Simulations to train educators in crisis management in a youth protection institution

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Summary: Simulation is a pedagogical practice that is widely used and studied in the field of medicine, but few studies have analyzed its use within continuing education. This study therefore seeks to evaluate, first of all, the pedagogical effectiveness of simulation-based training in continuing education, as well as to show whether the conflict management skills developed through the training improve with the implementation of such a system. In this research, the effects of two methods of integrating a syllabus into simulation-type training (syllabus before the simulation vs syllabus after the simulation) are estimated. The literature on the use of a syllabus upstream or downstream of simulation-type continuing education is not very extensive, but the approach can be compared to the principle of the flipped classroom.

Keywords: simulation; continuing education; training; conflict management skills; self-control strategies

1 Introduction

Society has been profoundly transformed by information and communication technology (ICT) in recent decades. Confucius said that involvement is the key to understanding, and that is why it is motivating to develop simulations for learning. Simulations have become common in many professional sectors over the past 20 years or so, having been initially developed for continuing education in risky professions. However, they have now been extended to many other fields, such as healthcare, civil security, and the military (Oriot, Boureau-Voultoury, Ghazali, Brèque, & Scépi, 2013). Today, various research fields offer a wide variety of forms of simulation for professional training through the use of technology (Dubois & Van Daele, 2018). A simulation is a simplified but accurate representation of a real situation (Chamberland, Lavoie, & Marquis, 1995). It can be considered a training device that allows the training context to be didactic. In short, simulation is a practical and safe way to carry out actions that prepare the learners for more complex activities. The practical benefits offered by simulations are also seen as practice for developing skills, and thus gaining professional experience (Audran, 2016). Serious gaming, or game-based learning, has become a popular platform to support subject learning. Numerous studies have shown that gamers are motivated and focused when participating in gaming sessions (Hoffman & Nadelson, 2010; Huang, Huang & Tschopp, 2010). In the context of crisis management within an institution, the challenges encountered have raised questions about the use of educational serious games as a learning method. A relevant question would be whether the use of simulation allows professionals to feel more competent in dealing with crisis situations. In this study conducted with educators working in a public institution for the protection of justice and carried out in a professional context, the objective is to evaluate the pedagogical effectiveness of a simulation on a digital medium for understanding crisis management. The impact of two modalities of using a syllabus in this training, which can be compared to the flipped classroom principle, will also be examined. Both groups of participants will have access to a syllabus containing the entire content of the training, either before the simulation, which will be considered the flipped classroom, or after it, which will be considered the "traditional" classroom. The objective of this research is therefore twofold. On the one hand, it aims to evaluate the effectiveness of continuous training by simulation for educators working in a Public Institution of Youth Protection to prevent and manage conflict situations with juvenile offenders aged 14 to 18 years old. On the other hand, it seeks to analyze the impact of two modalities of using the syllabus on the effectiveness of this training through a comparative analysis.

2 Review of the literature

2.1 Learning through simulation
According to Chamberlant, Lavoie and Marquis (1995), a simulation is a reproduction of a situation that constitutes a simplified but faithful model of reality. It exists only insofar as it is related to reality. The model must therefore be as authentic as possible because the main purpose of simulation is to allow an accurate understanding of reality. Simulation corresponds to the modeling of reality, removing certain elements to simplify it, and bringing out other elements considered important, to facilitate the description, analysis or understanding of the facts, laws and behaviors that make up our world (Chamberland and Provost, 2011). Simulation games are increasingly used in education to enable learners to develop complex skills (Pasin & Giroux, 2011). Moratis, Hoff, and Reul (2006) point out that simulation games are powerful learning tools because of their ability to simulate a realistic environment. According to Sauvé, Renaud, and Gauvin (2007), the main purpose of simulations is to create an environment to (1) support learners' learning of cognitive models, (2) test the models used in a system, and (3) better understand the relationships between different variables in the model. Professionals need to develop skills that can be more easily achieved in an environment that uses varied, concrete examples and produces instructional activities that accurately mimic reality (Kaufman & Sauvé, 2010). Simulations appear to be well suited for this purpose, as they offer a high degree of interactivity, promote the acquisition of concepts and theory, and place objects or systems at the center of the learning process.

2.2 Rationale for simulation-based training device
The first issue to examine is whether the use of simulations promotes the acquisition of skills in learners and their mobilization and transfer to the work situation (Dubois & Van Daele, 2018). We should not limit ourselves to the realistic aspect of the simulator or its physical fidelity. Indeed, several studies have shown that the performance level of learners is not directly related to the degree of physical fidelity of the simulator (Morge, 2008; Nyssen, 2009). The pedagogical design of these devices is a key element to ensuring their effectiveness, and must include clear objectives and a careful didactic elaboration of the simulated situations.

2.3 Model for the evaluation of a training action: Q4TE
The Q4TE is a questionnaire that assesses different levels of a training course, using participants' self-assessment. It has four levels: the first level assesses the participants' reaction, including their overall satisfaction and their perception of the usefulness of the training. The second level assesses learning, measuring the skills and knowledge acquired by learners (Aguinis & Kraiger, 2009). The third level measures behavior, assessing the changes in behavior that were observed in participants after the training. Finally, the fourth level assesses organizational outcomes, measuring the qualitative and temporal impact of the training on the organization. This questionnaire provides reliable and standardized results, and allows for the assessment of short- and long-term benefits of training, as well as participants' learning responses and organizational outcomes (Wang & Wilcox, 2006). (See Figure 1)

2.4 Concept of violence and its prevention strategies
In child psychiatry, violence may manifest itself as an oppositional disorder or conduct disorder, while in the social sciences, the term social deviance is generally used to refer to this phenomenon. In the field of criminology, which also studies youth violence, violence is generally understood to be the most serious form of offense against a person, involving the use of force and endangering their life, health, and the freedom of others (Garcia, 2010). The current research was conducted at

the IPPJ in Braine-le-Château, a closed regime institution that only houses boys between the ages of 14 and 18. According to Le Goaziau (2017), the perpetrators of violence are predominantly males, due to biopsychological or educational factors. However, recent studies also suggest that females can be violent as well, although research on this topic is limited. Many violence prevention programs exist, but few have been empirically tested. In a study conducted by Sylvain, Ouellet, Toupin, and Pelletier (2014), the effects of the "Vers le pacifique" program to prevent violence in elementary school were examined. This program is developed by the Institut Pacifique in Quebec and uses a multimodal approach combining prevention and targeted intervention to promote basic social skills, such as emotion recognition and conflict resolution skills. The adolescent tools from this program were incorporated into the used simulation. Boutin and Forget (2010) emphasized the importance of concerted actions in schools to encourage learning nonviolent methods and developing behavioral and emotional self-control strategies from an early age. The findings of the Sylvain et al. study (2014) highlight the importance of maintaining the program in institutions. Indeed, it allows young people to be better equipped to manage their conflicts and positively resolve the conflicts they may encounter, whether at school or at home.

3 Methodology

3.1 Experimental design and sample description

Implementing all of consulted research and readings, the experimental research hypothesis is formulated as follows: "Participation in a simulation-type continuing education action via the Twine tool (https://twinery.org/), with the use of a syllabus upstream or downstream of the training has a positive impact as to the usefulness of such training and the perception of the acquisition of skills acquired in this area". The research design is similar to a classic OXO-type, quasi-experimental design. It is based on observations taken with the help of a pre-test, but also a post-test carried out at the end of the experiment. The device used in this study includes an independent variable at two levels: the knowledge of the syllabus before the experimentation and the knowledge of the syllabus after the experimentation. The objective of this research is to study and measure the impact of such a pedagogical device on the participants' perceived level of competence in conflict resolution and general organization of their institution. In the experimental protocol, there are two dependent variables. The first is the perceived effectiveness of the learners' progression in conflict management and resolution skills. The second variable is learners' perceptions of the effectiveness of the training, including satisfaction, usefulness, knowledge, application, job performance and organizational outcomes. The sample for this study consisted of 40 educators working at the Public Institution for Protection in Braine-le-Château, selected on a casual basis. The participants were divided into two groups of 20. The first group tested the modality in which the knowledge of the syllabus is acquired before the simulation via the Twine software, while the second group tested the modality in which the knowledge of the syllabus is acquired after the simulation.

3.2 Research questions

The different research questions examined are presented below.
- Does participation in simulation-based training allow for a better mastery of conflict management and resolution skills? At the end of the training, is there a better mastery of each skill developed in the simulation?
- Is there a difference in progress between the two training methods (*)? (*) consultation of the syllabus before OR after the simulation.

- What is the learners' perception of their experience with this type of training in the form of a simulation?

Individual progress is measured using the relative gain calculation (Temperman et al., 2020) taking into consideration the individual scores obtained in the pre- and post-questionnaires. A satisfaction questionnaire was used to assess the participants' perceptions of their satisfaction, perceived usefulness of the training, skills and knowledge gained from the training, behavioral changes resulting from the training, and the qualitative and temporal impact of their participation in the training. The questionnaire is constructed from 11-point Likert scales ranging from "strongly disagree 0" to "strongly agree 10". It is administered at the end of the training. An overall average was calculated for each of the four levels.

3.3 Pedagogical scenario

In order to evaluate the effects of a pedagogical device aimed at developing conflict management and resolution skills, the research uses a pre- and post-experimental observation approach. The 40 participants are subjected to a pre-questionnaire (O1) which allows the individual evaluation of their level of mastery of the skills developed in the training and a comparison of the equivalence between the two groups. For the pre-questionnaire, the study by Gérard et al. (2006) was employed which uses a self-assessment tool to evaluate the pedagogical effectiveness of a training or course before and after it has been given. The competencies assessed are determined during the creation of the simulation based on the intended pedagogical objectives. Then, each group is exposed to the experimental treatment (X) which consists of running a simulation via the Twine software to develop conflict prevention and resolution skills. The simulation adopts a "story in which you are the hero" narrative approach, which aims to immerse the participant in a typical day in a Youth Protection Institution. During this day, several conflictual incidents occur, and the educator is responsible for managing them appropriately. To help them deal with this complex challenge and develop conflict resolution skills, the training provides new tools. Depending on their group, participants can read the syllabus before or after the simulation. After the simulation, each subject completes a post-questionnaire identical to the pre-questionnaire to measure the effectiveness of the device. Participants also complete the Q4TE satisfaction questionnaire according to the four defined levels.

4 Results

This part presents the different treatments carried out on the data we have collected. The objective is to answer our research questions formulated previously. A Student's t-test for independent samples was performed to ensure that the two groups of subjects were not statistically different with respect to their conflict prevention and management skills (t=0.244; p=0.808).

4.1 Overall effect of the system on the mastery of conflict management and resolution skills

Examination of Table 1 shows that the simulation training was effective. A progression of the average global score was observed, going from 71.28% to 84.35% in the post-questionnaire. The latter exceeds the 80% recommended by the pedagogy of mastery, therefore suggesting that the sufficient level is reached by the learners after the training (Temperman et al., 2020). It can also be seen, through the observation of the average relative gain which reaches 45.51%, that the proposed device had a positive impact on individual progress. Referring to D'Hainaut (1975) who indicates that a gain of more than 30% can be considered as a significant progression in a training action, it can be considered that the proposed training action is pedagogically efficient. A Student's t-test for

paired samples shows that the participants have a significantly higher level of mastery after participation in the simulation training (t=-11.767; p<0.001) than before. Analysis was also conducted according to the categories of skills. The six categories correspond to the different skills implemented within the training action. Each category groups together a set of skills specific to that category. The results from Table 1 indicate that the post-questionnaire average is higher than the pre-questionnaire average for all categories, exceeding all of the 80% recommended by mastery pedagogy, with the exception of the category related to the concept of "I" communication. For all categories, there is a relative gain of over 30%. The participants therefore feel that they have indeed progressed in their mastery of the objective targeted by the training program. This is confirmed from an inferential point of view, the participants have therefore made significant progress in all the categories of skills proposed in the training action.

4.2 Effect of the device on the progression of conflict management and resolution skills according to the integration modalities of the syllabus

Table 2 highlights a descriptive analysis of the scores obtained on the pre-questionnaire, as well as on the post-questionnaire, and the average of the relative gains of the participants according to the group to which they belong ("before the simulation", "after the simulation"). The group that used the "post-simulation" syllabus had the highest relative gain; 49.45% versus 41.48% for the group that used the "pre-simulation" syllabus. From a statistical point of view, there was no significant difference between the students' progress according to the time of consultation of the syllabus (t=-1.241; p=0.222). In Table 3, the relative gains attest to real learning for the two moments of consultation of the syllabus, with greater gains for the syllabus "after" the training. However, there are no statistically significant differences between the two groups regarding their relative gains, regardless of the category of skills observed.

4.3 Analysis of perceptions of the training action taken

The last part of the statistical analysis will look at the learners' perceptions of the training action. This information was collected via a questionnaire, the Q4TE, on two occasions: immediately at the end of the training and four weeks after the end of the training. The questionnaire consists of 11-point response scales ranging from 0% = strongly disagree (coded 0) to 100% = strongly agree (coded 10). Using 12 statements, the training is evaluated on six dimensions:
(1) participant satisfaction
(2) usefulness of the training
(3) knowledge acquired
(4) the application of the knowledge developed
(5) the individual's work performance
(6) the organization.
Table 4 shows that on all dimensions of perception for each group, both short-term and long-term, the participants expressed over 70% agreement. These very positive results again support the participants' perceived sense of effectiveness of the training action. In both the short-term and long-term evaluations, and depending on the way the syllabus was consulted, there were no statistically significant differences between the groups' perceptions on the six dimensions investigated.

5 Conclusions

The purpose of this study was to enable educators to acquire or develop their conflict prevention and resolution skills through a simulation using Twine software, as part of an ongoing training. The progress of two groups, each with 20 participants, was examined: the first group received the syllabus before the training and the second group received the syllabus after the training. The syllabus contained the topics covered as well as the tools proposed in the simulation. The main research question was: "Does participation in a simulation-type training, via a software program and according to two modalities of use (with or without a syllabus beforehand), allow for a better mastery of conflict management and resolution skills ? According to recent literature, simulation games are recommended for use in education. Pasin and Giroux (2011) point out that these games are effective in teaching complex skills to learners. Similarly, Moratis and colleagues (2006) explain that simulation games are powerful learning tools because of their ability to replicate a realistic environment. The designed simulation accurately reflects the reality that educators encounter in their daily work. The results of the inferential analysis show that participants' learning progress is similar whether the syllabus was accessed before or after the simulation. Although the learning gains attest to real learning (D'Hainaut, 1975), no differences were observed concerning when they consulted the syllabus. These results contradict those of Hamdan, McKnight, and Arfstrom (2013), who showed that learners' performance was higher in a flipped learning context (upstream syllabus) compared to a traditional learning context. The results also do not support Olson's (2005) study, which attests that students who read the syllabus before the course tended to understand the course better than students who did not complete the readings, and that they also performed better. In contrast, the study seems to support the argument made by Lucke (2014) that, in a flipped learning context, although learners score slightly higher, this does not translate into a significant improvement in their knowledge of the subject matter. The simulation used in this device proved to be beneficial. All participants were able to improve their skills in preventing and managing conflict situations for educators at the Braine-le-Château IPPJ. Simulation training on workplace violence as an intervention had already shown benefits in dealing with crisis management (Ming et al., 2009). Simulation appears to be a learning and teaching strategy that can be effective in managing violence (Fox & Johnston, 2020). Regarding the two modalities of using the simulation, it can be concluded that there is no significant difference in terms of participants' progress, regardless of when they consulted the syllabus. Concerning the participants' perceptions of this training program, they all seem to be in agreement: all the participants recognize the effectiveness of this type of device. In both the short and long term, more than 70% of the participants agreed with the effectiveness of this type of training. Although perceptions were higher in the long term, probably because time allowed participants to assess the impact of the training on their practice. The differences in perceptions according to when the syllabus was consulted were not statistically significant. The effect of flipped classroom learning in this setting does not appear to have any impact on participants' perceptions.

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Table 1. Descriptive and inferential analysis by skill category.

Categories	Pre-questionnaire mean	Post-questionnaire mean	Gain/Loss	t	ddl	P value
Concept of active listening and reformulation	73,25%	86,25%	48,60%	-9,390	39	<0,001
Concept of authority	69,5%	83,75%	46,72%	-9,410	39	<0,001
Concept of conflict	72%	83,5%	41,07%	-7,264	39	<0,001
Concept of violence	73,3%	83,6%	38,58%	-5,501	39	<0,001
Concept of conflict resolution	61,83%	81,67%	51,98%	18,973	39	<0,001
Concept of "I" communication	62,63%	79,13%	44,15%	-11,548	39	<0,001

Table 2. Descriptive analysis according to the training modalities.

Pre-questionnaire mean		Post-questionnaire mean		Gain/Loss	
Upstream Syllabus	Downstream Syllabus	Upstream Syllabus	Downstream Syllabus	Upstream Syllabus	Downstream Syllabus
76.1%	70.97%	83.38%	85.32%	41.48%	49.45%

Table 3. Descriptive and inferential analysis by skill category according to the training modalities

Categories	Gain/Loss with the "upstream" syllabus	Gain/Loss with the "downstream" syllabus	t	ddl	P value
Concept of active listening and reformulation	44,86%	52,34%	-1,551	38	0,129
Concept of authority	41,6%	52,10%	-0,667	38	0,509
Concept of conflict	33,04%	49,11%	-1,388	38	0,173
Concept of violence	33,59%	43,16%	-1,240	39	0,223
Concept of conflict resolution	49,58%	54,09%	-0,777	38	0,442
Concept of "I" communication	41,22%	47,02%	-0,861	38	0,395

Table 4. Descriptive and inferential analysis of perceptions according to the training modalities

	Perceptions of the group with the "upstream" syllabus		Perceptions of the group with the "downstream" syllabus		Short-term Mann-Whitney test	Long-term Mann-Whitney test
	Short-term average	Long-term average	Short-term average	Long-term average		
Satisfaction	79,5%	87%	85,5%	90,25%	W=140; df = 38; p = 0.099	W= 150.5; df = 38; p = 0.175
Usefulness	82%	92,75%	88,5%	93%	W=144; df = 38; p = 0.128	W=164; df = 38; p = 0.325
Skills and knowledge gained	78%	80,5%	80,5%	84,5%	W=178; df = 38; p = 0.554	W= 147; df = 38; p = 0,149

					W=196; df = 38; p = 0.919	W=186.5; df = 38; p = 0.706
Behavioral change	78,5%	81,62%	79,5%	82%		
Performance	73%	78,5%	77%	79,75%	W=176; df = 38; p = 0.517	W=193.5; df = 38; p = 0.867
Qualitative and temporal impact	69,5%	75,75%	75%	78,5%	W=152; df = 38; p = 0.193	W=165; df = 38; p = 0.329

Figure 1. Q4TE Scales