- Perla, L. (2011). La ricerca didattica sugli impliciti d'aula. Opzioni metodologiche, Educational Research on Implicit Teaching. Methodological choices. SIRD ricerche. *Giornale Italiano della Ricerca Educativa*, IV - 6 / giugno, pp. 119-130.
- Rivoltella, P. C. (2012). *Neurodidattica. Insegnare al cervello che apprende*. Milano: Cortina Raffaello.
- Rossi, P.G. (2011). *Didattica enattiva*. Milano: Franco Angeli.
- Schön, D.A. (1993). *Il professionista riflessivo. Per una nuova epistemologia della pratica professionale*. Bari: Dedalo.
- Seidel, T., Sturmer, K., Blomberg, G., Kobarg, M., & Schwindt, K. (2011). Teacher learning from analysis of videotaped classroom situations: Does it make a difference whether teachers observe their own teaching or that of others? *Teaching and Teacher Education*, 27(2), 259–267. <http://dx.doi.org/10.1016/j.tate.2010.08.009>.
- Sibilio, M. (2014). *La Didattica Semplessa*. Napoli: Liguori Editore.
- Siegel, D. J. (2001). *La mente relazionale. Neurobiologia dell'esperienza interpersonale*. Milano: Raffaello Cortina editore.
- Simondon, G. (2009). Entretien sur la mecanologie. In *Revue de synthèse. Tome 130,6, 1*, pp. 103-132.
- Terrell, S. (2012). Mixed-methods research methodologies. *Qualitative Report*, 17, 254-265.
- Trincherò, R. (2004). *I metodi della ricerca educativa*. Roma-Bari: Editori Laterza.
- Trincherò, R. & Robasto, D. (2019). *I Mixed Methods nella ricerca educativa*. Milano: Mondadori.
- Wilson, R. & Foglia, L. (2011). Embodied Cognition. *Stanford Encyclopedia of Philosophy*, 2011. World Health Organization (2001). *The International Classification of Functioning, Disability and Health (ICF)*. Geneva.
- World Health Organization (2007). *The International Classification of Functioning, Disability and Health, Children and Youth version (ICF-CY)*. Geneva.
- Voogt, J., Fisser, P., Tondeur, J., & van Braak, J. (2016). Using theoretical perspectives in developing an understanding of TPACK. In M. C. Herring, M. J. Koehler, & P. Mishra (Eds.), *Handbook of Technological Pedagogical Content Knowledge (TPACK) for Educators, 2nd Edition* (pp. 33-52). London, UK: Routledge.
- Voogt, J., & McKenney, S. (2017). TPACK in teacher education: Are we preparing teachers to use technology for early literacy? *Technology, Pedagogy and Education*, 26(1), 69-83. doi: 10.1080/1475939X.2016.1174730.
- Zottmann, J. M., Goeze, A., Frank, C., Zentner, U., Fischer, F., & Schrader, J. (2011). Fostering the analytical competency of pre-service teachers in a computer-supported case-based learning environment: A matter of perspective? *Interactive Learning Environments*, 1–20. <http://dx.doi.org/10.1080/10494820.2010.539885>.