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## **Playing in the classroom. Italian teachers' acceptance of Game-Based Learning: definition of the instrument and research outcomes**

### **Giocare in classe. L'accettazione del Game-Based Learning da parte degli insegnanti italiani: definizione dello strumento e esiti della ricerca**

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#### **Abstract:**

The growing awareness that games can be a very valuable learning environment has not been accompanied by an effective diffusion of games in Italian schools. From primary school to university, an ambivalent behaviour is manifested: its widespread appreciation is contrasted with a limited application, often reduced to the use of games or gamified online software of a behavioural matrix. A research analysis highlights the lack of recent studies on the use and diffusion of games in Italian schools. The goal of this contribution is to provide an updated understanding of Italian teachers' competencies related to the formative use of games. To this aim, we developed a survey adapting to the Italian context the Acceptance of Digital Game-Based Learning (ADGBL) framework, extending it to non-digital games and integrating sections on instructional design, game scenarios, and teacher

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roles. This research is instrumental for the development of new and more focused teacher training programs to promote the use of games in classrooms.

**Keywords:** Game-Based Learning (GBL), Italian School, Acceptance of the game, Attitude towards GBL, Quantitative research.

**Abstract:**

La crescente consapevolezza che i giochi possono essere un ambiente di apprendimento molto valido non è stata accompagnata da un'effettiva diffusione dei giochi nelle scuole italiane. Dalla scuola primaria all'università, si manifesta un comportamento ambivalente: a un diffuso apprezzamento si contrappone una limitata applicazione, spesso ridotta all'uso di giochi o software online gamificati di matrice comportamentale. L'analisi delle ricerche evidenzia la mancanza di studi recenti sull'uso e la diffusione dei giochi nelle scuole italiane. L'obiettivo di questo contributo è fornire una comprensione aggiornata delle competenze degli insegnanti italiani relative all'uso formativo dei giochi. A tal fine, abbiamo sviluppato un'indagine adattando al contesto italiano il framework Acceptance of Digital Game-Based Learning (ADGBL), estendendolo ai giochi non digitali e integrando sezioni sulla progettazione didattica, sugli scenari di gioco e sui ruoli degli insegnanti. Questa ricerca è utile per lo sviluppo di nuovi e più mirati programmi di formazione degli insegnanti per promuovere l'uso dei giochi nelle classi.

**Parole chiave:** Game-Based Learning (GBL), Scuola Italiana, Accettazione del gioco, Attitudine verso il GBL, Ricerca quantitativa.

## 1. Introduction

In recent years the scientific literature has documented well the importance of increasing the student's engagement within learning activities through play (Ifenthaler et al., 2012; Plass et al., 2015, 2020; Salen & Zimmerman, 2004). The link between play and learning is a process based on five characteristics: joy, meaning, engagement, iteration and social interaction (Zosh et al., 2017). During play, people explore the world, practising along five distinct axes of freedom: freedom to fail, freedom to experiment, freedom to create identity, freedom of effort and freedom of interpretation (Klopfer et al., 2009). It is this sense of freedom that creates the conditions for people's effortless involvement in any activity that resembles a game: the fundamental characteristic of games is, therefore, attributable to the control that people exert over and in the game. The feeling of control and the opportunity to make decisions in playful activities without the fear of failure helps people understand their role as active explorers of their social and physical environment (Gee, 2008; Gray, 2008; Hewes, 2014).

The activity that uses play within educational pathways to support learning is known as Game-Based Learning (GBL) and, in its digital version, as Digital Game-Based Learning (DGBL) (Daniela, 2021; Erhel & Jamet, 2019; Kaimara & Deliyannis, 2019; Plass et al., 2015, 2020; Prensky, 2000).

Several studies provide measurable evidence that GBL increases learning outcomes (Clark et al., 2016; Fokides, 2020; Gee, 2008; Girard et al., 2013; Hamari et al., 2016; Hersh & Leporini, 2018; Kaimara et al., 2020, Plass et al., 2020). Gunter and collaborators (2006) pointed out that it is not, however, sufficient to include educational content in games, which aim at increasing motivation in students, for a game to be perceived as educational (Andreoletti, 2023). In order to integrate analogue

and digital games into educational activities, these must be aligned with pedagogical and methodological principles, using the theoretical framework TPACK (Andreoletti & Tinterri, 2023; Mishra & Koehler, 2006; Spiteri & Chang Rundgren, 2020) and TPACK-G (Andreoletti & Tinterri, in press; Hsu et al., 2013).

In relation to the use of play in learning, there is an ongoing need for empirical research that addresses the challenges of implementing GBL in a variety of classroom contexts, considering the barriers that teachers themselves face in optimising GBL (Andreoletti, 2023; Hébert et al., 2021). The ways in which teachers relate to exploratory, simulative, collaborative and metacognitive-autoregulative instructional architectures (Bonaiuti, 2014; Bonaiuti et al., 2016) is one of the key factors contributing to their implementation and influencing students' motivation to learn (Martín-del-Pozo et al., 2019; Pacetti & Soriani, 2022).

## 2. Theoretical background

There has been an increasing focus on play within educational activities in recent years, although the integration of games in teaching is still an unexplored area of study and has received limited attention in the research field (Girard et al., 2013; Hanghøj & Brund, 2011; Kangas et al., 2017, Tzuo et al., 2012). Hanghøj and Brund (2011) note how research has prioritised the investigation of the effects on learning and the identification of the intrinsic learning potential of individual classroom projects and experiments, where play has been investigated in students, focusing the research predominantly on teacher-student interaction (Tzuo et al, 2012) or on teacher facilitation during play (Hanghøj & Brund, 2011), neglecting to investigate the pedagogical dimensions of the teacher (e.g., the design solutions or teaching strategies the teacher adopts when teaching with play).

Kangas et al. (2017) point out that teachers have little reflection on the pedagogy of play in instructional processes: the practices and processes of teaching before, during and after play, the ways in which they design activities supported and enhanced by play, and the roles that students assume within learning activities. Research shows that play is not sufficient to create the learning environment within the classroom context, but a dynamic relationship between teaching and learning is always necessary and is linked to the play experience and the design competence of the teacher (Ludvigsen et al., 2010).

The factors that significantly hinder the possibility of introducing play into educational activities in a meaningful and fruitful way can be traced back to the teacher, the students, the family and the school institution (Hanghøj, 2013). The aspects that can be traced back to the teacher are (Andreoletti, 2023; Hanghøj, 2013):

- poor/absent game culture (game literacy);
- presence of prejudices on the role and meaning of play in society and culture;
- confusion about the different forms and manifestations that play and ludic can take in educational contexts (game-based learning, gamification, playful learning, serious games, educational games, etc.);
- reduced skills in training design;
- difficulty in translating curricular learning goals within the playful activity and/or in the game;
- difficulty in defining the appropriate game scenarios to work with the educational goals;
- being able to identify the roles that the teacher can take on in the different phases of the game activity in the classroom;

- difficulty in identifying and selecting the most appropriate game and integrating it effectively and efficiently within the training activity;
- difficulty in identifying appropriate assessment methods for learning goals and play objectives;
- limited time to prepare playful activities;
- inability to adequately support students in understanding a complex game.

## 2.1 Teachers' motivations for introducing games in education

Teachers' perceptions and motivational factors regarding the integration of GBL into their lessons have been examined in relatively few studies (Hayak & Avidov-Ungar, 2020). Research suggests that the perceived value is an important driver for the implementation of pedagogical innovations, such as the use of games. Teachers' attitudes towards GBL are related to their personal experiences (limited gaming experience, workload, perceived self-efficacy with analogue and digital gaming) and perceptions of significant others (students, parents, colleagues and experts) (Andreoletti, 2023; Andreoletti & Tinterri, 2023; Bourgonjon et al, 2010; Daniela & Žogla, 2013; Fokides & Kaimara, 2020; Sánchez-Mena & Martí-Parreño, 2017). Several factors influence a teacher's predisposition to use GBL, and the perceived usefulness of the game is a significant determinant of teachers' attitudes towards it. When teachers perceive GBL as highly useful, their attitudes towards games tend to be more positive (Sánchez-Mena et al., 2017).

Research has shown that teachers are unwilling to use educational games because they are not convinced that games are highly useful for improving their work. Several investigations over the years have focused on factors influencing teachers' intention to use games in the classroom (An & Cao, 2016; Andreoletti, 2023; Andreoletti & Tinterri, 2023; Baek, 2008; Bensiger, 2012; Gabriel et al, 2020; Hanghøj, 2013; Hayak & Avidov-Ungar, 2020; Ince & Demirbilek, 2013; Jukić Matić et al., 2023; Kaimara et al., 2021a; Papadakis, 2018; Pivec, 2007; Sánchez-Mena & Martí-Parreño, 2017; Takeuchi & Vaala, 2014; Watson et al., 2013; Zou et al., 2021). The analysis of teachers' perceptions regarding the integration of GBL into their teaching activities has highlighted five categories of factors:

- *personal*: concern the perceptual challenges that teachers encounter in integrating GBL into teaching (e.g. having to step out of one's comfort zone as a teacher, changing one's teaching approach, dealing with anxiety in the face of technological innovations in relation to GBL), the perception of an acceptable changes the opportunity for professional development, one's own relationship with the game (game literacy), the drifts that the game can take (fears relating to possible addiction to the game, the violence present in video games and their encouragement of obesity), the quantity and quality of the training courses attended relating to GBL;
- *social*: these concern the perception of students (consideration of the game as a resource for learning, adequate interpretation of the purpose of using the game in teaching, ability to transfer what has been learnt within the game to the reality outside the game) and parents (vision of a school that uses diversified teaching strategies, consideration of the game as a resource for learning) in relation to GBL in training activities;
- *pedagogical*: they refer to issues relating to classroom management ("control" students' attitudes and one's own "position" within the activity), the personalisation of GBL to the needs

of the students, the alignment of games with the goals and objectives of one's own discipline, the time devoted to constant training to the search for suitable games, to the presence of skills in the use of new methodologies (DGBL), to the ease of use of tools and technologies (DGBL), to the ability to define assessment methods and tools, to the students' participative methods, to the spatial-temporal organisation of lessons;

- *structural*: they refer to the presence of school and national policies related to the introduction of game-integrated teaching methodologies, the freedom to manage/follow a "compulsory" curriculum, the backing/support from the school management, the availability of resources to manage the integration of GBL in the curriculum, the financial resources needed to purchase games and technological infrastructures (DGBL), the availability of quality games and technologies (software and/or hardware), the support for the management of technologies and collegiality within the school;
- *technical*: this refers to the technical difficulties and challenges associated with DGBL, such as logistical-organisational planning and technical know-how to operate the necessary equipment correctly.

Acceptance of GBL and DGBL is considered a part of the broader picture of acceptance of educational technologies. Davis (1986) developed the Technology Acceptance Model (TAM) which identifies *perceived ease of use* and *perceived usefulness* as the main factors influencing an individual's intention to use a new resource, environment or technology. Ertmer (1999) identified two main categories of barriers to the integration of new tools into the educational process

- *external barriers* (first-order) include limited technological and instrumental resources, the ability to access and use these resources, teacher training in their use, and support during use;
- *internal barriers* (second-order) include teachers' beliefs about their role in relation to student roles, curriculum and assessment practices.

In line with Ertmer's findings, Koh et al. (2012) indicate that teachers' perceptions are influenced by external factors, such as policies and curricula, and internal factors, such as personal interest and attitudes towards play. Fokides and Kostas (2020) point out that teachers fail to use play in their teaching due to internal barriers (second-order), such as their own opinions and attitudes towards play or any other resources in teaching, based on their own pedagogical beliefs, even if the external barriers (first-order) have been resolved.

In relation to the teaching experience, the identified outcomes may appear contradictory on a superficial reading in relation to the use of digital games within educational activities (DGBL). Hayak and Avidov-Ungar (2020) found that teachers with more teaching experience, i.e. at an advanced stage of their careers, implemented DGBL using more meaningful methods and inquiry-based collaborative learning; in contrast, teachers with less teaching experience, i.e. at the beginning of their careers, used DGBL in a more limited way, as a pedagogical tool to help students internalise and revise the material. In contrast, Hsu et al. (2017) found that teachers with less than 10 years of experience were more adept at integrating DGBL into their lessons, were more motivated to do so, and had a better understanding of DGBL-related content and pedagogy than their more experienced colleagues. Palha and Jukić Matić (2023) attribute the role of educational policy as an influential variable in interpreting these results: in countries where educational policies are aligned with aspirations to promote innovation in schools in general and (video)games, there is a well-defined set of targets for digital competence attainment that are widely recognised and supported by key stakeholders.

According to Avidov-Ungar and Hayak (2023), the use of games, particularly digital games, in educational practices depends on teacher training courses organised within universities and refresher/training courses. In national realities where such policies are absent, implementation is likely to be carried out only by experienced and/or enthusiastic teachers, leaving novice teachers struggling with implementation in the classroom.

Training is, therefore, the key factor in overcoming this misunderstanding, as it aims at fostering:

- *positive attitudes towards the adoption of instructional architectures and teaching strategies* characterised by greater empowerment and hands-on activity and increasing autonomy in the retrieval and organisation of information by the learner (Andreoletti, 2023; Andreoletti & Tinterri, 2023; Ranieri, 2011)
- *conscious, critical and research-validated use of analogue games (board games) and digital games (video games) as learning environments and resources* (Bensiger, 2012; Papadakis, 2018; Pivec, 2007);
- *the adoption of a culture of instructional design* based on the "backward" design model of Wiggins and McTighe (2004) (Andreoletti & Tinterri, 2023);
- *Game Literacy training* in which the teacher can:
  - "be accompanied in the design of training paths in which the mechanisms by which disciplinary goals are translated and aligned with game objectives and vice versa are made to be understood;
  - actively manipulate the games, hypothesise training paths in which they can be introduced, compare directly with other teachers on the experiences implemented;
  - meet games, where other teachers, game-based learning experts and researchers show the different possibilities with which the game can be introduced within the educational activity' (Andreoletti, 2023; Kaimara et al., 2021b).

### 3. The research

The general aim of the research is to understand the ways in which teachers perceive and accept GBL, in relation to their teaching experience with GBL: understanding the concerns and factors that encourage and hinder them can provide a valuable contribution to the development of a meaningful curriculum.

To achieve these objectives, a quantitative research instrument was specifically prepared, starting from and adapting two theoretical frameworks: the *Technological Pedagogical Content Knowledge-Games* (TPACK-G) and the *Acceptance of Digital Game-Based Learning* (ADGBL), proposed by Hsu and colleagues (2013).

Within this paper, we present and discuss the *Acceptance of Game-Based Learning* (AGBL) tool.

#### 3.1 The instrument

The development of the research instrument started from the analysis of the literature, identifying the instruments that investigated the factors that influence the teacher in the adoption of GBL (Bonanno & Kommers, 2008; Hsu et al., 2013, 2017, 2020; Kenny & McDaniel, 2011; Loperfido et al, 2019); subsequently, on the basis of those identified, it was created a new instrument integrating new areas and items to adapt them to the Italian context and, at the same time, extending the survey also to non-digital play, to the role that GBL takes on for the teacher, to the learning and teaching opportunities



for the teacher using the game, to the attitude that the teacher has towards the game used for training purposes.

### 3.2. Literature review

Hsu et al. (2013) developed the *Acceptance of Digital Game-Based Learning* (ADGBL) survey instrument, structured into four factors: the first three were adapted from Bourgonjon et al.'s (2010) survey and the last from Lee and Tsai's (2010) questionnaire:

- *Learning Opportunities (LO)*: measures the degree to which teachers believe the use of games in the classroom can provide learning opportunities for students; e.g. 'Games provide opportunities for students to experience things they learn';
- *Games Experience (GE)*: measures the amount of teachers' experience with games; e.g. "I play different types of games";
- *Attitudes towards Game-Based Learning (AGBL)*: probes teachers' degree of agreement with the use of games in teaching; e.g. "Game-based learning can improve students' learning motivation";
- *Game Preference (GP)*: measures teachers' preference for games use in the classroom; e.g. "I am enthusiastic about using games in the classroom".

### 3.3 The new instrument

Starting from the ADGBL questionnaire, the *Acceptance of Game-Based Learning* (AGBL) tool was developed, which takes up, integrates and expands the ADGBL questionnaire, as it does not limit itself to investigating only digital gaming (videogames), but extends to the entire analogue gaming sector (board games, exergames, etc.). The items of some of the criteria have been modified to adapt them better to the entire gaming context and to integrate them with the results of the most recent research (Andreoletti & Tinterri, 2023, p 37). The items in the *Learning Opportunities (LO)* factor were replaced with items referring to the game scenarios (Andreoletti & Tinterri, 2023, p. 37; Tinterri & Andreoletti, 2024) and the new *Teaching Opportunities (TO)* factor was introduced, which measures the degree to which teachers are able to manage the teaching activity using games (e.g. 'I am able to define which roles I will be able to assume during the game-supported teaching activity').

### 3.4 Evaluation of the instrument

The new questionnaire included a total of 33 items. To evaluate its reliability and validity, it was administered in CAWI modality, using Google Modules, to a sample of in-service teachers undergoing training to achieve teaching qualification. Answers were collected from April 9 to April 16, 2024. In total, 2752 participants (83.1% females, 18.4% males, 0.3% unspecified) were recruited for the study. The overall mean age of participants was 44.6 (s.d. 7.81, N=2236). 49.2% of participants were curricular teachers, 48.8% were special need teachers and 2% of participants had other roles within the school system (e.g. pedagogist, school psychologist, educators) (Andreoletti, Tinterri & Dipace, submitted).

## 4. Results

### 4.1 Survey evaluation

The data analysis involved an exploratory factor analysis (EFA; Fabrigar & Wegener, 2011) to evaluate the validity and reliability of the AGBL survey (N=2757). We used a “minimum residual” extraction method combined with oblimin rotation, a common procedure for survey analysis. We considered only factors with an Eigenvalue higher than 0.5 and removed items that presented crossloading, in accordance with the analysis of Hsu et al. (2013). Specifically, factors GP1 (“I am a promoter within my school of initiatives to encourage the use of games in the classroom”) and GP4 (“I share experiences of using the game in the classroom with colleagues”) were excluded due to crossloading and removed from the final model (Figure 1).

	Factor					Uniqueness
	1	2	3	4	5	
LO1 - Games provide opportunities for self-expression	0.742					0.438
LO2 - Games provide opportunities to learn new knowledge, skills and competences	0.809					0.287
LO3 - Games provide opportunities to explore complex problems and situations	0.837					0.293
LO4 - Games provide moments to reflect on a given topic	0.866					0.274
LO5 - Games provide moments to reflect on one's behaviour and attitudes	0.855					0.327
LO6 - Games provide opportunities to learn about a specific technology	0.792					0.389
LO7 - Games provide opportunities to explore identities and perspectives other than one's own	0.871					0.295
LO8 - Games provide opportunities to practice and consolidate knowledge, skills and competences	0.836					0.245
LO9 - Games provide opportunities to meet and communicate with other people and share experiences with them	0.820					0.333
LO10 - Games provide opportunities to assess learning goals and objectives (competences, skills and knowledge)	0.780					0.319
LO11 - Games provide opportunities to document student understanding and ideas	0.762					0.383
LO12 - The creation of analogue games (board games) and/or digital games (video games) offer the opportunity to	0.570					0.556



learn how to write text or computer code					
LO13 - Games offer the opportunity to create new media (games, mods, videos...)	0.587				0.538
LO14 - Designing or redesigning games offers the opportunity to activate search strategies to solve complex challenges	0.643				0.395
TO1 - I am able to combine the learning goals with the objectives within the game		0.825			0.268
TO2 - I am able to adapt/modify the game (rules, content etc.) in relation to the learning objectives.		0.877			0.226
TO3 - I am able to design pre/post-game activities to complete the learning activity.		0.895			0.218
TO4 - I can define the roles I will assume during the educational activity integrated with the game.		0.854			0.256
TO5 - I can define the most appropriate tools for evaluating the educational goals of my subject and the objectives of the game.		0.865			0.253
GE1 - I like to play.			0.487		0.528
GE2 - With friends, colleagues and students I describe myself as a player/gamer.			0.803		0.345
GE3 - I play many more games and spend much more time playing than people my age.			0.905		0.225
GE4 - I play different types of games.			0.844		0.254
GE5 - I inform myself about the latest releases of board games and/or video games.			0.739		0.422
AGBL1 - Game-based learning can increase students' learning motivation.				0.520	0.408
AGBL2 - Games can be used daily in the classroom.				0.470	0.567
AGBL3 - Game-based learning needs a sound and structured design of the learning activity.				0.845	0.287
AGBL4 - Game-based learning needs specially designed assessment methods and tools.				0.824	0.364
AGBL5 - Game-based learning is a future trend in education at all levels.				0.602	0.492

GP2 - I am interested in taking courses to learn about new games useful for learning my discipline.					0.915	0.142
GP3 - I am interested in taking courses to learn how to design educational activities integrated with games.					0.895	0.156

Figure 1. Exploratory factor analysis for the revised ADGBL questionnaire.

A total of 31 items were retained in the final version of the survey. The respective reliability coefficients, measured with Cronbach’s alpha (Cronbach, 1951), were LO (0.96), TO (0.94), GE (0.88), AGBL (0.85) and GP (0.93). The overall reliability was 0.95, indicating a good level of internal consistency and suggesting that this instrument is highly reliable in evaluating teachers’ acceptance towards the use of GBL in the classroom.

### 5.2 Factor analysis

The cumulative variance explained by the five factors was 66.2% (Figure 2), indicating an acceptable fit of the model. Model fit measures indicate less than ideal fit ( $X^2(320df)=4768$ ,  $p<0.001$ ) but with values for RMSEA(0.0711) and TLI (0.905) well within the limits of what is considered acceptable in the literature (Montoya & Edwards, 2021).

Summary			
Factor	SS Loadings	% of Variance	Cumulative %
1	8.89	28.69	28.7
2	3.87	12.47	41.2
3	3.19	10.28	51.4
4	2.67	8.63	60.1
5	1.89	6.11	66.2

Figure 2

All the factors were positively correlated with each other (Figure 3). The higher correlation observed was between AGBL and LO (0.575), whereas the lower correlation was observed between GE and GP (0.178).

Inter-Factor Correlations					
	1	2	3	4	5
1	—	0.383	0.278	0.575	0.418
2		—	0.380	0.235	0.244
3			—	0.199	0.178
4				—	0.491
5					—

Figure 3

Taken together, the analysis of the instrument indicates its validity and reliability as a tool to investigate teachers’ perceptions and acceptance towards the use of GBL.

## 5. Discussion and conclusions

As highlighted in the preceding paragraphs, understanding personal experience with the game, the level of game literacy possessed, and the motivational dimensions with regard to play in the classroom, is fundamental for defining operational strategies useful for preparing training courses for teaching staff to design training courses supported by the game (Game-Based Design Model), in which the distance between learning goals and the objectives of the game is not so great as to recognise in the playful activity implemented a pseudo-game that masks a learning activity that is not fun, enjoyable and motivating. This situation, unfortunately widespread in Italian schools, is eloquently described by the expression 'covering broccoli with chocolate'.

The aim of the present study, therefore, is to prepare an up-to-date analysis and evaluation tool that facilitates understanding of teachers' competences in relation to the formative use of games, concerning

- the degree to which they believe the use of games can provide learning opportunities in different learning scenarios (LO);
- their current experience with games (GE);
- their attitude towards GBL as a teaching strategy (AGBL);
- their willingness to learn more about GBL (GP).

The instrument, constructed according to the state of the art in the scientific literature, was then evaluated for its validity and reliability. Exploratory factor analysis, conducted on the basis of responses from a large sample of in-service teachers, confirmed that the instrument is valid and reliable for investigating the research questions.

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