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Training For Crisis Using Games – Testing of Game Based Technology “In The Making”

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Abstract:

Being prepared for crisis requires learning about crisis and training for handling crisis. Since the tragic event on July 22nd of 2011 where a man killed and injured men, woman and children in two separate terror strikes in Norway, the focus on learning about and training for handling crisis has contributed to a regulation ordering all municipalities to have a plan for handling crisis and crisis preparedness ((DSB), 2012). At Hedmark University College of Applied Sciences, Norway, it is possible to obtain a bachelor degree in crisis management. The degree offers courses that present theory and with practical examples that present different perspectives and that in total provide the students with a solid basis for handling crisis and being prepared for crisis. However, the need for expanding beyond theory and practical examples has been recognized. Simulations and realistic exercises are valuable, but may also represent huge costs resources to organize. With the emergence of video games other ways of simulating has been made possible. The digital games have also become more advanced and offer a user interface that is quite realistic. Games have been used for learning purposes for many years, and this has been subject for academic interest. This paper presents the work of testing a game “in the making”. The game is being developed by professional game developers and is based on a platform that games have been developed that have been used for educational purposes as well as having been sold as a commercial game. This is a part of a project at our campus called “Preparing for Future Crisis Management” (Skår, 2015).

Keywords: Crisis training, serious game, learning, game development

1. Introduction

Like “9.11” represents a date that is forever connected with terror in the US, “22nd of July” will forever be the date Norwegians connect with terror attack in Norwegian soil. One person managed to come very close to the governmental buildings with a van containing explosives. After blowing up the car, he went on to travel to a camp area outside Oslo where lots of youths and children were gathered. Killing 77 and injuring approximately 100, he is now convicted and imprisoned.

What this terror action displayed, was a need to be better prepared for terror strikes (Gjørsv, 2012). The unthinkable had happened and can in theory happen anywhere. One of the results was to order all municipalities to plan for crisis preparedness and also practice ((DSB), 2012). At Hedmark University of Applied Sciences, Campus Rena, Norway, there are now several studies, from half year studies to a BA in Preparedness and Crisis Management. In municipalities the planning and training is in addition to their ordinary every day work. And even if there are now systems to support training in different ways (table top, simulations, etc.) (ÅmotKommune, 2015), some municipalities and also call out services and volunteer organizations prefer to send staff to an educational institution like a University.

In order to provide the student with the best possible education, it is also important to look at the factors contributing to sustainable learning outcomes. Activity and involvement is central in adult education (S. Brookfield & Holst, 2010; S. D. Brookfield, 1991; Keregero, 1989; Malcolm S. Knowles, 1990; Malcolm Shepherd Knowles, Holton, & Swanson, 2005; Mezirow, 1991; Rogers, 2007). Activity is essential in experiential learning (Beard & Wilson, 2002, 2006; Kolb, 1984; Weil & McGill) and learning by experiencing should also include reflecting (Brockbank & McGill, 2007; Johns, 2009; Moon, 2004; Schön, 1987, 1991).

Doing live exercises are however very costly, both in time and money. It is however necessary to train, not only to do theoretical exercises. Using simulation or game based simulations are thus a less expensive way of training, and it also offers a variety of possibilities regarding reflection and learning from the game sessions. The military have used games for learning (Smith, 2009; Vold & McCallum, 2009). Different types of games have been used; First person shooter (FPS) and online games. Some games have been developed for the Army, and some are commercial off the shelf (COTS) games.

Hedmark University of Applied Sciences has established cooperation with the company Crisis Training AS (CTAS) that has specialized on developing training and preparedness plans for organizations. They have developed their own training strategy and are responsible for several major exercises in the county. They are also suppliers and participants in a major European Union project on crisis management.

It has been decided to look at developing scenarios together with CTAS to use on a platform originally designed for military use, but which is now also sold for commercial use(BohemianInteractiveSimulations, 2016). The scenarios has been developed by and tested on a group of students with different experience levels both in crisis management and computer game skills.

The paper elaborates the potential of serious games and explains how the work with the scenario has been undertaken. Also the results from the work and suggestions for further use within the study program are presented.

2. Serious gaming – gaming for learning purposes

James Paul Gee and Mark Prensky have forecasted and advocated for the use of games for educational purposes (Gee, 2007; Prensky, 2001). However, it still does not seem to have been totally integrated yet (Chee, 2016). There may be several reasons for this; games are generally made for entertainment and not for education, and games that has been made for educational purposes has been custom made for the purpose (Smith, 2009; Vold & McCallum, 2009).

Roger Säljö refers to two experiments; one experiment undertaken by Manuielenko in 1975, showing that introducing a playful approach increases the length of how (in this case) children can endure a task. The second experiment is by Istomina and is about recalling a number of items, and where the result is a better retention rate when in a playful setting (Säljö, 2001). By pointing to these experiments he stresses the fact that a playful setting can be motivating and thus contribute towards an increased learning outcome. Our actions are within contexts, and also creates and recreates contexts, according to Säljö (2001). Also the ludic approach supports retention (Huizinga, 1971) and thus learning. Knowledge and skills are situated, and persons react according to local conditions and premises. This means that there are preconditions and assumptions tied to what we call knowledge (Säljö, 2001). This supports training in an environment that will support these preconditions and assumptions. When this is to costly and inefficient regarding training many different scenarios, using games that provide a setting for the students to immerse in, may have the desired effect; it is thus possible to tie the learning to a setting of crisis communication and management.

Keeping in mind the definition of a game as “...a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome” (Salen & Zimmermann, 2004), it can be discussed of the gaming can be defined as simulation only or as gaming. Prensky (2001) made the distinction between simulation and games, that simulations often lack “fun, play, rules, a goal winning, and competition” (p. 212). The game used at Hedmark University of Applied Science thus resembles what Akilli in Gibson et al. refers to as *game-like learning environment* (Gibson, Aldrich, & Prensky, 2007, p. 5).

According to Prensky (2001) it is thus possible to learn from games (and game-like learning environments) due to the possibility of practice and receiving feedback, learning by doing (experiential learning), learning from mistakes, using goal oriented learning and task-based learning, role playing and multi-sensory learning. Also the learning can to a certain extent be situated (Lave & Wenger, 1991) as the context provided is relevant to the gaming and learning. Becker in Gibson et al. states that “players are learners” (Gibson et al., 2007) and suggest that this is supported by both Piaget and Bruner. The developmental psychologist Piaget (1951) describes how play is important for deep learning as it contributes to assimilation and accommodation which is connected to learning.

There are several definitions of Game Based Learning. Mayer and Johnson (2010) suggest that it should be rule-based, responsive, challenging and cumulative, meaning that the player/learner should understand the constraints, the game should respond according to input and guide input, so that it is possible to succeed, and that it should be possible to get feedback on the progress. Although this definition is broad, and would fit most games, it is still valid as a game must provide constraints that are understandable or else it is difficult to understand what to do. Confusion may prevent learning (Kember et al., 1999; Vold, Yildirim, Ree-Lindstad, & Souami, 2010). Response and succeeding in solving the obstacles in a game lets a gamer immerse in the game which sometimes lets the gamer/learner enter a state of

flow (Csikszentmihalyi, 1990). Getting feedback on the progress also support the flow, and show the gamer/learner how well he/she is doing.

However, it is not only the *gaming* or *gameplay* and the *digital game* that support the learning process. It is also about how the gameplay is utilized. Depending on the constraints set for each gameplay it is possible to use the same scenario several times and get different results. This way of utilizing the gameplay provides the player/learner with several perspectives of the action in the gameplay.

Reflection is another key word regarding utilizing gameplay or game sessions. It is possible to reflect *before* the gaming can support the learning. This reflection before action (Cowan, 2006) will prepare the player/learner for the action. It is also possible to pause the gameplay to reflect *during* action, as Donald A. Schön (Schön, 1987, 1991) refers to. However, the argument against pausing the game play, is the possibility of breaking *flow*. Reflection can also be undertaken *after* the game play, and similar to the military *after action review* (von der Oelsnitz & Busch, 2006) it is possible to reflect immediately after the gaming session. The outcome of this reflection can be used into a new round of playing (Vold & Yildirim-Yayilgan, 2013; Vold, Yildirim-Yayilgan, & Sørnes, 2014).

Reflection over gameplay can also be used for reflection over time. However, this has yet to be tested for learning purposes. Learning journals have been used for some time (Bassot, 2013; Moon, 2006), and one suggestion is to offer assignments that is about reflecting over the results from the game play over time, using the same constraints as for learning journals.

3. The game

The game used is based on Virtual Battlespace (VBS) which was developed with influence from a war game called Operation Flashpoint from the year 2000. Originally VBS 1 was developed in 2001 and then the American Marine Core took interest in the project, and invested heavily towards the end of 2001 (BohemiaInteractiveSimulations, 2010, 2016). The game is based on an engine which is used in a game designed for military use, and now the game is sold for commercial use(see also: <https://bisimulations.com/virtual-battlespace-3>).

1. CTAS has done no modifications to change the game engines behavior. What CTAS has done is to create a map with scenarios suited for first responder situations, add models that suit the maps environment, and prepare the game engine tools available for faster creation of scenarios. Is VBS 1 open source?

Bohemia Interactive have not released any of their products as open source, although they have released a civilian line of products called Arma, with the newest product named Arma 3. This product uses the same game engine as VBS 3, but has fewer options regarding mapmaking, scenario tools and a default model library

Regarding the game engine that is in use from Bohemian Interactive, they use all of them as the military customers of Bohemia Interactive buy what is called Enterprise licenses. VBS is under constant updates, some are more stable than others, and some customers prefer to have one version and stick to it while others upgrade when a new version is available. What is worth mentioning is that there are multiple versions of each VBS. There are currently 9 versions of VBS 3 for instance, with the newest named VBS3: 3.9.1.

The roles the players are playing in the game are of a supervisor, a civilian, a rescue, a police, or other rescue services. Any role can be played in the game. But some roles gain more value of training in Virtual Training, roles that have a job description alike this is more suitable:

- i. Leadership in the field
- ii. Field observation
- iii. Communication between

One of the core mechanics in VBS is shooting with guns, as it is a military training simulator, thus Police will be able to exercise on "sharp" missions.



Figure 1 Testing scenarios at Hedmark University of Applied Sciences

4. The gameplay and presentation

The gameplay for the testing was developed by the lecturers and a group of five students from the BA in Preparedness and Crisis Management. The students' backgrounds vary; two of the members have no former experience with crisis situations, one has served with the Norwegian military police and has some experience being in charge of different situations. The two last members has several years with the Norwegian Red Cross, and have been involved in search and rescue operations, and crisis situations like what happened in Norway 22nd of July 2011.

The aims for producing the scenario were firstly to make a presentation for possible funding, secondly for learning purposes. The decision fell on staging a traffic accident involving a fuel truck and SUV. This was considered to be both a good way of showing off the potential of the software, and also be realistic regarding a gameplay for learning. The lecturers had some thoughts about who they wanted to invite for this presentation, and it

was important to us that the scenario would be easily recognized and understood, not only by the possible stakeholders, but also by students.

This was also a scenario that could easily be scaled up or down. Scaling up could involve the decision makers having to consider evacuating the local hospital because of poisoned smoke from the fuel truck, etc. This shows some of the customization the software is capable of, and it is possible to make custom scenarios. After deciding the scenario, this was through and gave the players a possibility of familiarizing with the layout of the map and the scenario itself. It was also decided on conducting a scripted demo, meaning that the players/learners would know the dialogue and timing of events.

The experiences from the testing showed some issues with the VBS software. The issues were traced back to the original development; the original was developed for military use. This means that the Artificial Intelligence (AI) offered some challenges.

Excerpt from the log show the problem:

“The main problem with the software is that it is developed for military use. This means that the Artificial Intelligence (AI) is the same for all non-military personnel. The second we set fire to the fuel truck, every character supposed to be “involved” in the accident started running around, and disappeared, making it hard to get a realistic feel. It does not differentiate between firefighters, police officers or plane civilians. Another issue with the VBS software is that it is difficult to program. It requires a certain degree of know-how in programming to be able to make custom scenarios.”

From log by: Henrik Klevhus, Anders Klevhus, Petter Granlien

The issues were resolved enough to be replayed, but other issues arose during the testing. The log shows another issue:

“Unexpected accident:

During the last session before our big presentation, we encountered an unexpected accident. During the last minutes of our planned scenario, an asset from the medical air support is supposed to land near the car crash and pick up patients. However, during this play through, the helicopter crashed into the bridge on which the accident took place. The game master got upset, because this was a problem he had encountered several times, and not managed to fix. The players chose to take this opportunity to improvise, and called for extra resources to handle the new situation. The players later agreed that this situation had been fun, but we were also glad this happened. This exact situation happened in Norway in the middle of January 2014. You can train for every situation imaginable, but within the concept of “crisis” there will always be unknown variables.”

From log by: Henrik Klevhus, Anders Klevhus, Petter Granlien

Besides the evidence of learning and reflection, this log also point to some important issues with the gameplay. This also show the potential of using the gameplay as the here unexpected incidents that occurred, even if it is an unresolved issue regarding the engine, it obviously had a learning potential.

The issue of an experienced game master, is also visible in this statement. A game master needs to have an overview of the curriculum, but also the actual game, the game play and the gaming platform. This is concurrent with previous research regarding using games for learning purposes (Vold & McCallum, 2009).

The presentation was a success and the audience was impressed. Nothing unexpected happened during the presentation and the feedback from the people present was very positive.



Figure 2 From gametesting, screen showing screenshot from game

5. Possible Learning Outcome

The students working in this project report on a learning outcome both from working with the scenario, and also from the repeated testing. The “unexpected accident” also represented a learning opportunity.

The learning has both been on learning to master the “game”, but also regarding the outcome of decisions and actions *in* the gameplay.

The potential for this gaming and the use of the game playing is present. The students, however, also point out that the level of game play may be differentiated. The gaming as it is today may be better suited for studies on an operational and strategic level of command. This is due to the level of decision-making that is required. The presentation was a result of cooperation with lecturers, and also the background of the gamers was important to the result as three of them had extended experience from crisis and crisis management.

6. Conclusion

The game “as is”, has a potential as a support in the education. There is a need to work on the AI, and to have a game master that can resolve problems and issues arising during the game play, and that also can set up the game play according to what the students and lecturers come up with regarding scenarios.

There is a definite possibility of learning from the actual playing, and also from the reflection processes prior, during and after the gaming sessions. The game as it is developed today,

may also have a potential for decision makers; supporting a higher level of crisis management.

6.1 Further research

There is a need of testing the gaming on a larger number of students. This is scheduled for the autumn semester. It is also necessary to look further into the issue of leveling; what parts are suitable for what level in the education.

The students that will be playing will need to learn how to play a video game but knowing that the average gamer is approximately around the same age group as the students (Vold & McCallum, 2011) so that one can assume that some of the students are already gamers. The focus can thus be assumed to be on the game play and on the scenarios rather than learning to play. It is then possible to introduce different scenarios to practice on and learn from. It is however, important that the reflections upon the outcome of the gaming sessions are utilized so that the learning outcome from the gaming can be maximized.

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