



Leadership styles and skills developed through game-based learning

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ABSTRACT

Game-based learning (GBL) as a universal approach to developing leadership skills have been winning attention from researchers and practitioners. There are numerous studies which support the positive effects of games on learning and knowledge development; however, more research is needed regarding how games may influence development of leadership skills. This paper examines recent literature regarding game-based learning influence in leadership skills development and if new leadership styles can emerge during a collaborative gaming process. The research questions were: 1) what were the leadership skills developed, during a GBL course? Moreover, 2) what kind of leadership styles emerge in the gaming context? The methodological approach was quantitative and also qualitative, privileging the interpretative approach and the primary technique used was content analysis from the forums of discussion of 8 GBL courses with 15 participants in each course summing a total of 120 individuals and also factor analysis based on data collected by a questionnaire about the leadership skills developed, and which conducted to the identification of the leadership styles. The findings suggest that a game-based learning approach is an effective approach to leadership skills development and the primary skills developed were: motivation, facilitation, coaching, mindset changing, and communication. The significant originality of the research was the analogy process between the games situations and the organisational life resulting on the creation of a leadership typology.

1. Introduction

Game-based Learning is a pedagogical methodology currently used in a vast range of different domains. Games can be designed to potentiate the training process through a virtual world promoting the social interaction and competencies development. The main techniques in games are simulations, narrative or storytelling. According to [Keesey and Smith-Robbins \(2010\)](#) “the most successful organisations prepare their employees for the intricacies of virtual world collaboration through substantial cultural orientation experiences” (p. 41). Keesey & Smith-Robbins also refers that “a virtual world solution may offer an invaluable new opportunity for your training program” (p. 49).

Games can be used as training systems across some sectors such as government, non-profit, commercial and social sectors inclusive of military, healthcare, education and other fields. Games provide play-like simulation with the additional criteria of learning and or improving a functional proficiency and social interaction.

In training processes of project management, a multiplayer game can re-enforce the social, cultural or organisational value in a short period for the participants. [Michael and Chen \(2005\)](#) highlighted the

success of “simulation, beyond teaching the basics of project management, where the team also wanted the game to promote better relations between project managers and engineers” (pp. 94–95).

In the education sector, [Michael and Chen \(2005\)](#) citing Beck and Wade state “gamers were more creative, more ambitious, and more optimistic about their abilities and circumstances” (p.116). With games, there is an improvement in “cognitive skills, including improved visualisation and mental maps” (p. 117).

In resume, GBL is a learning methodology supporting effective learning ([Connolly, Boyle, MacArthur, Hainey, & Boyle, 2012](#); [Wouters, van Nimwegen, van Oostendorp, & van der Spek, 2013](#)), enhancing the thinking process ([Sánchez & Olivares, 2011](#); [Yang, 2015](#)), and increasing problem-solving skills ([Akcaoglu & Koehler, 2014](#); [van de Sande, Segers, & Verhoeven, 2015](#)).

According to this current and global context in learning, this research presents the results of the evidence-based pedagogy of GBL in project management leadership skills development. The primary activity of learning was a GBL course using a Social game on Facebook. The participant needed to use leadership skills like organisation, decision making, resources management, and financial skills, to decide

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what kind of city was under construction: more ecological or more industrial or even more targeted for entertainment or education.

The collaboration and the active participation of all students and trainees were critical to accomplishing all goals defined by the trainers and the project managers itself.

2. Literature review

2.1. Game-based learning to improve leadership skills

Game-based learning is a concept that is structured around a learning process that uses as the primary pedagogical tool a specific game which helps to arise and develop skills. It is well-known that games can foster soft skills and also technical skills because games can provide several kinds of contexts and scenarios for the learners.

Several game scholars like Gee, Kurt Squire, Constance Steinkuehler, David Williamson Shaffer often refer to the learning component in the game based learning as games for higher order thinking and social skills (Schaffer, Squire, Halverson, & Gee, 2005; Steinkuehler & Duncan, 2008).

The GBL methodology has the main advantage over classical education which is that practice precedes theory and in this assumption, the learning process is developed to solve situational problems, whose emergence is controlled by the training environment. The learning process is defined according to a strategic plan organised by phases and pre-defined goals focused on the identified of problems, involving step-by-step learning. Following this idea, we can state that GBL pedagogical model is very different from the traditional training systems that promote an educational paradigm focused on the trainer as the main agent of the action, and less as a facilitator/mentor of knowledge and learning experience.

There are three perspectives according to the Game Based Learning theory: the first and also identified as the dominant conceives game-based learning as a learning approach driven by game technologies (Gee, 2003; Prensky, 2003; Sousa & Costa, 2014) – the learning occurs predominantly as a result of the game played.

Another perspective assumes that game-based learning process is driven not only by game technologies but also by pedagogies. The learning process takes place within a game, but also through several defined activities that are created around the game and that is complementary to the game.

The third perspective assumes that game based learning is more a pedagogical/learning innovation driven by game design principles. This perspective gamifies the learning process using game mechanics like role-playing, achievement, competition and reward system (Kapp, 2012).

This learning process under research assumed the second perspective and created a course around a social game –with the goal to develop leadership skills.

In respect to leadership, the management literature significantly explores the importance of this concept, defined by McCauley, Moxley, and Van Velsor (1998) as “the expansion of a person's capacity to be effective in leadership roles and processes” (p. 4). Leadership developmental interventions have used different general leadership theories such as: the leader match concept (Fiedler, Chemers, & Maher, 1976), the decision making theory (Vroom & Jago, 1988), the situational leadership model (Hersey, Angelini, & Carakushansky, 1982), the leader-member exchange theory (Scandura & Graen, 1984) and the transformational leadership theory (Bass, 1990). Furthermore, Kozlowski and Ilgen (2006) pointed out that leaders need to create conditions for the team to “synchronise their knowledge, skill, and effort to be effective as a team” (p. 109).

This main research goal was to use a game that could provide several kinds of contexts and scenarios for the learners as proposed by Schaffer et al. (2005); and Steinkuehler and Duncan (2008) to develop their leadership skills.

Considering the lack of empirical validation for the theoretical models of leadership skills development using GBL, this study tried to fill this critical gap in the literature by testing the impact of a leadership training program, based on the GBL methodology for leadership skills development. To achieve this, we trained the participants of the training program and expected it would improve the effectiveness of the learning process. Thus, our first research question is:

RQ1. Which were the leadership skills developed in the game context?

2.2. Leadership styles

Leadership is discussed widely in the management literature as a soft skill and individual knowledge (Kimble, de Vasconcelos, & Rocha, 2016; Kinkus, 2007; Vasconcelos, Kimble, & Rocha, 2016). According to Dobbins and Pettman (1997), leadership is the ability to motivate people to work towards achieving common goals, to make ordinary people display extraordinary performance. In short, leadership has been related to a person's skills, abilities and degree of influence to get people moving in a direction, making decisions and doing things that they would typically not have embarked on (Kets De Vries & Florent-Treacy, 2002). Different styles of leadership are adopted by project managers, depending on the circumstances - teamwork may result from consensus building between project managers and team members rather than adopting a dictatorial style (Zaccaro, Rittman, & Marks, 2001). According to Lewin, Lippit, and White (1939), there are three major leadership styles:

Autocratic leaders, make decisions without consulting their team members. This can be appropriate when decisions need to be made quickly, when there's no need for team input, and when team agreement is not necessary for an outcome. However, this style can lead to high levels of absenteeism and staff turnover.

Democratic leaders, make the final decision, but they include team members in the decision-making process. They encourage creativity and employees are often highly engaged in projects and decisions. As a result, team members tend to have high job satisfaction and high productivity.

Laissez-faire, leaders give their team members much freedom to do their work and to set their deadlines. They provide support with resources and advice if needed, but otherwise, they do not get involved. This autonomy can lead to high job satisfaction, but it can be difficult if team members do not have knowledge, skills, or self-motivation to do their work efficiently.

The contingency school (Fiedler, 1967; House, 1971; Krech, Crutchfield, & Ballachey, 1962; Robbins, 1997) suggest that what makes an effective leader would depend on the situation. They tend to follow the same pattern: 1. Assess the characteristics of the leader; 2. Evaluate the situation regarding key contingency variables; and, 3. Seek a match between the leader and the situation.

This theory exhorts the idea that the leader needs to help the team to find the path to their goals and help them in that process. Path-goal theory identifies four leadership behaviours: Directive leaders; Supportive leaders; Participative leaders; Achievement-oriented leaders.

In their studies, Kirkpatrick and Locke (1991): Drive and ambition; the desire to lead and influence others; honesty and integrity; self-confidence; intelligence; and technical knowledge.

The behavioural school also assumed that effective leaders adopt specific styles (Adair, 1983; Blake & Mouton, 1982; Hersey & Blanchard, 1988), especially the ones studied in theory X and theory Y (Bass, 1990):

Theory X managers believe that the average employee has an inherent dislike of work and will avoid it if possible. Because of this, most employees must be coerced, controlled, directed, or threatened with punishment to get them to put adequate effort to achieve organisational objectives, they avoid responsibilities and have relatively little ambition. Theory Y managers believe that the expenditure of physical and mental effort in work is something natural, and the average employees,

under proper conditions, learns not only to accept but to seek responsibility. Employees will exercise self-direction and self-control to achieve objectives to which they are committed. They can exercise a relatively high level of imagination, and creativity in the solution of organisational problems.

Meanwhile Bass identified two types of leadership, transactional and transformational (Bass, 1990). Since the late 1990s, the emphasis has been to study the complexity of the contexts where leaders emerge, and researchers have acknowledged that transactional leaders emerge in situations of low complexity and transformational leaders in situations of high complexity:

Transactional leadership, the leader rewards followers for meeting performance targets. This kind of leader focuses on the role of supervision, organisation, and group performance.

Transformational leadership, the leader exhibits charisma, developing a vision, respect and trust. Considers employees, paying personal attention to followers and provides intellectual stimulation, challenging followers with new ideas and approaches.

In this research, we tried to find several types of leaders in-game context and make an analogy to the real life in organisations. Thus, the third research question is defined as follows:

RQ2. Did the leadership training program using GBL led to new leadership styles, which can be associated with the organisational context?

3. Research methodology

The methodological approach of this research was a mixed approach including qualitative and quantitative techniques.

In one hand, the qualitative analysis puts in evidence some methodological and epistemological questions that matter to point out: 1. From the epistemological point of view, the qualitative analysis allowed a better knowledge of the context and privileged an interpretative approach; 2. From the methodological point of view, the qualitative analysis was comprehensive and inductive, allowing the characterisation of the specificities of the context.

Regarding the specificities of this research the main qualitative technique used was content analysis from the course discussion forums. Content analysis is a research tool used to determine the presence of specific words or concepts within texts or sets of texts. In this case, the critical text to analyse was the reflections of the participants related to the activities and the development of the skills used in all phases of the game. The process used in the content analysis included the quantification and analysis of the presence, meanings and relationships of words and concepts. The final phase of the process is to make inferences about the messages within the texts and the posts of the trainees.

On the other hand, the quantitative analysis was based on a questionnaire about the leadership skills developed, and which conducted to the identification of the leadership styles.

4. Instruments and measures

The leading questions of the forums analysis were used to build the questionnaire helping to create the dimensions of the questionnaire to identify the skills, and the data collected was used to identify the leadership styles.

A pool of statements was generated and the main researcher from each partner of the project reviews the statements in terms of clarity, accuracy, and interpretability.

In terms of limitations of the questionnaire construction, beside the content validity achieved by covering the main features of the phenomenon in study and present on the forums, could be used the construct validity based on a theoretical or conceptual justification of the

statements validity.

Following this process the questionnaire was built using five dimensions (questions) with several items which were classified by the respondents using a Likert scale of 4 points, as follows:

I. Has the leader accomplished these activities?

1-Not at all; 2-Sometimes; 3-Fairly often; 4-Frequently, if not always

- a) Promoted knowledge sharing helping to solve problems;
- b) Raised questions to bring out different viewpoints;
- c) Guided discussions, but did not lead it;
- d) Provided constructive criticism;
- e) Understood the goals of the organisation;
- f) Kept the group on the agenda and moving forward;
- g) Involved everyone in the organisation activities;
- h) Made sure that decisions were made democratically.

II. How did the leader behave during the game situations?

1-Not at all; 2-Sometimes; 3-Fairly often; 4-Frequently, if not always

- a) Identifying strengths and challenges;
- b) Motivating and delegating;
- c) Team building;
- d) Providing feedback;
- e) Resolve everyday workplace challenges;
- f) Help employees to be more self-aware;
- g) Change problematic behaviours;
- h) Incentive workers to seize opportunities to grow and improve;
- i) Believe in worker's abilities;
- j) Willing to invest time in the worker's development;
- k) Trust in worker's effectiveness.

III. In your opinion does the leader have:

1-Not at all; 2-Sometimes; 3-Fairly often; 4-Frequently, if not always

- a) Create and foster a vision of a new future;
- b) Face up to behaviours, values and norms in current culture that must change;
- c) Initiate and lead the change.
- d) Create a willingness to separate from the past;
- e) Build shared ownership through organisation-wide participation;
- f) Communicate the changes and new cultural messages;
- g) Model the behaviour that supports the new vision;
- h) Reward behaviour which supports the new vision;
- i) Maintain focus on the goal
- j) Bring in resources who uniquely add value to the change effort by modelling new ways to act, think and view things.

IV. Has the leader expressed the organisational culture with the following elements?

1-Not at all; 2-Sometimes; 3-Fairly often; 4-Frequently, if not always

- a) The formal statements of philosophy, values and goals;
- b) The criteria used for reward, selection, promotion, and termination;
- c) The stories, legends and myths about key people and events;
- d) Critical incidents and crises and norms.
- e) Organisational design and structure;
- f) Organisational systems and procedures.

V. Has the leader behaviour influenced the employee's motivation?

1-Not at all; 2-Sometimes; 3-Fairly often; 4-Frequently, if not always

- a) Matching the employee's goals with the organisational ones;
- b) Recognition and rewarding
- c) Being a role model that influences employees to accomplish their goals;
- d) Encouraging employees to get involved in organisational life;
- e) Developing moral and team spirit.

These measures helped to identify not only the leadership skills developed, but also helped to emerge a typology of leader's styles.

5. Data analysis

To answer the research questions, a statistical analysis of data has been carried out using XLSTAT. As a primary set of measures, the Kaiser-Meyer-Olkin (KMO) was 0.652 which can be acceptable for proceeding with factor analysis. It is also important to refer that in the factor analysis process, the number of observations was 120 and five factors with eigenvalue > 1 were detected. They explain 61.2% of total variance. The extraction method was iterated using principal factor analysis. PCA has been selected with the goal to obtain a factor solution of a smaller set of variables, from the larger dataset we were working with and that is reflected on the leading questions of the forums above mentioned. A varimax rotation method was used to spread variability more evenly amongst the variables. Many variables shared close similarities as there were highly significant correlations.

Concerning reliability, all variables were analysed for internal consistency by using Alpha Cronbach which showed a reliability of 0.843, that can be considered very good, and as showed in Table 1, the factors Cronbach Alpha are also very good:

The PCA has identified the patterns within the data and expressed it by highlighting the relevant similarities (and differences) in every component. The data has been compressed as it was reduced in some dimensions without much loss of information. The rationale for the data reduction process was to identify leadership styles to understand the reflections of the participants. Table 2 outlines the items taken into account, and that was considered for the identification of the factors.

The factor components were labelled following a cross-examination of the variables with the higher loadings. Typically, the variables with the highest correlation scores had mostly contributed towards the make-up of the respective component. The underlying scope of combining the variables by using component analysis was to reduce the data and make it readable allowing the leadership styles identification. A brief description of the extracted factor components is provided in the following topic of this paper.

6. Main findings and discussion

The primary goal was to use games methodologies and tools in the leadership learning process to solve situational problems, whose emergence was controlled by the trainer according to a strategic plan with pre-defined goals, with a focus on the identification of problems

and on the decision making process.

The following points will present and discuss the activities and the skills developed by the participants of the learning process, answering the first research question:

RQ1. Which were the leadership skills developed in the game context?

To identify the skills developed the trainee's reflections on the forums were analysed according to the set of questions mentioned above on this paper and statistical analysis were developed to reduce the variables and we reached five factors (see Table 2). Each of the factors is associated with activities and skills developed (Table 3), by the participants of the learning process:

From the factors created and the skills analysis emerged five types of leaders which correspond to the previous work of (Sousa & Costa, 2014) on the leadership styles used by the participants of the GBL course:

(i) Facilitator

The leader facilitator challenges the employees thinking and creates lists of important points to discuss and realise. He develops activities promoting knowledge sharing, helping to solve problems and raises questions to bring out different points of view. Guides discussions, but does not lead it - provides constructive criticism. He understands the goals of the organisation and keeps the group on the agenda and moving forward, involving everyone in the organisation activities and makes sure that decisions are made democratically.

(ii) Coacher

Coaching is a collaborative partnership centred on achieving goals, and the primary objective of coaching is to develop the person being coached. It is a way of leading that supports guides and challenges to individuals maximize their potential and performance, through the following activities: Identifying strengths and challenges; Motivating and delegating; Relationship/team building; Providing feedback; Resolving everyday workplace challenges; Helping employees become more self-aware; Change problematic behaviours or seize opportunities to grow and improve; Believe in workers abilities; Invest time in the workers development; and in exchange for the trust and investment, the game-based expect workers to try their hardest.

(iii) Change Agent (Changing the Mindsets)

The Change Agent acknowledges the need to change and give immediate feedback to overcome employee's resistances.

This leader understands the common pitfalls that can lead to the derailment and is targeted for training and people development.

In order to be a change agent the leader create and foster a vision of a new future; face up to behaviours, values and norms in current culture that must change; Initiate and lead the change; create a willingness to separate from the past; build shared ownership through organisation-wide participation; communicate the changes and new cultural messages; model the behaviour that supports the new vision; reward behaviour which supports the new vision; maintain focus on the goal; bring in resources who uniquely add value to the change effort by modelling new ways to act, think and view things.

(iv) Communicator

The communicator uses continual feedback to enable progress and refocus the efforts of all. He expresses the organisational culture in numerous ways, including the formal statements of philosophy, values and goals; the criteria used for reward, selection, promotion, and termination; The stories, legends and myths about key people and events; critical incidents and crises and norms; organisational design and structure (reporting); organisational systems and procedures.

Table 1
Factors Cronbach Alpha.

	Cronbach Alpha
Factor 1	0,949
Factor 2	0,875
Factor 3	0,863
Factor 4	0,708
Factor 5	0,809

Table 2
Factor analysis – leadership styles.

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
	Motivation	Communication	Coaching	Facilitation	Changing the mindsets
Promoted knowledge sharing helping to solve problems	0,053	0,053	0,135	0,708	0,192
Raised questions to bring out different viewpoints	-0,055	0,299	0,027	0,599	0,345
Guided discussions, but did not lead it	-0,060	0,103	0,421	0,546	0,071
Provided constructive criticism	-0,075	-0,220	0,543	0,271	-0,028
Understood the goals of the organisation	-0,151	0,302	0,676	0,108	0,225
Kept the group on the agenda and moving forward	-0,210	0,163	0,627	0,099	0,291
Involved everyone in the organisation activities	-0,091	0,260	0,644	-0,032	-0,037
Made sure that decisions were made democratically	-0,202	0,290	0,691	0,170	0,087
Identifying strengths and challenges	-0,278	-0,109	0,740	-0,073	0,074
Motivating and delegating	-0,041	0,217	0,463	0,381	0,450
Team building	-0,235	0,128	0,638	0,002	0,270
Providing feedback	-0,057	0,482	0,215	0,085	0,394
Resolve everyday workplace challenges	0,071	0,888	0,045	0,046	0,073
Help employees become more self-aware	-0,043	0,816	0,039	0,003	-0,026
Change problematic behaviours	0,107	0,901	-0,037	0,066	0,094
Incentivize workers to seize opportunities to grow and improve	-0,093	0,664	0,141	0,057	0,242
Believe in worker's abilities	-0,111	0,517	0,078	0,204	0,153
Willing to invest time in the worker's development	0,014	0,410	0,259	0,138	0,233
Trust in worker's effectiveness	-0,138	0,641	0,249	0,029	0,183
Create and foster a vision of a new future	-0,068	0,098	0,225	0,261	0,787
Face up to behaviours, values and norms in current culture that must change	0,131	0,439	0,162	0,326	0,385
Initiate and lead the change	0,116	0,244	0,101	0,212	0,624
Create a willingness to separate from the past	-0,072	0,201	0,162	0,269	0,792
Build shared ownership through organisation-wide participation	-0,158	0,274	0,440	0,240	0,205
Communicate the changes and new cultural messages	-0,181	0,373	-0,055	-0,123	0,531
Model the behaviour that supports the new vision	-0,310	0,015	0,153	-0,125	0,580
Reward behaviour which supports the new vision	-0,189	0,320	0,056	0,388	0,433
Maintain focus on the goal	0,678	0,049	-0,020	-0,432	-0,097
Bring in resources who uniquely add value to the change effort by modelling new ways to act, think and view things	0,666	-0,137	0,008	-0,465	0,070
The formal statements of philosophy, values and goals	0,758	-0,005	-0,118	-0,330	0,194
The criteria used for reward, selection, promotion, and termination	0,501	0,219	-0,403	-0,082	0,034
The stories, legends and myths about key people and events	0,779	-0,049	-0,336	-0,119	0,053
Critical incidents and crises and norms	0,744	-0,005	-0,339	-0,074	-0,085
Organisational design and structure	0,809	-0,289	-0,081	0,107	0,041
Organisational systems and procedures	0,893	-0,079	-0,115	0,044	-0,177
Matching the employee's goals with the organisational ones	0,758	0,100	-0,286	0,229	-0,103
Recognition and rewarding	0,740	-0,143	-0,219	-0,273	-0,149
Being a role model that influences employees to accomplish their goals	0,843	-0,016	-0,216	0,023	-0,294
Encouraging employees to get involved in organisational life	0,864	-0,097	-0,039	0,129	-0,216
Developing moral and team spirit	0,873	0,105	0,012	0,218	-0,012

Extraction method: principal component analysis: Varimax.

Alpha = 0.843; KMO = 0.652.

Table 3
Leadership macro activities and corresponding skills.

Activities	Skills developed
Developing team member's skills.	Facilitation
Coaching team members	Coaching
Promoting creativity and eliminating resistances.	Changing the mindsets
Feeding back team and individual performance.	Communication
Motivating the team by using a combination of intrinsic and extrinsic rewards.	Motivation

The primary sources of feedback from the leader communicator include interviews with co-workers; performance appraisals; employee attitude surveys; management style assessment; teambuilding sessions; one-on-ones with the leader; assessment centres.

(v) Motivator

Motivation is a goal-oriented characteristic of the leader that helps employees achieve his objectives.

The leader motivates employees and helps people to find courage,

knowledge, and skills to make the needed changes. He provides the following support helping people to learn and acquire new knowledge and skills. Help people use and apply their new skills.

Reward and recognition—provide frequent recognition and rewards for employee's efforts and accomplishments.

Feedback support—give frequent feedback about performance that reinforces the desired behaviour and defines when the new behaviour is needed.

The leader behaviour can influence the employee's motivation. The leader makes their employees feel that they are performing an important work that is necessary to the organisation success.

Table 4 summarises the leadership styles and the skills identified through the content analysis made to the forums and the factors created with the factor analysis.

7. Conclusions and further research

This research analysis how games may be used as an innovative learning tool to assist with complex situations and develop the skills required. Since all times games can teach us skills and concepts. Games allow us the freedom to fail with only minor personal and social consequences.

Table 4
Leadership styles and skills developed.

(i) Facilitator	(ii) Coacher
The primary skills identified for this kind leader were:	The central skills identified for this kind leader were:
<ul style="list-style-type: none"> — The capacity of communication from management to meet goals. — Capacity to motivate employees and enhance productivity and efficiency through communication. — Results orientation. — Focus on the big picture and delegate smaller tasks to the team to accomplish goals. — Capacity to take advantage of the differences. — Capacity to anticipate and influence change. 	<ul style="list-style-type: none"> — Capacity to analyse worker's profiles and to realise who the employees are that learn best and what are their strengths; — Capacity to delegate; — Capacity to transform errors in learning opportunities; — Capacity to help the employees to learn how to solve problems.
(iii) Mindset changer	(iv) Communicator
The main skills identified for this kind leader were:	The main skills identified for the communicator leader were:
<ul style="list-style-type: none"> — Capacity to give feedback to employees as part of the organisational change; — Capacity to share power; — Capacity to acknowledge employee limitations and strengths; — Capacity to put the interest of the team ahead of personal ambition and self-interest; — Capacity to access both employees emotional and rational sides; — Capacity to project a positive, and optimistic outlook. 	<ul style="list-style-type: none"> — Presentation skills; — Capacity for asking effective questions; — Capacity to listening; — Capacity for facilitation and problem solving; — Capacity for conducting high impact conversations; — Coaching and mentoring skills.
(v) Motivator	
The main skills identified for this kind of leader were:	
<ul style="list-style-type: none"> — Capacity to build employee confidence; — Capacity to help employees to use and apply their skills; — Capacity to drive employee's development; — Capacity to be supportive. 	

Leadership skills have been shown to be of considerable value to the success of project teams. In the project management context, the complexity of the competitive business environment, integration of global cultures, and technological ubiquity are mighty forces and games, conversely, have shown to be inherent venues of significant skills development.

Using GBL methodology we tried to use games not serious thus seeks to find universal games available on the Internet and at no cost, but that accomplish the desired goals - the leader competencies identification: Coach (coaching team members); Facilitator (developing the skills of team members); Mindset Changer (promoting creativity, eliminate resistances); Communicator (feeding back team and individual performance); and, Motivator (motivating using a combination of intrinsic and extrinsic rewards).

This leadership styles and associated skills identification through GBL in the accelerating complexity faced by individuals and organisations requires us to gain greater insight into a model that includes the external environment, the internal resources of the organisations. Further research can analyse how games can be used to achieve leadership of high-performance teams: 1. determining which games allow the transfer of competencies to the organisational context in a more efficient way 2. The role of the leader in successful and unsuccessful projects. 3. Determining the degree and reasons to which organisations are not adopting as fast as expected the practice of playing games as learning and training tools? 4. More empirical analysis with regards to longitudinal studies, relationship development, and employee performance.

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Competing interests

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Appendix A. Supplementary data

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References

- Adair, J. (1983). *Effective Leadership - How to be a successful leader*. Pan Books.
- Akcaoglu, M., & Koehler, M. J. (2014). Cognitive outcomes from the game-design and learning (gdl) after-school program. *Computers & Education*, 75, 72–81.
- Bass, B. M. (1990). From transactional to transformational leadership: Learning to share the vision. *Organizational Dynamics*, 19–31.
- Blake, R. R., & Mouton, J. S. (1982). Theory and research for developing a science of leadership. *The Journal of Applied Behavioral Science*, 18, 275–291.
- Connolly, T. M., Boyle, E. A., MacArthur, E., Hainey, T., & Boyle, J. M. (2012). A systematic literature review of empirical evidence on computer games and serious games. *Computers & Education*, 59, 661–686.
- Dobbins, R., & Pettman, B. O. (1997). Self-development: The nine basic skills for business success. *Journal of Management Development*, 16(8), 521.
- Fiedler, F. E. (1967). *A theory of leadership effectiveness*. New York: McGraw-Hill.
- Fiedler, F. E., Chemers, M. M., & Maher, L. (1976). *Improving leadership effectiveness: The leader match concept*. New York: Wiley.
- Gee, J. P. (2003). *What video games have to teach us about learning and literacy*. New York: Palgrave Macmillan.
- Hersey, P., Angelini, A. L., & Carakushansky, S. (1982). The impact of situational leadership and classroom structure on learning effectiveness. *Group and Organization Studies*, 7, 216–224.
- Hersey, P., & Blanchard, K. H. (1988). *Management of organizational behavior* (5th Ed.). Englewood Cliffs, NJ: Prentice Hall169–201.
- House, R. J. (1971). A path-goal theory of leader effectiveness. *Administrative Science Quarterly*, 16, 321–339.
- Kapp, K. (2012). *The gamification of learning and instruction: Game-based methods and strategies for training and education*. San Francisco, CA: Pfeiffer.
- Keesey, C., & Smith-Robbins, S. (2010). Engagement, immersion, and learning cultures: Project planning and decision making for virtual world training programs. In W. Ritke-Jones (Ed.). *Virtual environments for corporate education: Employee learning and solutions* (pp. 36–49).
- Kets De Vries, M., & Florent-Treacy, E. (2002). Global leadership from A to Z: Creating high commitment organizations. *Organizational Dynamics*, 30(4), 295–309.
- Kimble, C., de Vasconcelos, J. B., & Rocha, Á. (2016). Competence management in knowledge intensive organizations using consensual knowledge and ontologies. *Information Systems Frontiers*, 18(6), 1119–1130.

Kinkus, J. (2007). Project Management skills: A literature review and content analysis of librarian position announcements. *College & Research Libraries*, 353–363.

Kirkpatrick, S., & Locke, E. (1991). *Leadership: Do traits matter?* Academy of Management Executive, May48–60.

Kozlowski, S. W. J., & Ilgen, D. R. (2006). Enhancing the effectiveness of work groups and teams. *Psychological Science in the Public Interest*, 7, 77–124.

Krech, D., Crutchfield, R. S., & Ballachey, E. L. (1962). *Individual in society: A textbook of social psychology*. New York, NY, US: McGraw-Hill.

Lewin, K., Lippit, R., & White, R. K. (1939). Patterns of aggressive behavior in experimentally created social climates. *Journal of Social Psychology*, 10, 271–301.

McCauley, C. D., Moxley, R. S., & Van Velsor, E. (1998). *The center for creative leadership handbook of leadership development*. San Francisco: Jossey-Bass.

Michael, D. R., & Chen, S. L. (2005). *Serious games: Games that educate, train, and inform* [Electronic version]. Publisher: Muska & Lipman/Premier-Trade. Retrieved June 11, 2017, from <http://0-site.ebrary.com.aupac.lib.athabascau.ca/lib/athabasca/edf.action?p00=&docID=1008 7000&page=10>.

Prensky, M. (2003). Digital game-based learning. *ACM Computers in Entertainment*, 1(1), 21.

Robbins, S. (1997). Managing today. In A. J. Dubrin (Ed.). *Leadership: research findings, practice and skills*. South-Western, OH: Cengage Learning.

Sánchez, J., & Olivares, R. (2011). Problem solving and collaboration using mobile serious games. *Computers & Education*, 57(3), 1943–1952.

Scandura, T. A., & Graen, G. (1984). Moderating effects of initial leader-member exchange status on the effects of a leadership intervention. *Journal of Applied Psychology*, 69, 428–436.

Schaffer, D., Squire, K., Halverson, R., & Gee, J. (2005). Video games and the future of learning. *Phi Delta Kappan*, 87(2), 105–111.

Sousa, M. J., & Costa, E. (2014). Game based learning improving leadership skills. *EAI Endorsed Transactions on Serious Games*, 1(3), 1–7.

Steinkuehler, C., & Duncan, S. (2008). Scientific habits of mind in virtual worlds. *Journal of Science Education and Technology*, 17, 530–543.

Van de Sande, E., Segers, E., & Verhoeven, L. (2015). The role of executive control in young children's serious gaming behavior. *Computers & Education*, 82, 432–441.

Vasconcelos, J. B., Kimble, C., & Rocha, Á. (2016). A special issue on knowledge and competence management: Developing Enterprise solutions. *Information Systems Frontiers*, 18(6), 1035–1039.

Vrom, V. H., & Jago, A. G. (1988). *The new leadership: Managing participation in organizations*. Englewood Cliffs, NJ: Prentice-Hall.

Wouters, P., van Nimwegen, C., van Oostendorp, H., & van der Spek, E. D. (2013). A meta-analysis of the cognitive and motivational effects of serious games. *Journal of Educational Psychology*, 105(2), 249–265.

Yang, Y. T. C. (2015). Virtual CEOs: A blended approach to digital gaming for enhancing higher order thinking and academic achievement among vocational high school students. *Computers & Education*, 81, 281–295.

Zaccaro, S. J., Rittman, A. L., & Marks, M. A. (2001). Team leadership. *The Leadership Quarterly*, 12(4), 451–483.