Behrloo: a serious gaming environment for Dutch police students

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1.   EXECUTIVE SUMMARY

Why do students of the Dutch Police Academy use a virtual city to practice their competences? What educational design principles are being used? Is it a serious game? This paper answers these questions, together with some background information.

1.1. Background Behrloo: case based learning

Behrloo is a virtual city. It consists of locations you can go to varying form "buildings", "rooms" and "objects". Navigating between locations goes mainly via hotspots, but you can also go to another location triggered via a dialogue.

The city contains realistic problems. These problems are transformed into Behrloo cases for learning purposes. For example traffic accidents, illegal hemp cultivation, illegal storage for fireworks, car explosives, identifying a victim and many more. After login students can carry out cases that match their educational degree. By means of these interactive and non-linear cases students can practice their competences. Students determine which actions they want to take and in what sequence. It is important that they can substantiate their activities. During such a case students are confronted with the consequences of their actions. This also means that if they don't do anything, nothing will happen. Unless time is a crucial factor. In the case of traffic accidents, if you don't take care of the victim he or she will die. Behrloo is personalized.

Site: https://behrloo.politieacademie.nl

2. START OF BEHRLOO

2.1. Learning at the Politieacademie (Dutch Police Academy)

The Politieacademie is the central organisation responsible for police education programs and knowledge management regarding the police profession in the Netherlands. The academy is run not just for the police forces but also by the police forces. The academy is rooted in practice and acts upon he demands of society and the forces as a basis for designing and updating its training. The traditional focus on the exchange of factual know-how has been replaced by an approach which concentrates on acquisition of competences in professional practice. The Politieacademie is designing its education programmes around key assignments and competence testing. Key assignments are the central tasks and problems that police professionals regularly encounter. Therefore it is important that learning is situated in both the academy and the police force ('dual learning').

2.2. Why Behrloo?

In 2002 when the Police Academy was replacing its modular and traditional education by competence based learning, their educational tools needed to be optimized and/or developed. The new tools need to be placed in context and realistic in feature, in order for the students to acquire and practice their competences.

At that time the academy started with the LMS Blackboard; a way to provide mainly information, communication and little knowledge testing. Apart from that there is a lot of information available in Police Knowledge Networks and other sources. It is all put together in the E-Campus of the Police Academy. However, these elements are isolated and hardly embedded in an authentic environment where students can actually practice their competences.

But what was exactly needed? Therefore it was important to describe the educational principles and requirements. We also asked teachers and students what they wanted. The learning environment is designed to apply competence based education founded on constructivism. Therefore we selected the following set of requirements:

A. It provides a context, authentic situations for an active, interactive and explorative learning process.
B. It contains multimedia elements, with various simultaneous, educational stimuli, so that the situation is as realistic as possible.
C. It offers students, during their education, an authentic environment where they can practice their competences in various situations during different key assignments.
D. The acquired competences must be transferable.
E. Existing educational material, aiming at the same learning goals, must be integrated in the environment.
F. Adequate anticipation to new educational needs
G. It must be an integrated part of education and not a stand alone environment.
H. Possibility for students to practice wherever and whenever they want through the internet.
I. It offers links to other parts of the E-Campus, Internet.
J. The authentic context offers an urban environment with maps, municipal administration, police force, relevant sources of information et cetera.

If there was already an environment that meets our criteria, we had to explore other existing environments and tools. It appeared at that time that there was no programme that met our set of requirements. This is the reason why the Police Academy started to develop a virtual city named Behrloo. At the beginning Behrloo was nothing more than a paper map that should be transformed to a virtual learning environment.
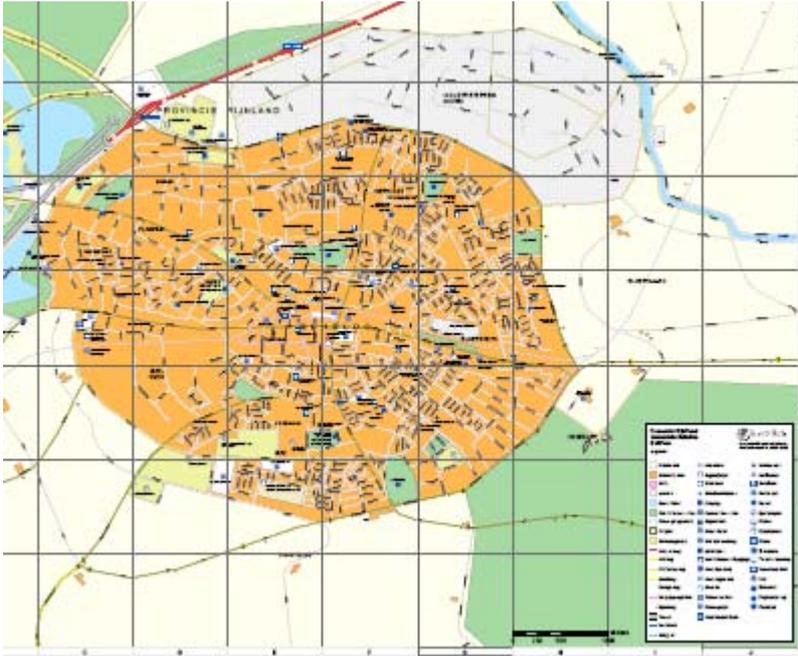
Figure 1: Behrloo started as a paper map.

Apart from the requirements described earlier, there were other reasons to use a ICT environment.

Sometimes learning situations are difficult to realise due to safety issues, high costs or limited availability. ICT offers support for simulating practical environments. Additional reasons why the Politieacademie developed the virtual learning environment Behrloo:

- K. Safe practice
    - o No real accidents can happen, only virtual accidents (for example with explosives)
    - o You are allowed to make mistakes; it is a possibility to learn.
- L. A learning environment where the problems are available. In the police force the problem is not always at hand.
- M. To decrease the gap between learning at school and learning in the police force.
- N. It gives students the opportunity to visit and revisit a specific scene (or case), which often leads to a more thoroughly understanding of the scene (or case),

3. BEHRLOO IN PRESENT TIME

At present (May 2008) Behrloo consist of twelve cases. Most of them are complex cases. Complex means that the whole virtual environment is used to create a learning setting for students (the learning process takes mainly place in Behrloo). At this moment seven complex cases are being developed. Behrloo is also used in a more simple way. This means that parts of Behrloo are used to enhance student learning (e.g. using paper maps, background information). In this perspective Behrloo provides teachers and students a context for their educational assignments.

Students indicate that Behrloo gives them a realistic image of the police work. It gives them something to hold on to function in daily practice. The learning environment gives them the opportunity to make mistakes, and cope with corresponding feedback. Teachers can use Behrloo in a multifunctional way for various goals and target groups.

Figure 2: Students working with Behrloo

3.1. Modular set up of Behrloo

So in 2002 the Police Academy started the design and development of the virtual environment. It resulted in the following set up:
- The game engine (built in .Net & Flash)
- Cases at operational, tactical and strategic level
- Multimedia content

And additional tools for:
- Case development
- Teachers (influence cases, progress, decissions, ...)
- Authorization (determine when a case is availlable to whom)

Because of the modular set up, the Police Academy can make their own Behrloo cases by using a development tool independent of the company that built the game engine and development tool. That reduces the costs considerably. It is also possible to quickly realise an alternative case based upon another case.

Since Behrloo has a modular set up, the engine can also be used by other educational institutes like the Fire Department Academy or the Academy of Social Work.

Figure 3: part of development tool: navigating in city hall

3.2. Learning theories

Behrloo is above all a (T)E-learning environment. Our dual learning sytem is set on competences and based on constructivism. During the designprocess 2 models are being taken into consideration. First principles of learning of D. Merrill (2001) and 4C/ID model of J. van Merriënboer (2007).

**First principles of learning:**
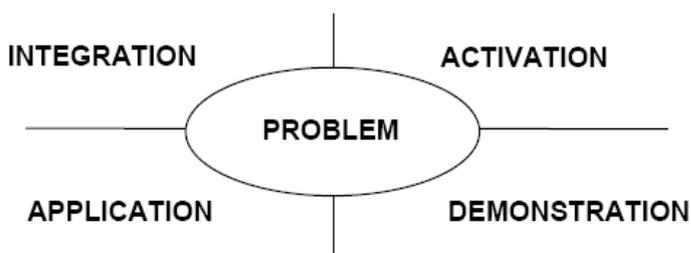
Figure 4: First Principles of Instruction Diagram (Merrill)

Merrill (2001) indicates that the most effective learning environments (with or without ICT) are based on the following five first principles of learning:

Learning is facilitated when:
- Learners are engaged in solving real-world *problems*
- Existing competences are *activated* as a foundation for new competences
- New competences are *demonstrated* to the learner
- New competences are *applied* by the learner
- New competences are *integrated* into the learner's world.

When designing a Behrloo case, it should meet those principles.
- Every case is build around a realistic *problem* students have to solve. For example: traffic accidents, where students have to act on the scene of the accident.

- Activation. Cases have an increasing difficulty and depend on prior knowledge/competences (little prior knowledge provides more feedback, than a lot of prior knowledge).
- Demonstration: Some new tasks/competences could be demonstrated to the students. It can be done virtually in de the city, but it can also be shown by a teacher or by consulting sources, such as the Police Knowledge Network.
- Applying: Behrloo is an environment where students can practice their competences, just like in real life. The students receive feedback on every step they take.
- Integrating: Students have to apply the learned competences into various situations.

4C/ID model

Van Merriënboer (2007) explains that a learning environment built according to the 4C/ID model is being described in four interrelated components:

- learning task

- supportive information

- procedural information

- part-task practice.

When designing a case we bear the 4 components of a learning environment in mind:

- a learning task in Behrloo can thus be determined as a total case.

- Supportive information: always available during a case. It can be given by Behrloo, but also by the teacher or students. Behrloo supports blended learning. It is not necessary for the Behrloo-case to completely take place in the virtual city, but can also be handled outside the virtual environment.

- Procedural information: This information is given at the moment the student needs it. For example feedback on the taken action/steps. But students can also ask questions to a digital coach, what to do next.

- Part-task info. Sometimes students needs to practice a part of a task/problem. This can also be practiced in Behrloo (or outside Behrloo. That depends on the goals). And after this part, students can apply the obtained competences in the case.

3.3. Is it a serious game?

Serious games are solutions to problems (Sawyer, 2007). His definition of a serious game is:

"Any meaningful use of computerized game/game industry resources whose chief mission is not entertainment".

In that respect, Behrloo is a serious game. The chief mission is achieving the learning objectives. But we want to do it in an entertaining and challenging way.

What makes a game so popular that people want to spend a lot of time playing it? Veen et al. (2007) described a few characteristics:

Figure 5: House of the suspect (360^0 photo)

- immersion
- presence
- controlling your game
- using avatars
- experimenting with virtual identities
- social ecological
- object and process (you do not have to

We tend to use these characteristics in Behrloo to make it stimulating, exciting and challenging. In Behrloo the initiative is taken by the students, just like in the real world. By giving the learners adequate feedback upon their acting, they will learn. The cases (scenarios) provides various situations, with more then one correct way. Behrloo has a user friendly interface, with realistic visualisations and an easy game play.

3.4. For what situations can Behrloo be used?

Behrloo can be used in different ways. It is not necessary to 'play' a complete case in the virtual environment. Parts of the case can also take place in the classroom (discussion about the taken actions, activating prior knowledge, explaining some background information before practicing). It is a form of blended learning.

In Behrloo you can distinguish 2 kinds of application.

1. simple (providing context and information).

In a simple way you can use the paper or digital map of Behrloo (inside or outside the virtual environment) to present situations on the road. For example: Students use it when they learn to brief their colleagues about the procedure to be followed at real police related events.

Behrloo itself provides information that is always available in every case. There is also a case called 'Behrloo city'. This case contains only information about the city, like demographic data, contingency plans, information about the police force, etc…

It is also possible to make a newspaper or televised news features, with news updates of Behrloo.

2. complex (action resulting in reaction)

A more complex use of Behrloo is that students can actually practice their competences. Actions result in feedback on the taken actions. Students can train procedures in authentic situations.

For example: victim identification.

Goal: Become aware of the steps necessary to discover the identity of the victim.

The students can validate their decisions, take priorities and cooperate with colleagues. Students get an assignment of the chief to discover the identity of an unknown man. Students are free to choose which actions they want to take, when they want to exercise the assignment and in what order they want to take these steps. If they aren't doing anything, nothing will happen. And if they are not taking the right steps they get immediate feedback or at a later time. So they have to consider what they want to do, when and how.

You can also practice social and cognitive skills. For example: Bringing the death message. This is done by dialogues and choosing what to do next. Wrong messages or questions result in a conversation that gets out of hand.
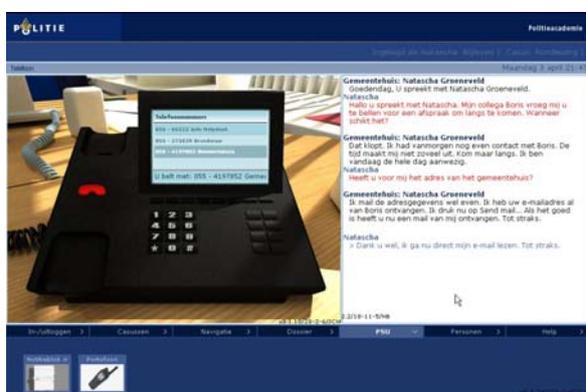

Figure 6: Making a telephone call.   **Figuur 7: Illegal hemp found.**
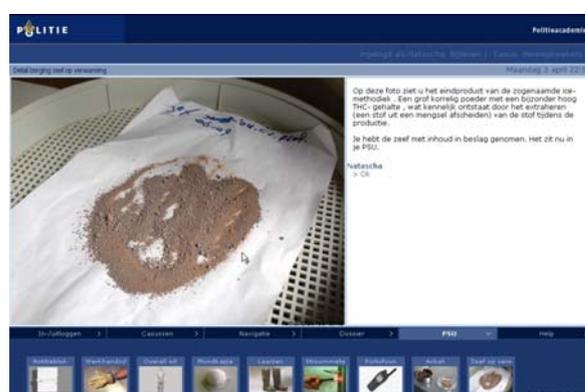
4. BEHRLOO IN FUTURE TIME

At present (May 2008) Behrloo consist of twelve cases, most of them are complex cases. Each year we want to develop at least 5 complex cases.

But there are other wishes. For now it is not possible for students to cooperate directly in a case. Behrloo is a single user environment. Every student has his/her own case and own progress. A multi player version of Behrloo is desirable to create a more realistic environment, because in daily practice policemen hardly ever act alone.

In the near future we also want to develop complex multi disciplinary cases where police students can cooperate with for example firemen students.

Finally, at this moment Behrloo is not yet a 3D environment. It is not necessary to achieve our goals (sometimes it even would be distractive) and we can manage with our (360 degree) photos, animations, videos and tools to make the game as realistic as it should be. But, In the future it is inevitable that Behrloo will be in 3D?!

Figure 8: Victim (rendered image of a 3D model)

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