PHYSICAL LITERACY (PL) AS A SCHOOL TOOL TO STIMULATE STUDENT LEARNING AND INCLUSION: HYPOTESIS OF AN INTEGRATED TEACHING MODEL

L'ALFABETIZZAZIONE MOTORIA (PL) COME STRUMENTO SCOLASTICO PER STIMOLARE LA FORMAZIONE E L'INCLUSIONE DEGLI STUDENTI: IPOTESI DI UN MODELLO DIDATTICO INTEGRATO

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Double Blind Peer Review

Citation
Palmiero, F., & Tafuri, FV. (2025). Physical literacy (pl) as a school tool to stimulate student learning and inclusion: hypotesis of an integrated teaching model, *Italian Journal of Health Education, Sports and Inclusive Didactics,* 8 (4). https://doi.org/10.32043/gsd.v8i4.1238

Doi:
https://doi.org/10.32043/gsd.v8i4.1238

gsdjournal.it
ISSN: 2532-3296
ISBN: 978-88-6022-504-7

ABSTRACT
Physical literacy is an emerging and crucial topic of increasing relevance in the international debate on physical education, due to its formative role and positive influence on the well-being and holistic development of all students, particularly those with special educational needs (BES). This study explores the current interdisciplinary debate, focusing on the most effective educational models for developing PL, examining intervention models and recognised best practices, with the aim of developing an integrated, inclusive, accessible and territorially adaptable Italian model. The research is based on a qualitative-quantitative methodological approach using validated and standardised assessment instruments such as the Test of Gross Motor Development (TGMD-2), the Physical Literacy Assessment for Youth (PLAY) and the Motivational Questionnaire of Interest in Physical Activity. Analyses will confirm that this approach supports students' psychophysical development, social participation and enhances individual abilities.

L'alfabetizzazione motoria rappresenta un tema emergente e cruciale di crescente rilevanza nel dibattito internazionale sull'educazione fisica, ciò grazie al suo ruolo formativo e alla sua influenza positiva sul benessere e lo sviluppo olistico degli studenti tutti, in particolare di quelli con bisogni educativi speciali (BES). Questo studio esplora l'attuale dibattito interdisciplinare, focalizzandosi sui modelli didattici più efficaci per sviluppare la PL, esaminando modelli d'intervento e best practices riconosciute, con l'obiettivo di sviluppare un modello italiano integrato, inclusivo, accessibile e territorialmente adattabile. La ricerca si basa su un approccio metodologico quali-quantitativo che ha visto l'utilizzo di strumenti di valutazione validati e standardizzati come il Test of Gross Motor Development (TGMD-2), il Physical Literacy Assessment for Youth (PLAY) ed il Questionario Motivazionale di Interesse verso l'Attività Fisica. Le analisi effettuate confermeranno che tale approccio supporta lo sviluppo psicofisico degli studenti, la partecipazione sociale e valorizza le capacità individuali.

KEYWORDS
Physical Literacy, Integrated Learning Model, Student Learning, Special Educational Needs (SEN)
Alfabetizzazione Motoria, Modello Didattico Integrato, Formazione degli Studenti, Bisogni Educativi Speciali (BES)

Received 08/11/2024
Accepted 11/12/2024
Published 13/01/2025

Introduction

Although Cairney, Kiez et al. (2019) trace the origins of the term Physical Literacy back to the late 1800s, it is in recent decades that the concept of physical literacy has been gaining increasing attention in the school and physical education context. In the literature, various studies highlight its positive impact on students' psycho-physical and social development. In particular, Whitehead (2010), a pioneering figure in the field, defines PL as the ability to perform conscious, skillful and appropriate movements in a variety of contexts, promoting positive interaction with surrounding environment. PL is configured as a set of transversal competences that include in particular four main areas of development: motor skills, cognitive skills, social awareness and intrinsic motivation: "Physical literacy is a multidimensional construct that requires the consideration of physical, psychological and social domains" (Bailey et al., 2021). In this sense, PL does not only train the body, but in educational practice in school settings, the adoption of PL has also been shown to positively influence students‘ minds and emotions and aspects such as self-confidence, motor self-efficacy and social participation, proving to be an extremely effective tool for learners’ psychological and physical well-being. "Physical literacy in children and youth includes the development of movement skills, confidence and motivation to be active, and knowledge and understanding of how and why to engage in physical activities" (Cairney et. al., 2019).

In recent years, the promotion of Physical Literacy (PL) has emerged as an emerging theme in several international education systems due to its benefits documented in the literature, making its implementation in school curricula a priority for educators and policy makers. PL is not just the simple development of motor skills, but integrates the ability to consciously interpret, understand and interact in various physical and sporting contexts promoting a positive and conscious approach to physical activity throughout life. “The Italian educational system promotes the development of each person's individual capabilities at all stages of education, emphasising creativity, reflection and the desire to experiment and investigate” (Valentino, L., & Romano, G., 2024). In Italy, in fact, the debate has intensified in recent years and has also focused on the importance of developing a pedagogical approach that is accessible and inclusive that can be applied especially for students with special educational needs (SEN) by guiding students in their motor and psycho-physical development and improving their well-being and social participation. PL offers a unique opportunity to promote motor and social skills synergistically, helping all students, and especially those

with SEN, to develop self-esteem, social skills and an intrinsic motivation towards physical activity. “Despite the growing recognition of physical literacy, Italian schools face significant challenges in implementing effective physical education policies that support its development” (Fortina & Toscani, 2023). The challenges related to inclusion and accessibility in motor education in Italy therefore require the adoption of a systematic approach that considers the cultural and territorial peculiarities of the school system. Students with SEN require didactic methods adapted to their specific needs and different ability levels that use multisensory and progressive approaches to develop motor, cognitive and social skills in a gradual and supportive way; this makes the PL approach an important issue. The literature points out that inclusive motor education is crucial in fostering a substantial and significant improvement in the quality of life, sense of belonging and confidence in one's abilities of students with and without disabilities (Block & Obrusnikova, 2007).

The purpose of this study is to fill a gap in our country's educational models and propose an Italian model that integrates the principles of PL into an educational system capable of responding to educational, territorial and cultural needs by creating an accessible and integrated organisational and methodological framework for all students.

Therefore, the goals of the research are:

1. To analyse the effectiveness of physical literacy as a tool to foster the education and inclusion of students.

2. On the basis of the results obtained, to hypothesise an Italian methodological model for PL as a fundamental element for inclusion that supports the construction of an integrated territorial educational system.

1. Research Structure: Methodology, Participants, Tools, Teaching Intervention

The proposed model is aimed at creating an inclusive educational system that promotes students' psycho-physical and social well-being, adapting to the specific needs of the Italian school system.

The study adopted a three-stage experimental design:

1. Pre-test: administration of tests to assess participants' initial PL levels.

2. Didactic intervention: development of a plan characterised by the implementation of programs based on motor games, multisensory pathways and collaborative activities to develop both the students' motor and social skills, with a customised approach for SEN.

3. Post-test: evaluation of the changes and effectiveness of the intervention using the same measurement tools as the pre-test.

The research sample consists of 300 primary and secondary school students, 50 of whom have SEN. The schools were selected to ensure geographical representativeness, collecting data from various Italian regions so as to take into account the geographical distribution in order to obtain a representative picture and an accurate view of the context of the Italian education system and the different local realities. As far as Special Educational Needs were concerned, there was no specific selection, but the only inclusion criteria were the presence of a certification deposited with the school administration and the ability to carry out the proposed activities.

The students selected for the research sample were then divided into 2 subgroups of 150 subjects (125 without SEN and 25 with SEN per group) so as to constitute an experimental group, which followed the activities of the proposed plan, and a control group, which did not adhere to the PL teaching proposal.

To assess students' Physical Literacy (PL) levels and evaluate the effectiveness of teaching interventions, internationally recognised tests were used:

- Test of Gross Motor Development-2 (TGMD-2): used to measure fundamental motor skills by offering an accurate assessment of basic gross motor skills.

- Physical Literacy Assessment for Youth (PLAY): assessment tool that considers students' motivation, confidence, knowledge and motor skills offering a comprehensive picture at the physical literacy level.

- Motivational Questionnaire of Interest in Physical Activity: a qualitative questionnaire designed to collect data on students' attitudes and motivation towards physical activity.

Quantitative data were analysed using Student's t-test for independent samples and paired t-test for pre-post comparison of results. Qualitative data, relating to student motivation and teacher feedback, were coded and analysed using

thematic analysis to identify recurring themes and assess the perceived effectiveness of the model.

The project implemented specific and structured teaching activities to develop students' motor, cognitive and social skills, through an intervention program divided into three main areas: Motor Games, Multisensory Pathways and Cooperative Activities. The following table specifies the teaching protocol.

Area of Teaching Intervention	**Activities**	**Description of the Activities**
Motor Games *This area includes playful activities that aim to stimulate fundamental motor skills such as balance and agility through play and movement and to increase active participation and enjoyment in physical activity.*	Relay Game	Divided into teams, the children compete in relay races that require both speed and movement control skills. Through this game, they also work on a sense of cooperation and respect for turns.
	Aim and Accuracy Games	With the help of balls or throwable objects, children are invited to hit targets placed at different distances. This activity stimulates concentration, planning skills and hand-eye coordination.
	Running and Obstacle Course Games	The students take part in courses with different kinds of obstacles, such as cones, hoops and small jumps, to improve agility and coordination. The aim is to keep the enthusiasm high and get the children involved in movement.
	Imitation Games	Students imitate movements proposed by the teacher or a partner, thus developing the ability to observe and reproduce movements, important for the acquisition of basic motor skills.
Multisensory Pathways *Activities designed to stimulate participants' senses through visual, tactile and auditory stimuli, customised especially to involve students with SEN and*	Tactile pathway	Children walk on different surfaces, such as soft mats, grainy materials, rough or smooth surfaces, to stimulate touch and improve body awareness. This helps participants become familiar with different sensations and improve their perception of their own body in space.
	Visual Pathway	Paths with lights, colours and objects of different shapes are used to stimulate

with specific exigencies, adapting the experience according to individual needs.		visual perception. Children are encouraged to recognise colours and shapes or follow light signals, improving attention and visual perception.
	Auditory Pathway	An environment with different sound stimuli (such as music, natural sounds or voices) is created to stimulate hearing and promote concentration and listening skills. Children learn to react to acoustic signals, improving spatial orientation and auditory discrimination.
	Handling and Construction Activities	There are activities that stimulate both touch and visual skills, in which children have to build shapes or structures using materials of various consistencies. These games serve to develop fine motor skills and stimulate creativity and problem-solving abilities.
Cooperative Activities *Proposed group activities aimed at fostering social inclusion and developing group skills such as cooperation, socialisation and inclusion of students, encouraging them to interact and relate to each other.*	Team Games	Children are divided into small groups to play games such as football, volleyball or basketball, in which they must work together to achieve a common goal. The aim is to teach them to respect the role of each team member, to support each other and to manage group dynamics.
	Group Problem-Solving Activities	This activity involves children solving small problems together or completing specific tasks, such as building a structure or crossing a 'river' without getting 'wet'. Through these games, students learn to develop strategies, communicate effectively and make decisions together.
	Role-playing and Drama Games	A context is created in which children have to impersonate different roles and respond to imaginary situations. This activity fosters empathy, stimulates the imagination and helps children understand and respect the emotions and points of view of others.
	"Circle of Trust" game	The children stand in a circle and have to pass an object or message to each other

		in an orderly manner. As well as fostering patience and respect for others' times, this activity stimulates mutual trust and creates a supportive environment within the group.

Table 1: Educational Protocol

The intervention structured through these activities has the overall objective of supporting the integrated development of the students, both physically and psychologically and socially. Through play and movement, the overall well-being of the children is promoted, encouraging the harmonious development of motor, cognitive and social skills, with particular attention to inclusiveness and respect for the diversity of each participant. Specifically, the goals were:

- Increase in Motor Skills: The project aimed to develop coordination and motor performance skills, with significant results observed in improvements in basic motor skills, especially in SEN. “Physical literacy is a significant predictor of physical activity levels and overall health outcomes in both children and adults” (Cairney, et. al., 2019).

- Motivation and Participation: The activities aimed at fostering a positive attitude towards physical activity and promoting active participation, resulting in increased motivation and confidence in the students.

- Social Inclusion and Interaction: The project placed emphasis on social inclusion, creating activities that enabled students with SEN to interact with peers, improving their self-esteem and collaboration.

2. Results

The results show a significant increase in basic motor skills, motivation and social participation, especially in SEN, highlighting the effectiveness of structured and customised activities such as motor games, multi-sensory pathways and collaborative activities. Data were analysed to assess improvement in three specific areas: motor skills, motivation and social participation. In relation to the quantitative investigation, the results of the two tests used in the pre and post evaluation process for the experimental and control groups are shown below.

TEST OF GROSS MOTOR DEVELOPMENT-2 (TGMD-2)	
Experimental Group	Control Group
Students without SEN: 15% average increase in post-test scores compared to pre-test, indicating significant improvements in basic motor skills, with progress in coordination and motor control Students with SEN: Average increase of 12%, showing improvements especially in activities requiring coordination and gross control.	Students without SEN: No significant changes from initial scores observed. Students with SEN: Minimal changes in scores, with no statistically significant differences.
Student's t-test: Significant differences ($p < 0.01$) for TGMD-2 between experimental and control group for both students without SEN and students with SEN.	

Table 2: TGMD-2 results

TGMD-2 showed a significant improvement in the basic motor skills of the students in the experimental group, with an average increase of 15% in the post-test scores compared to the pre-test for students without special educational needs (SEN). Students with SEN recorded an average increase of 12%, showing progress particularly in coordination and motor control activities.

PHYSICAL LITERACY ASSESSMENT FOR YOUTH (PLAY)	
Experimental Group	Control Group
Students without SEN: Average increase of 18% in scores related to motivation and confidence in active participation, with improvements in motor self-efficacy. Students with SEN: I average increase of 20%, with strong growth in motivation and confidence, as well as in self-efficacy and social participation.	Students without SEN: Minimal or stable increases in the measurements of motivation and confidence. Students with SEN: Virtually unchanged scores, indicating that motivation and confidence have not improved significantly.
Student's t-test: Significant differences ($p < 0.05$) for PLAY scores between experimental and control group, indicating significant improvements in motivation and motor self-efficacy in the experimental groups.	

Table 3: PLAY test results

"PLAY instruments are designed to assess children's and young people's physical literacy in several domains, including physical competence, everyday behaviour, motivation and confidence" (Cairney et al., 2019). In the experimental group, Physical Literacy Assessment for Youth (PLAY) scores related to motivation and confidence increased by an average of 18% for all students and 20% for students with SEN, showing a significant increase in self-efficacy and active participation in motor-sports education.

Overall, the results of the TGMD-2 and PLAY thus led to evidence of an improvement in motor coordination and motivation towards physical activity in the experimental groups, compared to the control groups. Students with SEN showed significant educational progress especially in gross motor skills, demonstrating the effectiveness of the inclusive activities and multi-sensory pathways used.

With regard to the qualitative investigation, the items of inclusion and social interaction on the part of the students, the teachers' point of view regarding the teaching-pedagogical action implemented and the students' attitude towards motor education in the school context were taken into consideration.

SOCIAL INCLUSION AND INTERACTION	
Experimental Group	Control group
Students without SEN: Teachers report an increase in social interaction and cooperation. Students showed an increased propensity to participate in group activities and an increased willingness to interact with peers with different abilities. Students with SEN: Increased self-esteem and social confidence; 90% of the students showed an increased propensity to interact positively with peers, reported by teachers as a significant achievement.	Students without SEN: Teachers report no significant developments in interaction, cooperation and participation. Students with SEN: No increases in self-esteem, socialisation or self-confidence were reported.

Table 4: Results item 'Inclusion and social interaction

TEACHERS' FEEDBACK	
Experimental Group	Control Group
Students with and without SEN: Teachers observed that the customised teaching model facilitated cooperation and increased self-esteem, especially among students with SEN.	Students with and without SEN: Teachers report no substantial changes in the behaviour and attitudes of students with and without SEN.

Table 5: Results item 'Teachers' feedback'

Qualitative feedback from teachers and PLAY data emphasised an increase in social inclusion and cooperation, especially in students with SEN. Thematic analysis of the teachers' responses identified significant improvements in self-esteem and social confidence, with 90% of students with SEN demonstrating an increased propensity to interact with peers.

MOTIVATION AND ATTITUDES TOWARDS MOTOR EDUCATION	
Experimental Group	Control group
Students without SEN: Through the Motivational Questionnaire of Interest in Physical Activity, 78% showed a more positive attitude towards physical activity, expressing a greater desire to participate in future physical activities. Students with SEN: 65% expressed increased confidence in their motor skills and a better sense of belonging during collaborative activities, emphasising the value of interaction with peers in group activities.	Students without SEN: Through the Motivational Questionnaire of Interest in Physical Activity, almost identical results were recorded between pre- and post-intervention. Students with SEN: No improvement was evident from the questionnaires.

Table 6: Results item 'motivation and attitudes towards motor education'

Qualitative analysis of the responses to the Motivational Questionnaire of Interest in Physical Activity showed an increase in motivation towards physical activity, with 78% of the students reporting a more positive attitude and greater willingness to participate in new activities. 65% of the students with SEN expressed greater confidence in their motor skills and a greater sense of belonging during group activities.

The results of the motivational questionnaire show an increase in students' motivation and confidence to participate in physical activities. Teachers observed that the adapted interventions improved cooperation and self-esteem in SEN students, emphasising the value of the personalised approach and interaction with peers in collaborative physical activities.

3. Discussion of results and proposal of an integrated teaching model

Colley and Tremblay (2023) show that there are significant differences in physical literacy levels between Canadian and Italian youngsters, highlighting the influence of cultural and environmental factors. Furthermore, 'Current physical education policies in Italian schools often lack a coherent framework for the promotion of physical literacy, resulting in differences in implementation and outcomes across regions' (Fortina & Toscani, 2023). In this regard, the adoption of an Italian model

for PL, which integrates cultural and scientific aspects, is an effective response to the diversified training needs of our school system. The structure of this model proposes an educational approach that facilitates the inclusion of students with SEN, highlighting the importance of PL as a tool for enhancing students‘ individual abilities and promoting an inclusive and positive environment that fosters students’ psychophysical and social growth. Furthermore, the results of this study confirm how an integrated approach can make motor development opportunities more accessible to all students.

These findings led to the definition of a model that integrates three fundamental aspects:

Multilevel activities: progressive motor activities graded in complexity so that they can be adapted to each student's abilities. responding to the different ability levels of the students. This approach allows modulation of difficulty and complexity, ensuring inclusion and access for all. Some proposals could include activities other than those used in this research, such as:

Circuit training	students work in stations that offer various exercises, with increasing levels of difficulty, such as jumping, jerking, balance exercises, and coordination. Each station can be adjusted to the student's ability, allowing for active and safe participation.
Coordination and balance activities	Exercises such as elastic play, rope jumping or balance circuits can be adapted according to the students' abilities and are excellent for developing coordination.
Games with different goals	Games such as football, volleyball or basketball are adapted with flexible rules and level-specific objectives. For example, in ‘simplified’ versions of football or volleyball, the focus can be on passing only, without end goals, favouring inclusion and participation.
Endurance and breathing exercises	Activities that gradually increase endurance, such as interval running or walking, are useful for developing endurance and lung capacity, and can be customised according to fitness level.

Table 7: Multi-level activity suggestions

2. Collaborative Learning: approaches based on the creation of heterogeneous teams and teamwork to foster inclusion and improve social skills by involving each student in specific roles. Ideas for proposals could be:

Team building through cooperative games	Games such as 'treasure hunts' or building structures (for example, a human pyramid) stimulate collaboration and require the contribution of each member. The game can include specific objectives, such as completing certain milestones only with the cooperation of peers.
Sports role-playing games	In volleyball or basketball, students take on different roles within the team, such as defender, striker, or captain, promoting the learning of team dynamics and the enhancement of each individual's abilities.
Relay activities	Relays, either on land or in the water (if available), make it possible to structure competitions or group activities where each student contributes his or her own segment. Relays can also include different tests, such as a balance segment followed by a running or swimming segment.
Peer tutoring projects	Students with greater ability in one area act as tutors for those who have difficulties, promoting the exchange of knowledge and the strengthening of bonds. For example, those with good shooting skills in basketball can teach shooting techniques to other teammates.

Table 8: Suggestions for collaborative learning activities

3. Continuous Monitoring: the use of periodic tests to monitor and evaluate the progress of PL in order to adapt and optimise activities. Monitoring could take place with activities such as:

Periodic endurance and motor skills tests	Simple tests such as measuring running time, number of consecutive jumps, or balance on one leg provide data on basic abilities. These tests are

	recorded and compared over time to check progress.
Teachers observation sheets	Teachers fill out worksheets recording social and motor skills, such as teamwork and coordination, noting improvements or difficulties. The sheets are reviewed in regular meetings with students and parents.
Regular feedback from students	Gathering opinions by means of questionnaires or short interviews allows us to understand how each student experiences the activities and whether there are areas where they need more support or modification.
Individual Adaptation Plan	Based on the results of tests and observations, the teacher updates a plan for each student, identifying suitable activities and areas of development to focus on.

Table 9: Monitoring strategies

Following this, a typical week is also profiled with a view to optimising teaching design for motor and sports sciences, which also allows the short-term dimension to be taken into account.

Monday	Tuesday	Wednesday	Thursday	Friday
Multi-station course. Students train in various motor exercises, choosing between different levels for each station. Duration: 45 minutes.	Team building with sports role-play. Students play football with adapted rules and specific team goals. Duration: 60 minutes.	Team relays and team competitions, with assigned roles and regular changes between participants. Duration: 45 minutes.	Monitoring with periodic endurance and capacity tests. Final reflection and discussion on results and goals for improvement. Duration: 45 minutes.	Collaborative games and coordination activities in which students try out new activities and support each other, such as games with rubber bands or ropes. Duration: 60 minutes.

Table 10: Example of an Activity Week in the Italian Model

This Italian educational model in Physical Education is built to respond effectively to the needs of an inclusive and diverse school system, promoting the growth and well-being of each student and fostering socialisation and self-esteem.

Conclusions

The results of this study underline the relevance of an inclusive education system that promotes Physical Literacy as a key element for the physical, psychological and social well-being of students. 'Physical literacy should be considered a holistic concept encompassing physical, cognitive and affective domains' (Belton et al., 2022). The proposed model is based on multilevel motor activities, collaborative learning paths and a continuous monitoring system, which have proven to be effective tools for the improvement of motor skills, motivation and social participation of all students, particularly those with SEN. The implementation of the tested activities has contributed to increasing students' confidence and self-efficacy, fostering a culture of collaboration and inclusion that supports the integrated well-being and active participation of each student. The multilevel and progressive approach of the model ensures the adaptability of activities to different ability levels, while collaborative learning and continuous monitoring facilitate a personalisation of the intervention that responds to the specific needs of SEN, promoting positive interactions and meaningful relationships between peers.

In addition, the adoption of internationally recognised assessment tools, such as the TGMD-2 and PLAY, provided a quantitative and qualitative picture of the students' motor skills, motivation and social skills, showing significant post-intervention progress. These improvements, confirmed by statistical analysis, indicate that the proposed model not only increases motor skills but also the social inclusion and psychological well-being of the students. The research shows, therefore, that an integrated Physical Literacy model can effectively respond to the challenges of inclusion, especially if it is based on motor activities that are customised and adapted to the specificities of the Italian territory.

Looking forward, the proposed PL model represents an important contribution to Italian physical education that can create an educational system capable of responding to the educational and territorial needs of the country. 'Integrating physical literacy into physical education curricula improves student engagement and fosters a lifelong commitment to physical activity' (Durden-Myers, 2024). The proposed model lays the foundation for a way of teaching that enhances students'

motor and social skills in an inclusive manner, promoting an environment that supports the psychophysical growth and active participation of all students. Future research could broaden the sample and further analyse the applicability of this approach in different school contexts, consolidating the basis for an inclusive and accessible educational system that supports the psychophysical and social growth of every student.

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