3D world of Quest Atlantis

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ICESKS: Information, Communication and Economy Sciences in the Knowledge Society:

Abstract

Quest Atlantis (in further text QA) is an international learning and teaching project which uses virtual 3D environment for children's education. The project headquarters is at the Indiana University.
The environment has been designed for children age 9 to 15 and it combines strategies that can be seen in commercial games with learning content.
QA makes it possible for users to travel to virtual places and solve different educational activities, communicate with other users and teachers and to build their personalities in the virtual and the real worlds.
More than 20,000 children from all continents have taken part in the project and have solved several hundred thousand research exercises in the past four years.
Pupils and teachers are included in different research exercises, through which they learn certain curriculum contents and at the same time adopt social skills needed for co-operation and communication.
Authors describe QA as a system that attempts to incorporate elements of entertainment, education and social commitments, directed toward the complex goal of fostering learning among its participants.
Quest Atlantis is set in a Multi-User Virtual Environment (MUVE) based on Active Worlds with some modifications to provide support for forming identity (humanoid avatars), working on quests, and communicating with each other.

Key words: computer mediated communication, virtual classrooms, active learning, virtual learning environment, experiential learning
3D world of Quest Atlantis

Quest Atlantis (in further text QA) is an international learning and teaching project which uses virtual 3D environment for children's education. The project started in 2001 at the Indiana University, and has, until now, won many grants and awards. Through the last seven years QA has become a successful game-based learning environment due to acceptance from more than 20,000 children from all continents. The environment has been designed for children age 9 to 15 and it combines strategies from commercial games with learning content. Quest Atlantis team designed a context for learning, which sits at the intersection of education, entertainment and social action. Through socially responsive design they followed Vygotsky's idea that playing creates a zone of proximal development for the child (Barab et al, 2005).

Faculty research team (Sasha Barab, Melissa Gresalfi, Dan Hickey i Kylie Peppler) has published multiple articles and case studies discussing the impact on learners, design principles, curriculum insights and other aspects of implementation of QA. Findings from those researches are cycled back into QA improving its design.

Figure 1: User interface to Quest Atlantis with 3D world in main window, chat window below, and QPod on the right
Structure of Quest Atlantis

In order to immerse young learners in educational game authors created a story, which puts children in the position of helpers to Council of Atlantis. As the story says: "The people of Atlantis face an impending disaster: despite their technological development, their world is slowly being destroyed. In an effort to save their civilization, the Council developed the OTAK- a virtual environment that serves as a technological portal between Atlantis and other worlds. Today's youth with their adventurous optimism can especially contribute with the sort of knowledge that the Council seeks. Become a Quester and help save Atlantis!" (QA team, 2008).

The 3-D space of Quest Atlantis contains different worlds (Culture, Taiga, Unity...) and each world features several villages that present a series of challenges (called quests) which are designed to help restore the Atlantian knowledge. Worlds reflect and combine various themes: ecology, water quality, literacy, language, arts, astronomy, weather, mathematics etc. Quests address those themes through challenges with different levels of complexity from simulation to application problems. Worlds establish storylines and interaction such that Questers can use academic knowledge to address real-world issues (QA team, 2008).

Figure 2: Activities, Tools and Resources of Quest Atlantis (QA team, 2008)
One of the main goals of the QA project is to foster an awareness of seven critical dimensions in order to actualize them in the lives of children:

- **Creative Expression** - "I Create"
- **Diversity Affirmation** - "Everyone Matters"
- **Personal Agency** - "I Have a Voice"
- **Social Responsibility** - "We Can Make a Difference"
- **Environmental Awareness** - "Think Globally, Act Locally"
- **Healthy Communities** - "Live, Love, Grow"
- **Compassionate Wisdom** - "Be Kind"

Pupils and teachers are included in different research exercises (Figure 3), through which they learn curriculum contents and at the same time adopt social skills needed for co-operation and communication. Engaging students in activity follows the child-centered, experientially-focused, and inquiry-based learning environments promoted in academic research (Barab et al., 2007). "New educational strategies make cooperative learning, development of critical thinking, interpersonal and global communication possible, that leads to development of tolerance, understanding and harmonious human relationships." (Bakić-Tomić et al., 2007).

Figure 3: Some of available Quests and their description (QA team, 2008)

The core elements of QA are:

1) 3-D multi-user virtual environment,
2) Learning Quests and unit plans,
3) Storyline,
4) Community of participants.

Quest Atlantis is set in a Multi-User Virtual Environment (MUVE) based on Active Worlds with some modifications to provide support for forming identity (humanoid avatars), working on quests, and communicating with each other (Figure 2). Using their avatar, students move through the virtual worlds of QA and interact with other players (students, teachers, QA team). Students communicate with virtual characters too. Those characters use pre-scripted dialogues to communicate their perspective on the problem in quests.

Students and teachers in QA are not only questers, they are active citizens in a community. Each one of them helps to rebuild the lost knowledge of Atlantis and therefore accumulate own knowledge to influence on real world (Barab et al, 2005).

**Interaction and communication in QA**

Using QA teachers and students can interact with other users through avatar movements, text chat, email, telegrams and bulletin boards. Using dynamic abilities of avatar enables students to express themselves through non-verbal signs like giggle, hug, dance, clap etc. Students even communicate with virtual characters, for example Council members, which means they are real to them and that students consider them as friends (Barab et al, 2005). Virtual environment encourages a more casual conversation than face-to-face classroom discussion often does. Conversation can be livelier because there is no drawback to "talking over" each other (Robbins, 2006). Online communication can be a catalyst for investigative learning for children to develop abstract reasoning through concrete experience and growing through their zone of proximal development (O'Sullivan et al, 2007).

Collaborative learning in virtual environment involves positive interdependence and mutual responsibility for successful solving quests. That makes it essential to use politeness strategies in online communication. Studies suggest that in computer mediated communication there are two basic rules of communicative competence: make yourself clear and be polite. Students intend to write messages that are more direct and they wish to establish a close relationship based on enhancing group cohesion and friendship (Vinagre, 2008). Students can submit their responses to quests as text answers, essays, spreadsheets, slideshows, pictures etc., which makes QA their place for expression and enables them to create their own e-portfolio. By completing quests students earn points and gain status in the virtual environment. After completing series of quests the student can gain virtual privileges, like flying and building. E-portfolio, privileges and online identity are powerful motivators for engaging participation in online world (Barab et al, 2005).

Group members who participate successfully gain greater self-acceptance, confidence in themselves as online learners, grow in their perception of self-efficacy and learn skills that can enhance their communication in other context (Bandura, 1997, Shedletsky and Aitken, 2004).

Students in virtual environment quickly realize that they can learn form each other and that learning can occur in and out of school and during and after class time (Robbins, 2006). Resonance occurs when a group of people has an experience in virtual and real worlds; real-life experience is amplified because it resonates with virtual world. In Quest Atlantis students achieve that resonance by producing content that other students will use, signing up for jobs as greeter or guide, crafting alternative narratives, building and teaching others how to build virtual houses etc. (Dodge et al, 2008).
Research shows that QA become significant third place for students, place where they can make new, close friendships and belong to a community. Those QA communities go beyond school and country boundaries. "Living” in QA enable students to communicate with peers all over the world and meet them on their cyber playground. Through that kind of communication and collaboration children build their real and virtual identities (Dodge et al, 2008).

Students using QA create a network of online communities introducing new friends to old ones, search for mutual friends and establish ties across the world, virtual and real one (Dodge et al, 2008).

Quest Atlantis provides technical structure that supports human-human interactions and communication mediated through technology. Through that medium participants can realize relational communication as interaction for the purposes of creating and maintaining an interpersonal relationship (Shedletsky and Aitken, 2004).

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<th>Quest Atlantis Affordances</th>
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<td>I. Learning &amp; Achievement</td>
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<td>II. Narrative Engagement</td>
<td>Fixed Media, Media Interactions</td>
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<td>VI. Reflexivity</td>
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During 2004 QA research team did a research with participants from United States, Australia, Singapore, Denmark, China and Malaysia. Here are some highlights considering QA affordances (Table 1) from that research.

Children's interaction with characters shows a form of engagement with QA story because children discuss topics that they find important to both characters and themselves, e.g. mercury pollution on Atlantis and tsunami in the US. Story and characters are equally interesting to boys and girls (Barab et al, 2007).

Research on identity development showed that sport style clothes for avatar are most popular among boys, and pink dresses among girls. Girls put significantly more information on their QA homepages than boys. Boys and girls showed equal interest for applying for name plaques and jobs (Barab et al, 2007).

Collaboration in QA occurs when one child with more experience and knowledge helps another child in orientating, discovering and managing in QA; and children helping each other while they work parallel on their quests. Soon children helping each other became cultural norm in QA (Barab et al, 2007).

Communication in QA shows that students use all forms of communication actively and extensively. In first 15 months of the program usage students sent 1500 emails, 500 000 lines of chat. Communication in QA is specific because it's not visible to anyone outside QA and therefore children can communicate in a safe environment. Questers cannot send emails to people outside of their local classroom or affiliation unless they first meet this person in the virtual space and add their username to their “Friends” list. All communication in QA is safe.
for children and monitored constantly. Girls did tend to use all QA communication structures significantly more than boys (Barab et al, 2007).

**Conclusion**

Quest Atlantis makes it possible for children to travel to virtual places, solve different educational activities, communicate with other children and teachers, and to build their personalities in the virtual and the real worlds. The community in QA is enthusiastic and supportive and there is always someone to answer any question. Students are able to work together without the need to sit in the same room.

Last year one teacher's team from OŠ Veliki Bukovec finished training for using Quest Atlantis in teaching and learning. This year a few more Croatian teachers are attending that training. There is a plan to establish The Croatian center for Quest Atlantis, translate quest and teacher materials into Croatian and monitor acceptance of learning in virtual environment at Croatian schools.

With guidance of good teachers, computer technology and virtual environments can provide students with special place and safe context to explore real world concepts, analyze and solve real world problems (Shedletsky and Aitken, 2004).

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