

# The Avatar as a Knowledge Worker? How Immersive 3D Virtual Environments may Foster Knowledge Acquisition

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**Abstract:** The rapid development of virtual worlds has created new possibilities for supporting formal and informal knowledge acquisition and learning processes online. Consequently, greater immersion of “knowledge workers” in cooperation and communication tasks in social virtual worlds should be a more prominent topic in sociological and cognitive-psychological research designs. The relatively new social potential of virtual worlds can be examined using theoretical models that describe the use and assessment of virtual world technologies in contexts of knowledge acquisition and exchange. In this paper, three co-created scenarios will be described to help demonstrate how virtual worlds can be used to explore new forms of interaction in (virtual) social contexts. These scenarios and the results of the avatar-based ethnographic investigation during the process of co-creation and collaboration will be introduced and used to reflect on the 3D projects. Afterwards, two sets of criteria to evaluate 3D environments for learning and teaching will be presented. The paper ends with suggestions for further research concerning the effects of immersion during collaboration and education in virtual worlds and an outlook on other upcoming 3D projects.

**Keywords:** virtual worlds, immersion, knowledge exchange social software, knowledge management, Web 2.0, Second Life

## 1. Introduction

New architectures, new interconnected spaces, new open standards: The probability of internet users having some sort of presence within avatar-based virtual worlds or Multi User Environments (MUVE) – whether professional or personal – has seemingly increased (Gartner, 2007). Digital Environments are vital parts of the emerging Web3D. And a good thing too: Drawing on their possibilities for communication and cooperation, virtual worlds might be able to form a stronger internalization of IT-supported knowledge processes thereby creating new opportunities for formal and informal processes of knowledge acquisition – supporting a personalized knowledge management strategy (Hansen, Nohria & Tierney, 1999), making knowledge literally tangible and creating experience of action rather than theory-based knowledge.

To achieve all of this, 3D worlds offer a wide range of tools that provide users with various possibilities to communicate and connect, ranging from simple text chat to professional collaborative interaction within social groups.

Additionally, MUVES seem to possess a special motivational immersive character. They allow their users to literally “plunge” into the virtual world, to be surrounded by a completely different reality, to experience immersion (Murray, 1997). Immersion is defined by the degree to which people perceive that they are interacting with their virtual environment rather than with their physical surroundings (Guadagno et al., 2007).

Therefore, the use of social virtual worlds could help to achieve a higher involvement of “knowledge workers” in IT-based tasks of communication and cooperation. Different theoretical models of social presence and immersion examine the newly recognized social potential of virtual worlds supporting knowledge-based processes (Davis et al., 2009; Eschenbrenner et al., 2008). For example the Sociable Media Group at the MIT does research on special “Information Spaces” (Harry & Donath, 2008). Other researchers are analyzing the use and the assessment of virtual world technologies in the context of knowledge acquisition and exchange (Wittmer & Singer, 1998).

Not only does the perception of the presence of one’s own avatar within a virtual environment for learning and teaching contribute to a higher degree of immersion, but also – and more so – the perception of the presence of others (Bredl & Herz, 2010; Davis et al, 2009). The user is not alone

“out there”. There are people working and interacting with him within the same space - a fact that greatly increases the feeling of reality rather than virtuality. This creates a sense of actually “being there” (Heeter, 1992).

However, the possibility of offering a higher degree of social presence and therefore creating higher levels of immersion raises further community-related questions: Could the requirements of the social constructivist and the even newer connectivistic paradigm (Siemens, 2005) be fulfilled through interconnected 3D spaces? Can virtual worlds support immersive knowledge communication? And even more importantly, which criteria must be met to successfully teach and learn within these environments?

Since they are large, scalable, flexible, informal and non-structured, virtual worlds do indeed provide a constructivist and connectivistic environment – at least at a first glance. Their possibilities to support immersive knowledge communication are almost unlimited and should be further discussed in sociological and cognitive-psychological research designs.

Apart from functions such as socializing via chat, gaming, role playing and movie showing, 3D virtual worlds offer a wide range of possibilities for interaction and collaboration. It is hardly surprising their application in education (edutainment), especially for children and teens aged 6 to 18, is increasing steadily (KZERO, 2011). This creates a whole new generation of experienced avatar users, eager to work professionally within virtual worlds in the decades to come.

The following article illustrates some first steps to tap into this great potential by introducing three co-created 3D projects and suggested criteria to successfully evaluate avatar-based virtual learning and teaching settings.

### **Theoretical Approach for Immersive Knowledge-Based Virtual Environments**

The idea of using virtual environments to foster knowledge communication is strongly supported by theory: There are indications of a connection between virtual worlds and intrinsic motivation. Game Research points to an increase in motivation and efficiency of the knowledge acquisition process due to the flow effect (Csikszentmihalyi, 1993) fostered by virtual spaces (Fritz, 2004). According to Csikszentmihalyi and Rathunde (1993), flow in virtual environments can be characterized by ten factors: loss of self consciousness, concentration, goal orientation, distorted sense of time, direct feedback, balance between ability level and challenge, a sense of personal control over the activity, intrinsic reward of the activity, lack of awareness of bodily needs and absorption into the activity. Consequently, it can be assumed that the flow effect may be achieved at the peak of immersion (Krause, 2008).

The typical forms of communication and collaboration within 3D virtual worlds – interacting with the help of customized avatars in three-dimensional graphical settings, bringing content to life, sharing and using 3D objects – apparently cause a higher degree of immersion (Fromme, 2006) and therefore lead to a more intense participation and a higher degree of interaction within a group of online learners. Increased understanding of the effectiveness of 3D virtual worlds as learning scenarios is leading to them being held in higher estimation and being taken more seriously (Nattland, 2008). Virtual worlds have become more than just a game. They are being used to teach, counsel, prepare, support and even heal – the U.S.Army, for example, currently operates a virtual island within the world of Second Life, giving help to soldiers’ families and soldiers suffering from Post Traumatic Stress Disorder (United States Army, 2011).

However, the user has to be willing to learn and work in three-dimensional worlds. As Bartle (2003) suggests, immersion is always influenced by a user’s subjective perception and personal attitude towards a virtual construct.

Participants of social knowledge-based processes within virtual worlds usually do actively seek knowledge exchange and participation. They develop relationships and, bit by bit, begin to see themselves as part of a community. Building upon digital social networks, 3D knowledge spaces add a dimension of high immersion (Castronova, 2005) to knowledge exchange processes, favouring the development of communities of practice (see Wenger, 1998; Wenger et al, 2005). Therefore, avatar-based 3D environments could serve as a platform for user-centred knowledge acquisition and

cooperation scenarios. Work-based social role-playing, simulations, and product-based experimental grounds are now easily achievable. It has become possible to use virtual worlds as instruments to exchange implicit knowledge and to enable an informal and constructivist knowledge exchange based upon the new learning paradigm of connectivism (Siemens, 2005).

As a consequence of the developments in modern technology, the borders between real and virtual worlds are becoming increasingly blurred.

Technological developments enable professionals to create photorealistic virtual environments, true-to-life sound quality as well as the ability to input devices that provide haptic feedback and capture the player's movements (for example the Nintendo Wii or Microsoft Kinect). As a result, modern technology allows users to interact virtually in a way that very closely resembles "real" interaction. Thus, the player of modern computer games can experience higher levels of presence leading to the sense of actually being in the virtual environment (Steurer, 1993).

Depending on how large and how vivid a virtual world is, the user can immerse more or less deeply (Pietschmann, 2009). A well-designed and complex environment has the potential to put the users into a state of mind where they are surrounded *"by a completely other reality [...] that takes over all [their] attention, [their] whole perceptual apparatus. [They] enjoy the movement out of our familiar world, the feeling of alertness that comes from being in this new place, and the delight that comes from learning to move within it"* (Murray, 1997: 98ff). The real world outside becomes irrelevant. All of the user's thoughts are focused on the virtual reality around them.

Immersive virtual environments enable the user not only to learn, but also to use and improve what they have learned – to gain experience through action. According to Gee (2009: 70),

*"people primarily think and learn through experiences they have had. They store these experiences in memory [...] and use them to run simulations in their minds to prepare for action and problem solving in new situations. These simulations help them form hypotheses about how to proceed in the new situation based on past experiences."*

In other words: What people have learned online and in a virtual world can help them solve similar real-world exercises and problems.

## 2. Social virtual worlds in enterprises

Contrary to the rigid codification of knowledge elements in systems and platforms, the strategy of personalization within knowledge management (Hansen, Nohria & Tierney, 1999) is gaining in importance. Due to the introduction of Web 2.0 technology and social software, this development, known as Enterprise 2.0 (Koch and Richter, 2007), corresponds with a strategy of personalization, which is seeing an increase within enterprises.

The staff of IBM, for example, are already using the Second Life GRID-Engine for internal cooperation and learning processes (Fray & Carey, 2009). In the future, "Enterprise Immersive Platforms" (Driver & Driver, 2008) could be used enterprise-wide.

This raises the question of how the new factor of immersion could be inserted in a model for social Information- and Knowledge Systems. Fig. 1 illustrates how the factor of immersion could be embedded into a social software model for use in organizations (Bredl, 2009).

In this crystal-model for immersion in Social Media for knowledge processes we find, in the center, the Social Software technologies: Weblogs and Micro-blogs, Content and Document Management Systems (CMS, DMS), Wikis, Digital Social Networks and finally Avatars in Virtual Networks. On the left side there is the strategy of codification, which leads to Content and Information Management. On the right side, in the human area, the strategy of personalization, which, combined with an high degree of immersion, leads to the need to manage presence. Further Management functions are communication and community management.

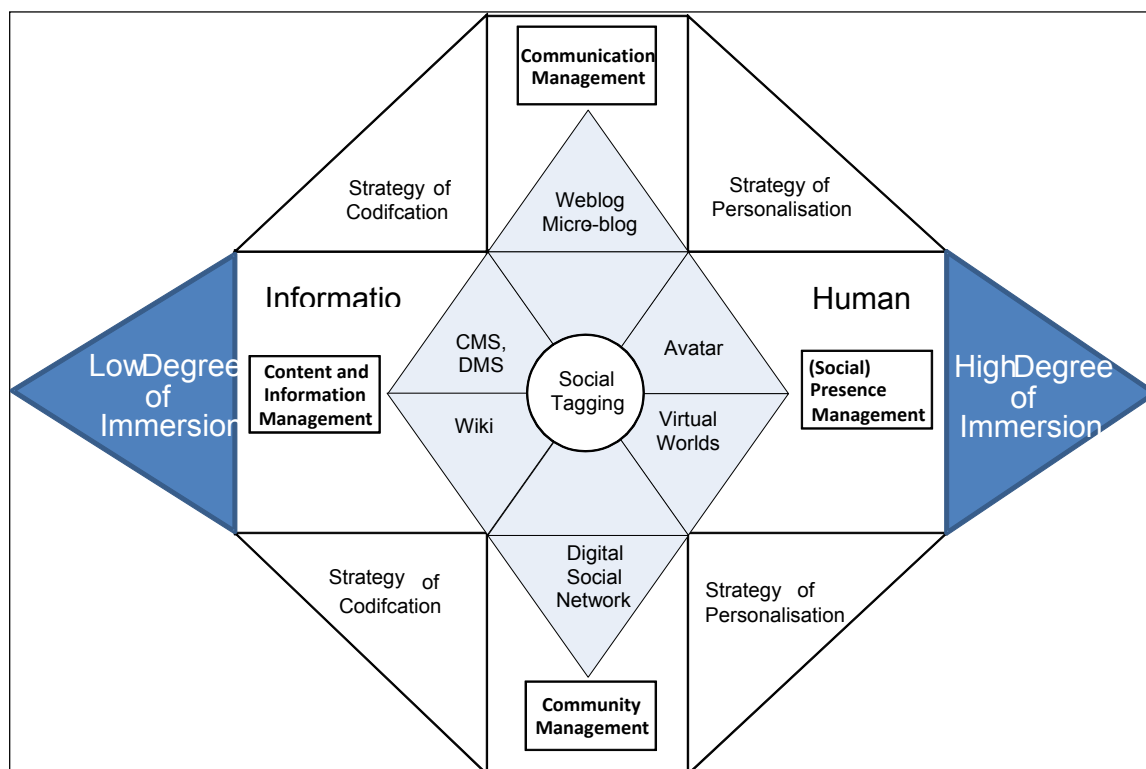


Figure 1: Crystal (Xtal)-Model –Immersion in Social Media

### 3. Scenarios for the application of knowledge and learning settings in a 3D virtual environment

During the course of three semesters, students of Media and Communication co-created various prototypical scenarios, which combine aspects of game-based learning and simulations within the virtual worlds of Second Life and Open Simulator (2011). The initial motivation for developing these scenarios was a result of the recognized limitations of digital support for learning, teaching and knowledge management via traditional platforms such as Stud.IP, Moodle and various other learning management systems as well as the limitations of synchronous interaction during online courses.

Three scenarios, their infrastructure and implementation, their potential benefits and the challenges which were overcome during creation will be described within the following section.

#### 3.1 Surrounding the case study

In order to create content within virtual worlds, an appropriate plot of virtual land was needed. The Digital Media division at the Augsburg Institute of Media and Educational Technology found their plot on the European University and the neighbouring European Science Island (Simteach, 2011); two spaces within the virtual world of Second Life especially designed for academic 3D projects.

##### *Scenario 1 - Learning adventure*

In the first project, a game accompanying the course “Introduction to the Methods of Empirical Communication Research” at Augsburg University was created. Designed just like an adventure game and fully implemented in Second Life, its frame story followed the theme of well-known fairy tales. As with researchers at the “Magic Wood Research Institute”, students explore the Magic Garden, Sleeping Beauty’s Castle, the Gingerbread House and even Rapunzel’s Tower while answering questions about empirical communication research and completing different tasks (Bitzer et al, 2010; Bitzer & Bredl, 2010) (see figure 2).

But does a university need adventure games in order to impart scientific knowledge? When thinking about education at university, one might easily picture a professor lecturing in front of hundreds of students taking notes. One might also think of seminars where students give talks one by one, their only motivation being to gain urgently needed credit points. It is possible that these students feel more

like they *have* to learn the subjects rather than they *want* to learn them. For children, there is a wide range of learning games, many of which make learning a more attractive venture. However, for university students, there are only a very small number of similar products – there are far too many subjects and courses, differing from university to university, to allow the creation of economically interesting learning software.



**Figure 2:** Learning adventure „Magic Forest“

Looking at virtual worlds like Second Life, where everyone is able to create content without needing to know how to program and without having to spend a lot of money, the alternative is obvious: here, teachers and instructors can easily bring their own ideas and their own game concept to life, thereby allowing theory-based courses and lectures to contain experience of action.

At the moment, there are two main e-learning settings to be found in Second Life. First, there are virtual classrooms where people meet and listen to presentations and lectures. Second, there are simulations and pre-made parts, allowing the user to experience a subject close up. However, virtual worlds offer many more possibilities to support learning and teaching. One of them is to connect 3D environments such as Second Life with the aspects of game-based learning and so-called “serious games” (Abt, 1970; Gee, 2003). The game accompanying the course “Introduction to the Methods of Empirical Communication Research” for students of Media and Communication does just that. Its use shall be described in the following section.

By definition, students of Media and Communication have a high affinity with digital media. Some of them are even already using Second Life – a good premise for learning and creating in virtual worlds. The seminar “Introduction to the Methods of Empirical Communication Research” is a blended-learning seminar with twelve face-to-face meetings through the course of one semester. Every week introduces a different theoretical focus. During the real-world meetings, students gain the basic knowledge allowing them to complete the exercises within the game. Further information is given in Second Life. In the “Magic Forest”, students have to unravel hidden secrets and complete various quests to consolidate their knowledge. Every level is represented by a new fairy tale. Once there, students have to answer questions that draw on the topic of the last meeting and afterwards work on a practical exercise such as conducting an interview.

Every face-to-face meeting unlocks a new level in the virtual “Magic Forest” and every new level is more complex than the previous one. In order to complete their in-game tasks, students have to work together through face-to-face meetings in groups to create questionnaires and interview guidelines. If a problem cannot fully be solved in Second Life – for example because it requires statistical software – the task is then worked out in the real world and the results presented later on in Second Life.

After the next meeting, if the exercise is correct, they will get the password for the next level and can then teleport there to advance.

### Scenario 2 - Knowledge acquisition in disaster training

When disaster hits, it hits unexpectedly. And when it does, well-trained emergency professionals within the police force, the fire brigade and rescue services have to cooperate across unit borders and make prudent decisions in the midst of chaos in order to save lives. But how can professionals prepare for large scale emergencies when hundreds of injured persons need to be taken care of by far too few emergency physicians; when important infrastructure is destroyed, damaged or flooded? Regular training cannot prepare emergency professionals for all of this. Efficient disaster training requires a large number of emergency professionals and actor “injured persons” to be realistic. Preparing such training exercises tends to be extremely time-consuming, difficult and expensive: The German Disaster Management Exercise “Lükex”, for example, simulated 14 different disaster sites all across the nation, uniting tens of thousands of emergency professionals in one large scale training exercise. It took two years of planning and cost almost one million Euros. Each participating unit also had to remain deployable during the whole 36-hour training session in case of a real emergency.

Therefore, during a second project, the Digital Media division at the Institute of Media and Educational Technology at the University of Augsburg built up a prototypical disaster training site showing how real world professionals might gain the possibility to create training at the point of need – allowing them to practice the management of real world emergencies without the limitations of real world training, such as time and place (Groß, 2011; Groß, et al. 2011). Since – as illustrated above – real world disaster training tends to be extremely time-consuming, expensive and difficult to organize, disaster training exercises are rare. There is a great need for efficient and affordable training solutions that allow emergency instructors to create “out-of-the-box” training scenarios just at the point of need.

The project team tried to create just that. They built up a prototype of an online training site within Second Life, simulating a cargo plane crash over a suburban area on European University Island (see figure 3). There, the individual player has to manage multiple spreading fires and perform a triage following the Simple Triage and Rapid Treatment Scheme StaRT. Every crash victim has to be sorted into four different categories of injuries ranging from T3 (minor injuries) to T1 (major injuries) and TOT (fatal injuries or dead). The player has to decide quickly which individuals need to be taken care of immediately and which can wait until the severely injured have been treated? To guide the player in making the correct treatment decision, every injured person within the simulated disaster site has visible, more or less severe injuries and gives away a notecard. This notecard describes the individual’s injuries and afflictions. After making a decision, the player has to put up the appropriate triage sign and move on. The lack of immersive medical examination methods such as vitality checks is deliberate in order to allow for easy-to-use controls. These aspects are part of First Aid Training and First Care and should rather be practiced offline.



Figure 3: Emergency training in 3D

When fighting fire, the player is forced to pay attention. They cannot enter burning areas or buildings filled with smoke without proper breathing protection and fire-resistant clothing – if they do, they will become casualties themselves and make the actual task at hand even more difficult for their remaining team members.

All of the player's actions during Second Life disaster training may be filmed with screen capturing tools such as "Fraps" and can be evaluated afterwards either in-world or in the real world.

### *Scenario 3 - Counseling in virtual worlds*

Virtual worlds are more and more becoming part of our reality and have an increasing influence even on the area of psychology and counselling. But can virtual worlds really support clients of psychosocial counselling and if so – how?

First of all, virtual environments may be able to enhance a client's identity by allowing the user to create a virtual self – within the virtual world they can be a totally different person, interacting freely with other people, overcoming real-world fears and limitations in a game of identity (Misoch, 2006; Schelske, 2007). Secondly, virtual worlds could improve and support regular psychosocial counselling sessions in general. Due to its guaranteed absolute anonymity and the possibility to simply log out whenever the client wants a session to end, virtual worlds allow counsellors to get in touch with people who otherwise would not seek psychosocial counselling. However, there are very few efforts being made to use immersive virtual environments for counselling in the new Web3D.

In 2009, the university of Neubrandenburg in Germany together with one of the authors took a first step towards psychosocial counselling within virtual 3D environments: It created a prototypical counselling setting in Second Life (Bräutigam et al, 2011). This psychosocial counselling ambulance, built onto the university's virtual campus in Second Life, consists of an information area as well as three different counselling settings in various skyboxes that are accessible via teleportation. During building, a special focus was set on creating a pleasant and confidence-inspiring environment in order to allow for an appropriate and positive counselling area. The Neubrandenburg virtual psychosocial counseling ambulance features a neutral conference room, a magical forest and a Japanese garden. Since every client is allowed to choose the counselling setting they like best, the client is offered an active role during counselling right from the beginning (Bräutigam et al, 2011).

After building up the ambulance, a campaign across various social media services was started to get the first "real" anonymous clients in order to investigate the possibilities and limitations of virtual psychosocial counselling. Clients with deeper psychological problems and those suffering from psychiatric illnesses were excluded from the study via sounding interviews.

During counselling, the counsellor and the client were accompanied by a team of students reflecting on the use psychosocial counselling within 3D virtual worlds. Results showed significant interdependencies between the clients' real and their "second life". Within virtual worlds, clients were observed talking very freely about their real life difficulties and necessities, suggesting systemic counselling in virtual worlds to partly act as trans-cultural counselling.

## **4. Lessons learned in projects**

After creating some 3D virtual world projects, the team can look back at various lessons learned. Generally, students responded very positively to the projects, as they were very motivated to learn and interact within 3D virtual environments. During sessions, they developed many new ideas about how to use virtual worlds for educational and cooperative purposes themselves.

The fact that students often stayed within the virtual environment to continue their discussions even after the sessions ended was very remarkable. This strengthens the hypothesis of the existence of processes of immersion and flow (Csikszentmihalyi & Rathunde, 1993).

However, there are some limitations to the use of virtual worlds, such as the lack of possibilities to combine the established learning and communication platforms and the new possibilities of knowledge acquisition and exchange in 3D environments. The projects showed that more time should be taken to develop instruments that take advantage of the steady nature of the learning, simulation

and counselling environment – introducing for example elements such as bots that interact with the user even when neither teacher nor tutors are online.

Despite more interactive possibilities, the need for the possibility to create and share content became evident during the projects. Furthermore, learning and knowledge objects created within conventional web applications could not easily be transferred into virtual worlds and vice versa. The project Sloodle, which combines Second Life and the open source platform Moodle, is one of only few exceptions (Kemp & Livingstone, 2006). It is a combination of the 2D-web and the 3D-environment; a Second Life and Moodle mash-up.

In order to successfully create immersive virtual environments for learning, counselling and teaching, various guidelines and criteria need to be fulfilled. However, official recommendations or guidelines concerning didactic design within social virtual worlds have yet to be voiced. Based upon the introduced case studies and 3D projects, the Digital Media division of the Augsburg Institute of Media and Educational Technology has developed a set of criteria for immersive learning environments (Dörr, 2010). Featuring a tabular design resembling the Zurich pedagogical university's inventory, nine main categories were created:

- “Getting Started” and Support
- Content Design
- Didactic Design
- 3D Design
- Design of Tasks and Questions
- Immersive Dimension
- Motivation & Emotion
- Communication & Cooperation
- Results

Some of the categories contain special filter-questions, guiding the evaluator or designer to sub-categories relevant for his very own learning or counselling setting. This allows the quite extensive set of criteria to be shortened wherever possible, concentrating on the necessities and thereby greatly increasing the practical utility of the set.

However, some settings such as the emergency training site mentioned above, require special elements and therefore a special set of criteria of their own. Because of this, there have been worked out a special set of criteria with the needs of professional emergency instruction in mind (Groß, 2011).

Virtual worlds for training professional emergency responders within the emergency services need to be highly specialized learning environments, fulfilling several special requirements in order to guarantee successful training. However, there are no guidelines to allow emergency instructors to evaluate the suitability of existing training software. Groß (2011) tried to bridge this gap by creating a set of criteria based on didactic theory and interviews with emergency instructors, keeping the special requirements of professional emergency training in mind. This newly developed set of criteria rests upon the works of Benkert (2001) and Thomé (1989) as well as the categories and items of Dörr (2010) and has been enhanced with various important emergency facts and requirements. Like this, 41 requirements for software-based training solutions for emergency professionals were developed. They are summarized within seven main categories relevant for the evaluation of disaster training software: The degree of reality and detail, the scalability, the design of tasks, environments and missions, the usability, the possibility to adapt to the user as well as the instructor and the focus onto tactical aspects. Within the set, those categories are represented as following:

- “Getting Started”, Usability and Security
- Content Design
- Media Design
- Design of Tasks and Missions
- Aspects of the User

- Aspects of the Instructor
- Feedback

Across all nine categories, 38 criteria and 60 items can be used to evaluate the software in question. In order to allow for an easy and objective assessment of the future training tool, the evaluator only has to decide whether each item's requirement is fulfilled within the virtual world (YES) or not (NO). The possibility to create own missions from scratch and some other closely defined aspects can be rewarded with Brownie Points. Every category ends with a summary of the achieved YES and Brownie Points, showing how the software totalled within this part of the set.

In order to avoid a subjective bias of the results, the emergency set of criteria does not attach different weights to any of the items. This decision was taken very deliberately. Which of the given aspects are especially relevant is going to differ from instructor to instructor and from training goal to training goal. This special set of criteria therefore doesn't tell what is important, but rather shows the software's detailed score across all nine categories, allowing the instructor to decide whether the virtual world fulfils his requirements or not.

## 5. Conclusion and prospects

The goal of this paper was to describe the research phenomena in regard of social, cognitive and personal competencies in teams of knowledge workers that could be observed, and to explore new forms of interaction in virtual social contexts. Various scenarios were created to study the potential of virtual worlds for supporting knowledge and collaborative processes; three of them are featured in this article.

All of the featured projects were based upon peer learning. Peer education is particularly suitable for use with information technologies since it creates cooperative learning via face-to-face interaction on the one hand and collaboration within virtual environments on the other. Thanks to multimodal online communication, the group can interact and communicate in various ways. Heterogeneous groups additionally benefit from peer learning, resulting in the individual knowledge workers learning from each other as well as teaching one another.

The advantages of immersion and networking and the actual knowledge gain through the use of virtual worlds exceed the potential costs because of the amount of time and travel that are saved. According to Bartle (2003) the following points are to be considered in the application of MUVES:

- The degree of (social) distance between the participants in a learning environment could be regarded as diminishing thanks to a growing immersion in 3D environments.
- The more or less unlimited possibilities of interaction compared to conventional information and communication systems could be further objectives of research.
- Changing the user's own identity by appearance of diversity (ethnicity, gender) brings the possibility of anonymity and therefore equality in the knowledge process.
- The feeling of being present together with other learners in the learning field is possibly the strongest factor in how immersion is perceived in the learning setting of a virtual world. This is also strengthened by the other users' reactions to the digital self, which increases one's own presence and participation within the MUVE.

Based upon open standards, some prototypical platforms for closed 3D intraworlds such as OpenSim, Croquet or Sun Wonderland are currently in further development. It is conceivable that virtual worlds designed especially for knowledge work could increase the quality of further immersive knowledge processes. Corresponding with development initiatives, there should be further effort to create interfaces connecting real and web-based environments.

The conclusion may be drawn that immersive education tends to be more engaging than text- or video-based online communication. This leads to the hypothesis that the phenomena of immersion could increase the motivation and the learning capacities of avatar-based co-workers and learners. Therefore, the phenomena of immersion and community-building should be studied more extensively by means of reasonable operationalisations in experiments with prototypical scenarios in virtual worlds.

The Digital Media Division at Augsburg University continues working within virtual worlds, putting to the test the open-source world of OpenSim. Although the software is still in alpha status, various regions have been put up within OpenSim, allowing students of Media and Communication to put their very own 3D projects to life. The results are outstanding. Over the course of just one semester, 40 students have created a total of eight great learning sites within the "Second Learning Grid"<sup>1</sup>, featuring among others a bicycle training course for kids, the alchemist's tower introducing chemistry or a oversized walk-in computer. Since OpenSim's user interface, handling and scripting language are very similar to Second Life, students could easily apply what they had learned in Second Life to their tasks in OpenSim.

Currently, another group of students continues to build on a third region, extending the possibilities of "Second Learning Grid" by developing a virtual first aid training, a planetarium with the universe, and a walk-in painting of Monet – to mention only a few projects that are in the works.

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<sup>1</sup> [www.secondlearning.org](http://www.secondlearning.org)

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