

**Simulations for the Learning of Decision
Making in Educational Leadership in the Context of
the Chilean School System***

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Abstract

This article describes the process of designing and creating six computer-based simulations for school leadership training programmes, in the context of the Chilean school system. For the design and construction of the simulations, six scenarios were selected from case analysis of principals with formal training and experience in different contexts. These scenarios were turned into stories with decision branches, and scores were assigned to the decision-making events according to national and international leadership standards. Finally, the scenarios were coded and installed onto a platform, which was adapted to capture quantitative and qualitative data.

The simulations were applied to principals and candidates for school leadership positions. The process of creating and implementing the simulations demonstrated that it is possible to introduce a tool specifically designed to improve the decision-making abilities of school principals and leaders, replicating the Chilean educational context. This is a step forward in efforts to facilitate learning experiences based on decision-making situations contextualised and relevant to the training of school leaders. Finally, the use of computer-based simulations has great potential to scale the exchange of knowledge and make it universally accessible as a complement to other training opportunities in the careers of school leaders..

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Introduction

In the current worldwide scenario, there is a great diversity of training programmes for educational leaders. However, it is possible to identify some trends and effective practices. Huber (2013) highlights the existence of courses, self-study, collegial exchange, feedback, reflection and planning and concrete experiences as main approaches to Professional Development. Within "concrete experiences", it is possible to recognise the use of simulations as a tool that presents situations or problems in the most realistic way possible. In a simulation, participants are required to solve a situation as they normally would in their contexts (Issenberg, McGaghie, Petrusa, Lee Gordon, & Scalese, 2005). In other fields, such as medicine and nursing, the use of simulations (face-to-face and computer-based) is well developed, but in the training of school leaders, the tool is still being explored.

In Chile, one of the main goals in the field of education is to improve the quality and equity of student achievement in all levels and types of schools. Educational policies of recent years have given more importance to the role of school principals, acknowledging their impact on school improvement and developing programmes for their training. However, current training programmes have some limitations: on the one hand, there is little information linking the professional training with its impact at the school level and finally, while programmes have a strong theoretical content, they give participants few opportunities to put the skills they develop into practice (OECD, 2017).

In this context where new training trends emerge, this article describes the process of creating six computer-based simulations for the training of educational leaders in the context of the Chilean school

system. The simulations are based on cases of Chilean school principals with extensive experience, seeking to reflect different contexts and problems at a national level.

Literature Review

School Leaders' Training

The variety of training programmes around the world is broad. Practitioners and researchers have combined their efforts, presenting new approaches and models (Hallinger, Shaobing & Jiafang, 2017; Shaked & Schechter, 2017). Nevertheless, comparative assessments of training programmes report common foci and characteristics in those considered to be effective. After checking different effective training programmes for school leaders, Bush & Jackson (2002) concluded that most of them combine theory, research and practice. Huber (2013) remarks that programmes are moving from a theoretical and cognitive emphasis (e.g. courses and self-study) to structures that include cooperative work, facilitate reflection and reinforce concrete experiences through practical work and simulations. This implies a shift from imparting knowledge to the development of knowledge in a procedural and conditional manner. The notion of 'knowledge acquisition' will be replaced by the concept of 'knowledge development' or 'knowledge creation', by the means of managing information (Huber, 2010).

After studying the most effective practices when training school leaders and principals, researchers have noted that they must connect theory and practice, allowing participants to exercise key skills. Specifically, the programmes must provide opportunities for the participants to solve real practice problems, using exercises that simulate their daily tasks at school (Davis, Darling-Hammond,



LaPointe, Meyerson, 2005; Davis & Darlig-Hammond, 2012; Mitgang, 2012). For that reason, the use of simulations stands out as a concrete tool that reproduces key processes of principals' and school leaders' jobs.

Simulations are a technique to improve learning by (re)creating real experiences with an 'immersive approach', which 'evoke or replicate substantial aspects of the real world in a fully interactive fashion' (Lateef, 2010, p.328). Simulations are an effective way to develop and train decision-making abilities, while at the same time protecting participants from the real world consequences of their decisions and performance (Staub & Bravender, 2014). They seem to be the most appropriate way to develop experience in a safe learning environment. In order to accomplish that, the content of the simulations must be valid, reproducing the key challenges of the position that they represent, in this case, of school leaders (Maynes, McIntosh, & Mappin, 1996):

'The types of simulations discussed offer opportunities for participants to explore problems that they will 'predictably encounter in the world of practice' and thus "serve as the stimulus for acquiring new knowledge' as participants examine and define the problems and 'wrestle with how to apply [their]... knowledge to resolving the problem they face'. (Bridges & Hallinger, 1997, pp. 132-133, in Bernstein et al., 2016).

Computer-based Simulations

Computer-based simulations are becoming more relevant in the educational field, due to the possibility of creating realistic and dynamic professional learning environments. The use of computer-based simulations makes it possible to represent real conflict situations, decision-making scenarios and experiences, all of them designed to foster and develop problem-solving abilities in a variety

of situations, providing immediate feedback. Also, based on the results of some works of research (Henneman, Cunningham, Roche, and Curnin 2007, in Bernstein, McMEnamin, & Johaneck, 2016), the use of simulations along with group discussion exercises is useful in improving the personal and professional development experience and can contribute to forming communities of professional practice among school leaders.

For participants to adequately acquire new skills, they must get completely involved and immersed in the world of the simulation (Bernstein et al., 2016). Therefore, the goal of the simulation is 'to recreate the essence of real situations in order to design authentic learning experiences for students' (Herrington, Oliver, & Reeves, 2003, p. 2115). This is what some authors call 'cognitive realism' (Smith, 1986, in Herrington et al., 2003), which means that 'the physical reality of the learning situation is of less importance than the characteristics of the task design, and the engagement of students in the learning environment' (Herrington et al., 2003, p. 2117). Simulations are a powerful tool because they are stories that engage emotions by providing a shared context. They can trigger memories through their context and language (Spero, 2012). They present contexts and scenarios that get the students involved through their emotions, which allows them to 'learn by failing', that is, 'to practice new skills and behaviours in a safe environment without fear of the repercussions of failing' (Spero, 2012, p.6). This type of training allows the students to acquire knowledge from the situation in a way that resembles the German expression "Ein Erlebnis", which means that one 'lives' through 'experience', thus acquiring the knowledge from that experience 'lived' through the simulation.



In order to design meaningful simulations adapted to the local context, research must focus on understanding what kinds of scenarios and problems of the everyday school environment must be included to fulfil the participants' needs. Seeking to design and develop simulations that fulfil the training requirements of a 21st century school leader, Poikela (2017) identifies fourteen characteristics of meaningful learning in computer-based simulations: experimental, experiential, emotional, socio-constructive, self-directed, collaborative, competency-based, goal-oriented, individual, reflective, contextual, critical, active, and responsible.

Simulations designed with criteria such as the 'full plot development and character representation' (Herrington et al., 2003, p. 2116), are effective tools to learn necessary competencies and skills for the 21st century school leaders, as well as a powerful tool to put theory into practice and to apply problem-solving techniques to real experiences in local contexts, encouraging participants to become experts in their field of action, that is, school leadership.

There have been successful experiences of adapting simulations for specific contexts (Hallinger & Kantamara, 2001; Hallinger et al., 2017) integrating research and formal knowledge into the design of the tool. An example of a computer-based simulation is Penn GSE's PELS (Penn Educational Leadership Simulation Program), which has the goal of 'drawing out leaders' own experiences tackling real-world challenges' (Penn Graduate School of Education, n.d.), to create online simulations that are sustainable in the training context, with a problem-based learning method that offers participants context-rich learning modules.

Simulations as Tools for Problem-based Learning

Problem-based learning (PBL) requires focusing on a task and finding solutions to a problem using available knowledge. The approach is essentially centred on 'doing' what is necessary to accomplish the task. The learning process is oriented towards action and active learning, which requires suitable learning methods, such as portfolios, role playing and simulations to allow participants to experience situations and problems that are common to what school principals face on a daily basis in their contexts. As Philip Hallinger (2007) remarks, 'we believe that PBL represents a potentially powerful approach to preparing 'managers for action'' (p.6).

Simulations foster critical thinking and judgement, thus promoting problem-based learning. They share some key characteristics with the PBL approach (Hallinger & Bridges, 2017): for example, the starting point is a problem, not a theory; learning is stimulated by challenges that participants might find at their workplace; participants must simulate a solution, receiving formative feedback. PBL aids in achieving four key learning results (Bridges & Hallinger, 1997):

- Acquiring new knowledge and learning how to apply it.
 - Developing skills in self-directed learning.
 - Developing skills in running meetings, resolving conflict and using group problem solving and decision tools.
 - Acquiring insight into the emotional aspects of leadership.
- (p.135)

The study conducted by Copland (2000) concluded that higher exposure to PBL was 'associated with greater problem-framing ability among prospective principals' (p. 586). Additionally, the study



highlighted the incorporation of debriefing practices to help students to solidify a way of thinking to solve problems. Furthermore, different studies confirm students' positive attitude toward PBL (Hallinger & Bridges, 2017).

Simulations promote critical judgement in the decision-making process (Duke, 2018) by employing feedback and reflection on practice and performance. Following the Clinical Judgment Model (Tanner, 2006), simulations succeed in triggering the process of noticing, interpreting, responding, and reflecting. In other words, it is possible to improve leaders' judgment by accelerating their experience through training and practice of these abilities and competencies via computer-based simulations.

Decision-making and Improvisation in Organisational Management

In the world of organisations and leadership functions, not everything is planning and scheduling. Improvisation in decision-making is a commonplace, a subject of study and a learning challenge. Very often, the strategic plans of the organisations are not fully completed: 'Only 10-30% of intended strategy is actually realised, resulting in leaders improvising a solution' (Tabaee, 2013, p.4). Therefore, the exercise of improvisation in decision-making is an ability worth studying, especially in aspects such as how it expresses itself, what factors trigger it, and how to teach improvisation in organisational contexts, specifically in school environments:

'Studies show that improvisation in leadership decision making is on the rise, and it transpires in organisations 75-90% of the time, yet very little research has explored this skillset. No other leadership skillset that is applied two thirds of the time has ever been so underdeveloped' (Tabaee, 2013, p.xvii).

This ability can be learned, and can therefore be taught. Many authors have established an analogy between the teaching of musical improvisation in jazz and the teaching of improvisation abilities in decision making inside organisations by their leaders (Vendelø, 2009; Newton, 2004; Vieira Da Cunha, Kamoche, & Pina E Cunha, 2003). Learning the 'language of jazz' through hearing previous experiences (recordings) and identifying repetitive patterns in them, provides the musician with the basis of the language of jazz music with its signs, codes and rules. That experience allows the musician to improvise within that structure. This is analogous to learning the language of the school. Based on this knowledge, school leaders will be able to improvise their decisions as a response to unplanned events. Computer-based simulations could teach the language of the school with scenarios adapted to local contexts. Through the immersion approach, participants can experience the reactions and consequences of their decision making, and immerse themselves in a dynamic educational experience in a "safe environment" with instant feedback.

Chilean Context

In Chile, one of the main goals in the field of education is to improve the quality and equity of student achievement in all levels and types of schools. Although Chilean students in recent years have obtained better results in international education standardised tests than their Latin American counterparts, the gap is still significant with respect to OECD member countries or those with a similar GDP (OECD, 2017). In this scenario, since the decade of the 2000s educational policies highlight the role of school principals, acknowledging their impact on school improvement and fostering their training with initiatives such as the 'Plan de Formación de Directores' ('Principal Training Plan') promoted by the Ministry of



Education and in effect since 2011. The initiative has been implemented by different universities and organisations, supporting principals from all over the country at different stages of their professional careers (CPEIP, 2016).

In fact, the training rate of principals is high: data indicates that more than 9,000 principals lead and manage the teaching of more than 3.5 million students (MINEDUC, 2017a). Of those, 88% have a teaching degree and more than 80% have completed postgraduate studies (diploma, masters degree or a doctoral programme) (MINEDUC, 2017b). However, current training programmes have some limitations: on the one hand, there is little information linking the professional training of Chilean teachers with their impact at the school level (Muñoz & Marfán, 2011). Secondly, while the programmes have strong theoretical content, they give participants few opportunities to put the skills they learn into practice in a safe environment and which allows them to test possible solutions to a certain problem.

Problem and Goals

One of the central premises of the research project is that decision-making is an ability that requires training and practice to be improved. Professional judgment in the decision-making processes is usually the product of experience, and leaders with a long professional career possess a corpus of knowledge and wisdom they have acquired through practice, through collective professional judgement and years of experience. That is why this knowledge is difficult to achieve (Volante, Müller, Johaneck, Jeldres, Lazcano & Llorente, 2017). It is composed, among other elements, of the ability to categorise and analyse underlying ideas when facing an

unexpected problem or situation, and to act accordingly, redirecting the course of action based on different dimensions, analysing and reflecting this process in the results (Tanner, 2006).

With the goal of accelerating the development of decision-making expertise, this study presents the question of how to replicate the contexts and experiences of school leaders with extensive professional experience, who make decisions in critical situations that require the use of professional judgement. This, in order to create computer-based simulations that allow novice and expert principals to exercise professional judgement in relevant contexts. In this sense, the question of this study aims to prove that it is possible to design, implement and run simulations that represent decision-making situations that may present themselves in the everyday experience of leaders in the school system, promoting decision making with differentiated criteria, thus producing varied courses of action.

The goal of the project is to design and implement simulations adapted to the local context and based on scenarios that represent real experiences and critical situations in the careers of experienced leaders, addressing the everyday and strategic challenges of the local and current context. This way, the tool could improve the development of school principals and leaders' critical judgement skills in decision making, in the context of educational leadership training programmes.

Materials and Methods

The hypothesis that guides the article is that it is possible to identify and reconstruct real-life experiences in school leadership decision making and to transfer them through virtual simulations,



thus contributing to school leaders' professional learning opportunities.

Therefore, the process assumes the search and selection of relevant cases of school principals, considering a wide spectrum of possibly interested individuals and a process for each principal to elaborate on their experience, producing a syntax that can be transferred to the project platform, and therefore be used as a basis to train the decision-making dynamic.

The methodological approach is a research and development design (R&D) (Hallinger et al., 2017), which proposes the search for solutions to a problem or need, based on successive and iterative steps of experimentation and reflection among researchers and users, thus producing prototypes that are tested and validated through different techniques of consultation and observation of the use, relevance and effectiveness of the solution. In this case, semi-structured interviews were conducted with the selected principals and individual work was carried out with each one of them, producing scripts of relevant situations, which were validated by a panel of experts. The goal was to create simulation designs to be tested with users with an equivalent profile to that of final recipients.

Case Selection

The first step to designing the tool was the selection of relevant cases, which allowed for the examination of decision-making processes in different contexts. Those cases were the basis of the simulations. In order to accomplish that, in 2016, the research team worked with a universe of more than 70 participants, teachers and school leaders, who were completing school leadership training programmes at a Chilean university. The research team asked them

to write down complex decision-making situations that occurred in the last 5 years and that did not necessarily have evident or technical solutions. The team obtained 45 answers.

An expert panel formed by academics and experienced principals selected 6 relevant cases (Table 1), based on three criteria: they were principals with sustained experience, defined according to the length of their professional career in years, and the number of years they held the position; it was also considered relevant to locate case selection in organisations with good learning results. Accordingly, a revision was made based on the results of each principal's school in the National System for the Measurement of Educational Quality (Sistema Nacional de Medición de la Calidad de la Educación, SIMCE), during at least six years. Only schools with results higher than the national average, and/or higher than the average achieved by schools with similar sociodemographic characteristics, were selected. Although, one of the cases did not have national measurements during the assessed period, and another case decreased their results in the last period. Finally, the cases were selected due to the variety and relevance of organisational realities, including public, private subsidised, and private non-subsidised schools, at primary, secondary and technical-professional levels, located in both urban and rural areas, and of different sizes, thus seeking to reflect the diversity of the national educational context. Also, the cases allowed alternative solutions, and the solutions required relational considerations. The third criterion reinforces the potential for the development of decision-making exercises in different organisational contexts, also including different types of issues, addressing mainly instructional, organisational and behavioural problems.



Table 1.

Background information about participant principals

Case No.	Gender	School type	Profession	Years of professional experience	Years of experience in the position	Academic results (3 years)
1	Female	Public	Elementary School Teacher	25	15	n/a
2	Female	Private Subsidized	Art Teacher	5	1	1
3	Male	Private Non-subsidized	Physical Education Teacher	20	2	1
4	Female	Private Non-subsidized	Language Teacher	30	8	1
5	Female	Private subsidized	Natural Sciences and Biology Teacher	22	14	1
6	Male	Private subsidized	History and Geography Teacher	31	18	1

Iterative Process of Creation of Scenarios

Once the cases were selected, the six principals were interviewed in late 2016 to detect key decision-making experiences. Each principal was interviewed by a member of the research team, using an extensive and unstructured technique, with the goal of

obtaining narrative details of their experience. The process was called 'narrative edition of principals' decision making in real contexts'. The interview allowed us to capture key decision-making situations, their participants, place, specific events, possible causes and consequences and the final decision to be identified.

In a second instance, the research team - along with participants - designed an itinerary of consecutive decisions, including the ones that were actually made or could have been made in the moment, as well as other options that emerged in the process of reflection and in the retrospective analysis of the situations. Therefore, following the model that inspires this simulation development process, 'the simulation branches off based on the choice made. This then leads to another choice and the branching continues until an endpoint of the simulation is reached' (Bernstein et al., 2016, pp. 248-249).

In the third instance, the research team modelled the original contents according to frameworks that were structured in a common syntax, consisting in a description of the initial situation, alternative decisions, and possible consequences. Thus, when performing the simulations, participants must face different decision-making moments, having to choose between one or more alternatives within a certain amount of options. In addition, analysis and reflection sessions were carried out with the research team, with the goal of studying in depth the learning opportunities that each scenario could offer to the final users. In total, each simulation has between 6 and 16 decisions, and each decision has between 4 and 6 options. The simulations also include the possibility to complete written answers, where the participants must elaborate on why they chose one alternative over another, or respond freely about ideas on how to

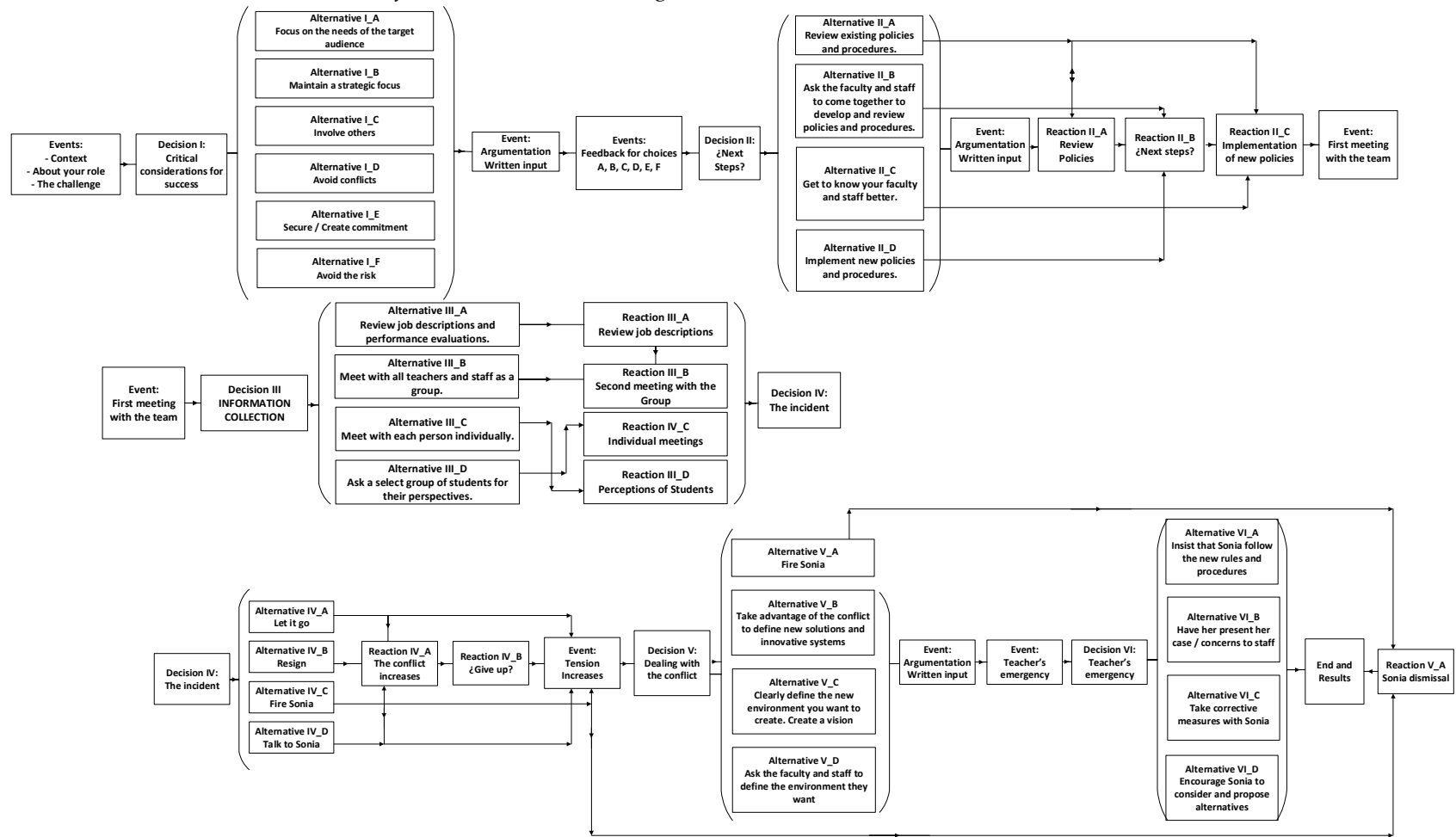


implement a decision, for example. In both cases, the feedback is detailed in the Narrative Feedback section.

Figure 1 shows an example of a diagram of a decision tree that was created in this process, showing which kinds of decisions the participants have to face. In this case, it illustrates the "Turnaround Challenge" simulation, where a new principal (the participant) confronts a conflict of interests and leadership with the Inspector General (position in charge of disciplinary matters), who has assumed an informal role of leadership and greater responsibilities each time the school principal has changed.

Figure 1.

Decisional route exercise of the "Turnaround Challenge" simulation





Adaptation of the Principals' Experiences and Creation of the Interface

In this stage, a creative process was carried out, adapting the principals' stories and narratives with the purpose of transforming them into scripts of the decision-making scenarios, programming sequences, and transforming the model of each case into prototypes that could be 'installed' on the project's platform.

After a preliminary trial of these prototypes, some of the decision alternatives and their consequences were reformulated, and the situations were aligned based on criteria that could orient the school principals' performance. In order to do so, the Framework for Good Management and School Leadership, (MINEDUC, 2015) and the Professional Standards for Educational Leaders (National Policy Board for Education Administration, 2015) were utilised to incorporate a local and a global school leadership perspective. Then the scripts of the definitive scenarios were created, and audiovisual resources with local actors and contents were produced. Later, the IT team inserted each situation into the ELS's (Ed Leadership Sims) TrackBuilder© platform, with their respective multimedia resources. The platform was fully operational in April 2017.

Results

Recreating and Virtualising Leaders' Experience

In the context of the research and development approach utilised in this study, the first result (besides the creation process itself) is the production of six unprecedented school leadership simulations, based on local content from the Chilean school context, in Spanish, that represent the key scenarios of principals in different

types of organisations. The six scenarios extracted from the principals' experiences, and transferred through the simulations platform to be used in professional training and exchange, are described below.

The simulations: different contexts and challenges

1. *The Turnaround Challenge:* This simulation is about a small private subsidised, vocational-technical secondary school founded six years ago, a period in which it had four principals. The school has an enrolment of 200 students and is located in a high-vulnerability area. You are facing a conflict of interests and leadership with the 'Inspector General' (position in charge of discipline affairs), who has taken an informal leadership role, gaining more responsibilities with each new principal.

2. *The Consolidation Challenge:* The fusion of two public primary schools, located in two 'rival' towns in a rural area, with students from pre-elementary to 8th grade and an approximate enrolment of 200 students, produces tension among everyone in both communities. While your school is obtaining good academic results, the neighbouring town's school is achieving poor results and having disciplinary problems. Municipal authorities have announced that they intend to merge both schools, as they are no longer sustainable due to low enrolment. You are now the principal of both schools and you will have to manage the information, make decisions, and deal with all the groups of interest involved.

3. *Substance abuse at School:* This simulation is about a private school with an enrolment of 1,066 students from preschool to secondary school. You have worked there throughout your entire career and are currently the principal. A group of students is using drugs, and you need to decide whether to expel them or provide them with support



and counselling. The situation triggers a series of decisions that will get students, parents, teachers, school leaders, and local authorities involved.

4. Improving school performance: It is about a private subsidised school, with students from preschool to secondary school. It was handed over by a religious congregation that managed it for many years to a secular non-profit organisation dedicated to youth and community education. In this context, the enrolment has decreased from 700 to 300 students in the past five years. Although some adjustments have been made, the district where the school is located has another seven schools with better organisational and academic results, and you must address the challenge of increasing enrolment by improving its standing.

5. Resolving conflicts among parents and students: In a private subsidised school belonging to a Christian congregation, with an enrolment of 1,050 students, the absence of a beloved teacher produces tension between students and the substitute teacher. An escalating tension mounts within the school and against the principal, reaching a point where a group of students takes over a classroom as a form of protest.

6. Growing Pains: You are the principal of a private school with an enrolment of 1,305 students. The school has three per level from first to sixth grade, but decreases to only two per level from seventh grade on. You do not like the idea of leaving 30 students unenrolled and will attempt to add a third class, assuming the multiple challenges implied.

Moreover, decision-making opportunities within the simulations vary in number, content, and conflict intensity. The topics emphasise relational tensions and organisational dilemmas in which people with different criteria and roles are involved.

Narrative Feedback

A scoreboard was developed, based on three main criteria: (1) the experience of the six principals that were the protagonists of the cases. The research team worked with them, analysing their experience and their decisions and establishing which could have been the best options for each decision. (2) The instructional component. At the moment of creating the decisions and their alternative answers, the research team designed viable and competitive situations. Some situations were “better” than others in terms of their instructional component – in other words, they had a more direct effect on leadership and learning. (3) Proximity to professional frameworks. The model favoured answers that were more aligned to local and global frameworks: the Framework for Good Management and School Leadership (MINEDUC, 2015) and the Professional Standards for Educational Leaders (National Policy Board for Education Administration, 2015). Therefore, during the process of completing a simulation, each decision made by the participants has a specific punctuation. After completing each simulation, the participant receives a feedback report, showing fit percentages between observed and expected responses.

In addition to the fit percentages, participants receive narrative comments on each one of the choices they made, explaining why the selected option was appropriate or not, followed by a description of the decision’s effects and consequences. In this sense, this feedback ‘models’ the choices to be made in a similar future scenario.

Users' Perception of the Simulations

The interface presents multimode information through text, video, audio, and images referring to varied school contexts. The platform's images (Images 1 and 2) reinforce the virtual immersion environment, which seeks to approach schools' everyday agents, attributes, and languages.

Image 1.

Simulation platform interface

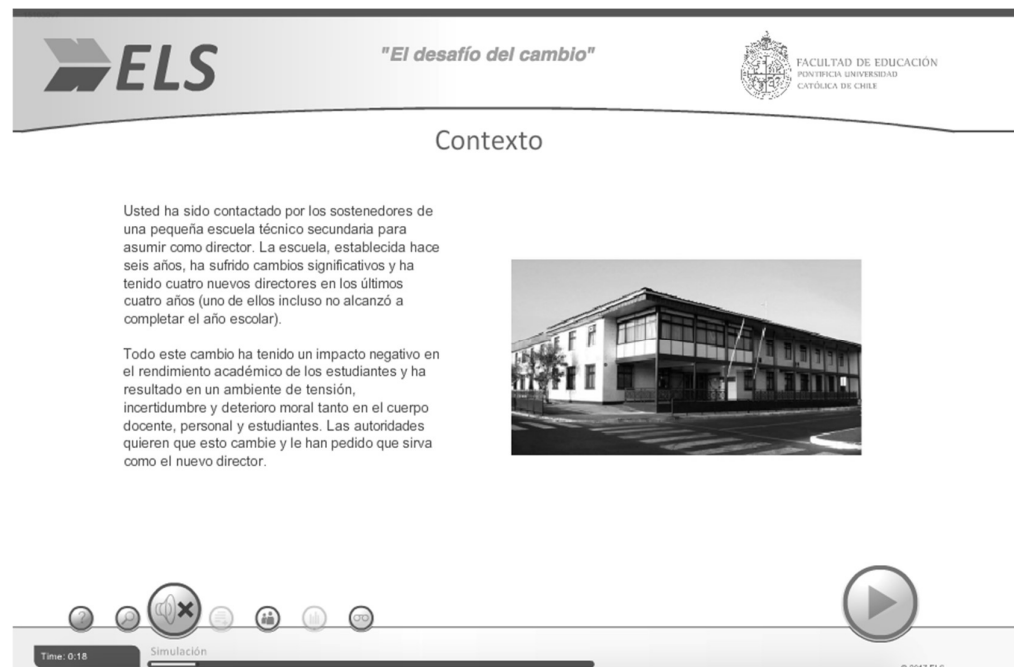


Image 2.

Simulation platform interface



In 2017, a testing phase was carried out, in which 30 principals, school leaders and educational professionals participated. To make up the sample, open calls were held allowing the formation of five groups, each one composed of five to eight participants. Table 2 summarises the main characteristics of the sample.



Table 2.
Characteristics of the test sample

		Frecuency	Percentage
Gender	Female	17	56,7%
	Male	13	43,3%
Position	Principal	16	53,3%
	School leader	11	36,7%
	Other position in the education area	3	10,0%
Type of school	Public	17	56,7%
	Private Subsidised	6	20,0%
	Private Non-Subsidised	5	16,7%
	Other	2	7%
Zone	Santiago	23	76,7%
	Other	7	23,3%

All the participants in the sample were principals, school leaders, consultants, or district officials. Most of them were working in the public system, although some of them worked in private schools (subsidised and non-subsidised). Since the sessions were held in Santiago, Chile, most of the participants were local, although some of them came from other regions of the country.

Five face-to-face work sessions (one for each group) were held in Santiago, where the participants had to complete the "Turnaround Challenge" simulation and then do a critical thinking exercise in which they assessed the alternatives and decisions proposed in the scenario and their validity, as well as aspects such as platform usability, interface and the scenario's choices and relation to professional leadership standards, both national and international. After the exercises, a focus group was conducted by the research team in which participants had the chance to discuss the scenario,

their choices and consequences, as well as aspects of the leadership practice within an educational organisation.

In this stage of the project, the perception of the participants was collected and processed, examining the criteria of usability, relevance, and expectations regarding the professional learning that can be achieved through the simulation experiences. In this sense, some of the participants' opinions, collected during the sessions highlight the potential to exchange and reflect that these types of tools offer.

- *'It seems to me this is a bid by the school to manage change, conflicts, personnel, environment, and organisational culture'. (Language and communication teacher).*
- *'It allows for the application of theoretical elements and a more in-depth study of the possible consequences of the models used to make better decisions'. (Public secondary school Principal, 5 years in this position).*
- *'I can take away that there are different perspectives on each situation, and that advice from successful practices is good'. (Academic Coordinator at a public secondary school, 4 years in this position).*
- *'It is interesting to listen to the interpretations that other people make of the situations, whether or not they have more experience than oneself'. (Teacher in a leadership position, 7 years in this position).*

Source: Testimonials from users in pilot tests.

Usability

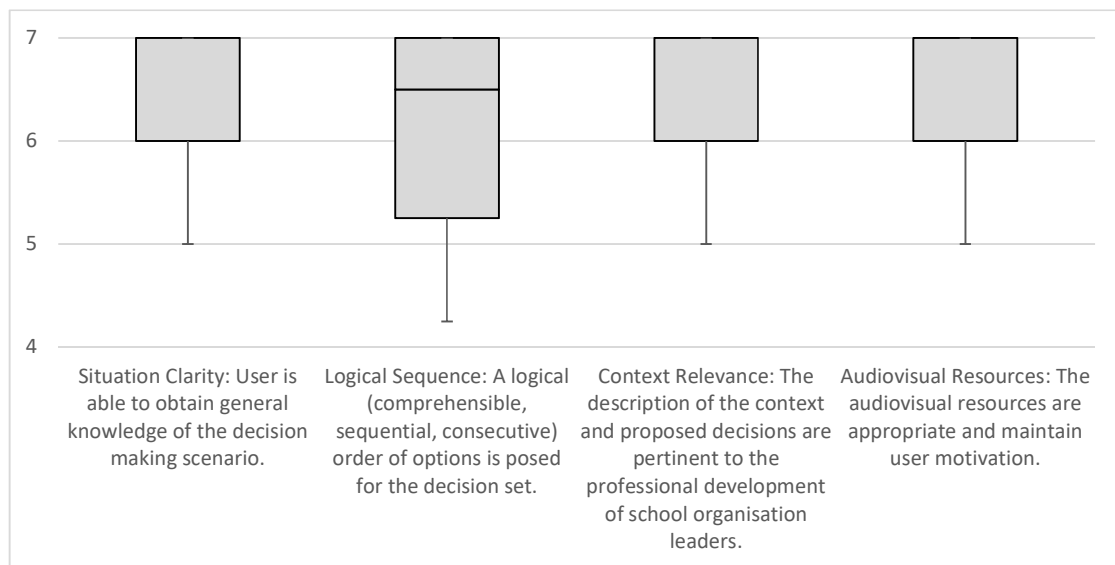
The self-explanatory and intuitive design of the simulations allowed the participants to complete the computer-based exercises with minimal instruction. However, it was evident that the presence of a facilitator is necessary to offer technical assistance to some participants who are less familiar with interactive tools and therefore require more support. Additionally, a usability test was run,

assessing four aspects related to the platform's potential to motivate participants and the ease with which its resources and sections could be used. The following chart (Figure 2) presents the data obtained from a sample of 30 participants.

The data shows that the four assessed aspects were highly accepted (all of the medians are over 6 on a scale of 1 to 7), and the evaluations also have a low degree of dispersion. The variables with greater dispersion are the logical sequence and structure of the decision tree, and the quality and appeal of the audiovisual resources.

Figure 2.

Trends and Dispersion in user assessment



Relevance

In general, the participants declared the scenarios relevant to decision making in the context of the Chilean school system, and this perception is shared by principals and teachers in middle leadership positions, such as Department Head or Cycle Coordinator. Some of their impressions are:

- *'I think that the modelling of better decisions allowed me to see how close or far I was from those decisions. When I was close to them, I felt reassured in my own judgement; when I was far, it allowed me to analyse my own beliefs and mechanisms of reflection'. (Language and communication teacher, director of content in online education).*
- *'Leadership is a process that one has to learn; the responsibility in the decisions that one makes is huge, therefore it is necessary to manage relevant elements and contents such as culture, environment, strategic planning, processes, teamwork techniques, etc.'. (Academic Coordinator at a private subsidised school, 3 years in this position).*
- *'It is very important to learn to manage the different types of leadership, depending on the context in which one works'. (Counselor at a private subsidised school, 2 years in this position).*

Source: User testimonials in pilot tests

The usability assessment examined the level of connection between the simulations and their relation to leadership standards, both national (MINEDUC, 2015) and international (National Policy Board for Education Administration, 2015). Results from the first case of the simulations platform, 'The Turnaround Challenge', are presented below as an indicator of the relationship perceived by participants between the cases and national and international frameworks.



Framework for Good Management and School Leadership (MINEDUC, 2015):

In the testing phase of the platform, the users perceived the areas of Leadership, Resources Management and Organisational Environment Management as the most closely related to the case, as shown in Table 3.

Table 3.

Areas from the Framework for Good Management and School Leadership, and their relation and relevance to the case

Area	Indicator
A. Leadership (F=96; f=64%; N=30)	A1. The principal and the leadership team exert leadership and manage change within the school. (F=22; f=73%)
	A2. The principal and the leadership team communicate their points of view with clarity and understand the perspectives of other agents. (F=21; f=70%)
	A4. El The principal and the leadership team are able to manage conflicts and solve problems. (F=27; f=90%)
B. Curriculum Management (F=24; f=20%; N=30)	B2. The principal and the leadership team organise the time schedule in an efficient way to implement the curriculum in the classroom. (F=6; f=20%)
	B3. The principal and the leadership team establish mechanisms to secure the quality of teaching strategies in the classroom. (F=6; f=20%)
	B4. The principal and the leadership team secure the existence of mechanisms to monitor and assess curriculum implementation and learning results, consistent with the Institutional Educational Project. (F=8; f=27%)

C. Resources Management (F=46; f=38%; N=30)	<p>C1. The principal and the leadership team manage and organise the institution's resources based on their institutional educational project and the students' learning results. (F=9; f=30%)</p> <p>C3. The principal and the leadership team motivate, support and manage the personnel in order to increase the effectiveness of the educational institution. (F=25; f=83%)</p> <p>C4. The principal and the leadership team create the proper institutional conditions for the recruitment, selection, assessment and development of the institution's personnel. (F=10; f=33%)</p>
D. Management of the Organisational Environment and Coexistence (F=56; f=37%; N=30)	<p>D1. The principal and the leadership team foster institutional values and an environment of trust and collaboration in the institution in order to achieve its goals. (F=26; f=87%)</p> <p>D2. The principal and the leadership team promote a collaborative environment among the educational institution, students, and parents or guardians. (F=14; f=47%)</p> <p>D5. The principal and the leadership team inform the community and the owners the achievements and needs of the institution. (F=6; f=20%)</p>

In summary, the dimension with the greatest perceived relation to the analysed case is 'Leadership' (MBD_A, using the acronym for Marco para la Buena Dirección, Spanish name of the Chilean framework), and especially the practices associated with managing conflicts and solving problems (MBD_A_4). Also, the dimension 'Management of the Organisational Environment and Coexistence' (MBD_D) is perceived as outstanding, and in particular the practices wherein 'the principal and the leadership team foster the institutional values, and an environment of trust and collaboration in the institution' (MBD_D_1) stand out.



Professional standards for educational leaders 2015 (National Policy Board for Education Administration, 2015):

In order to make a comparative synthesis of the most highlighted elements by participants (N=30), they were asked: Which standards do you consider most representative of the situation presented in the simulations?

As observed in higher frequencies, the standards most commonly associated with the situation, decisions, and alternatives presented on the platform are the following:

Standard 1: Mission, Vision and Fundamental Values (indicate Absolute and Relative Frequency) [F=17 f=56% N=30]. This implies that 'Effective educational leaders develop, advocate, and enact a shared mission, vision, and core values of high-quality education, academic success and well-being of each student'

Standard 2: Ethics and professional norms (indicate Absolute and Relative Frequency) [F=17 f=56% N=30]. This would allow for the observation of how 'Effective educational leaders act ethically and according to professional norms to promote each student's academic success and well-being'.

Standard 10: School Improvement (indicate Absolute and Relative Frequency) [F=18; f=6% N=30]. This standard assesses how 'Effective educational leaders act as agents of continuous improvement to promote each student's academic success and well-being'.

The evaluation allowed the research team to obtain evidence to affirm that it is possible to model decision-making experiences and situations, and that they are perceived as relevant to the context of school direction and leadership. One feature that was especially valued by users is the opportunity to visualise possible scenarios,

situations, realities and complex contexts to which they could be exposed in current or future positions.

Discussion

It is possible to say that the use of simulations as part of a professional development programme is a useful complement for school leaders who wish to develop critical judgement and decision-making abilities. Nowadays, those two abilities are not explicitly trained in the context of principal training programmes (Duke, 2018). In that sense, the use of simulations such as those developed in this research project has a practical implication: it allows for the deliberate training and improvement of abilities that are currently developed only through practice in educational organisations, receiving immediate feedback, and based on national and international standards. It is even possible to propose a broader scope for the simulations, as part of pre-service or induction programmes for school leaders, allowing for their use on a large scale.

It is also possible to say that the simulations designed by the research team innovate by introducing a tool specifically designed for the decision making of school principals and leaders, replicating the Chilean educational context and addressing issues that are specific to educational organisations in the country. In addition, the simulations presented in this article offer the possibility of recording the responses of participants, offering significant potential to increase and improve what is currently known about the decision-making patterns of school leaders. Moreover, they could improve the understanding of the reasoning and judgement patterns that explain decisions in different problem-solving situations.



By creating the simulations, it was possible to confirm that the experiences of school leaders can be integrated into a replicable and scalable instrument with applications in training and research (Volante et al, 2017). Also, consistent with previous evidence, users found simulations to be relevant for their practice (Hallinger et al, 2001; Hallinger et al, 2017). An important step will be to expand the number of cases and scenarios, in order to address a greater number of issues, contexts and situations pertaining to different moments in the leaders' career. Thus, it will be possible to disseminate the use of computer-based simulations, developing a professional learning approach based on real experiences and adapted to different contexts. Simulations are a powerful tool that contributes to the processes of professional development and innovation in continued training because they emphasise the exchange among agents within a professional community, systematising "stories" that are not currently available due to the lack of techniques and records about the operation of decision making and everyday actions of school leaders. The results will be a new source of qualitative and quantitative research, which can provide new evidence about practices and experiences that are key in the professional field.

Limitations

Some limitations of the study are related to the size of the sample participating in the validation, which is small both in number and context of individuals (principals and school leaders mostly from the Metropolitan Region). In that sense, it would be interesting to have a more diverse sample, which may reflect a greater variety of contexts and experiences. In addition, only principals and school leaders currently in the position were included in the sample, a decision which on the one hand was useful because they can properly

evaluate the relevance of the exercise but, on the other hand, their report of the simulations as a learning tool could be biased. For that reason, it would be very important to conduct evaluations among candidates for leadership positions or leaders in training.

Regarding the validation process, more simulations must be assessed to understand the usability and relevance of the tool as a whole. Regarding the simulations, they are still limited in quantity, so in the next stage of the project, it would be desirable to look for more scenarios, reflecting the particularities of different contexts and situations. Therefore, it will be possible to enrich the instrument, making it suitable for leaders and principals with different backgrounds, both professional and personal. Finally, it is important to analyse and put the scoring system of the simulations into perspective: while it is based on Chilean and global standards, it is important to leave room for the singularities present in each case and to consider how personal knowledge or experiences could shape participants' decision-making processes. Eventually, more than one decision path could be correct or acceptable, thus changing the way feedback is delivered to participants. This issue highlights the tension between the development of participants' autonomy and the use of standards as the basis for the scoreboard. Consequently, that leads to the question of how to truly stimulate professional reflection on the frame of decision-making processes. A possible way to address this issue is by fostering the development of workshops or discussion groups where participants could reflect on their decisions and consider the different factors influencing them and which other courses of actions could have been adequate in their contexts.

The next step of the project will be to analyse the evidence collected in the testing stage, with the goal of backing up the



hypothesis that professionals who use simulations in the context of educational leadership training programmes experience greater learning in decision-making skills than professionals who receive formal training without simulations. Likewise, we expect to test whether the participants who completed the simulations in addition to receiving mediation in the form of decision-making workshops achieve a higher level of development in their critical judgment and decision-making abilities compared to those who were only exposed to simulations. Another line of research is related to expanding the number of simulations, seeking to address some of the most frequent situations that school leaders and principals face at different moments of their professional careers.

Conclusions

The use of computer-based simulations has become a training trend in different areas, especially in health and management. There have been few experiences in education, and even fewer with a specific focus on the training of school leaders on decision-making abilities. In this case, it has been possible to produce an innovative tool for specific users – school leaders – created in Spanish. Six simulations were designed and implemented by the research team, reproducing real-life scenarios and decisions made by experienced principals in the Chilean context. Pilot results show that users of the simulations declared that the scenarios are relevant for decision making in the context of the Chilean school system and they visualise the relationship with national and international standards. They also highlight the potential to reflect on their decisions after completing the tool.

It is possible to say that simulations described in this article have the potential to facilitate the development of new problem-based learning research, thus promoting a better understanding of the principles of judgement for decision making of school leaders in different contexts, both at national and regional levels.

In summary, the research project described in this article made it possible to recognise and reproduce decision-making experiences made by experienced principals, in order to create simulations for the development of school leaders, within the frame of a problem-based learning approach.

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