VIRTUAL LEARNING ENVIRONMENTS: WILL THEY CONQUER THE EDUCATIONAL ARENA?

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1. SUMMARY

Virtual environments (VEs) boom at an incredible speed, people's minds are conquered by computerized media. Some forecast a complete victory of virtual learning environments over conventional education. This paper attempts to define the major characteristics and educational principles of virtual learning environments, examines the process how education integrates VEs or VEs integrate education, summing the benefits and dangers.

> *"It has become appallingly obvious that our technology has exceeded our humanity."*
> Albert Einstein

2. THE VIGOROUS REALITY BEHIND "VIRTUAL REALITIES"

In 2007 Gartner, the world's leading information technology research company, predicted that by the end of 2011 eighty percent of active internet users will have some kind of participation in some kind of a virtual world. (Gartner, 2007)

The number of internet users during the past ten years show a steady and rapid growth globally, although the degree of internet penetration reflects dramatic differences spanning from below 10% in Africa to 75+% percent in North America (Figure 1.).

In its most recent news release the International Telecommunication Union announced that the number of internet users has exceeded 2 billion globally.

The growth rate of internet users globally is much higher than that of the average percentage of internet using population, indicating that the increase is uneven (Figure 2.). Furthermore, the increase does not coincide with the general pattern of the economic growth (Figure 3.).

If Gartner's prediction is fair, over 1 billion people are present in one way or another in virtual worlds This has been confirmed by KZero, a British analytics company, that specializes in the virtual worlds and virtual goods market, who reported last year that the number of users registered for virtual world sites broke the 1 billion mark. The dynamic growth is clearly illustrated by the KZero Worldswide report 'Virtual Worlds 2010+' providing an assessment of the sector with an indication of trends emerging (Figure 4.).

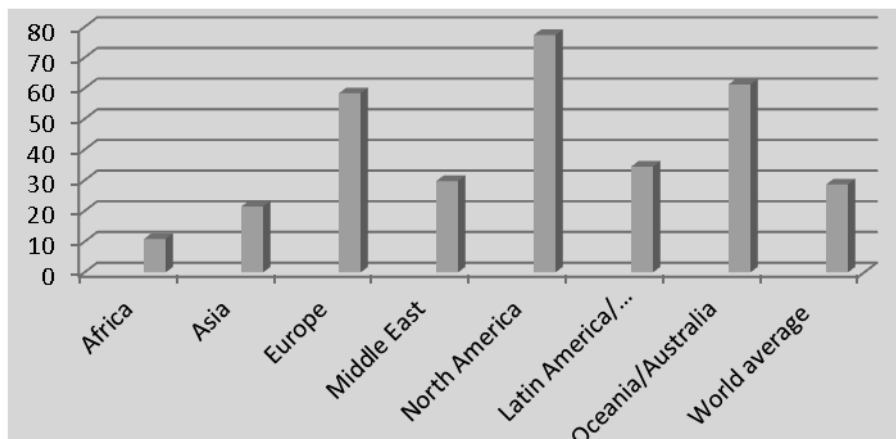Figure 1.
Internet penetration by continents
Source: World Internet Usage Statistics

**Global numbers of Internet users,
total and per 100 inhabitants, 2000-2010**

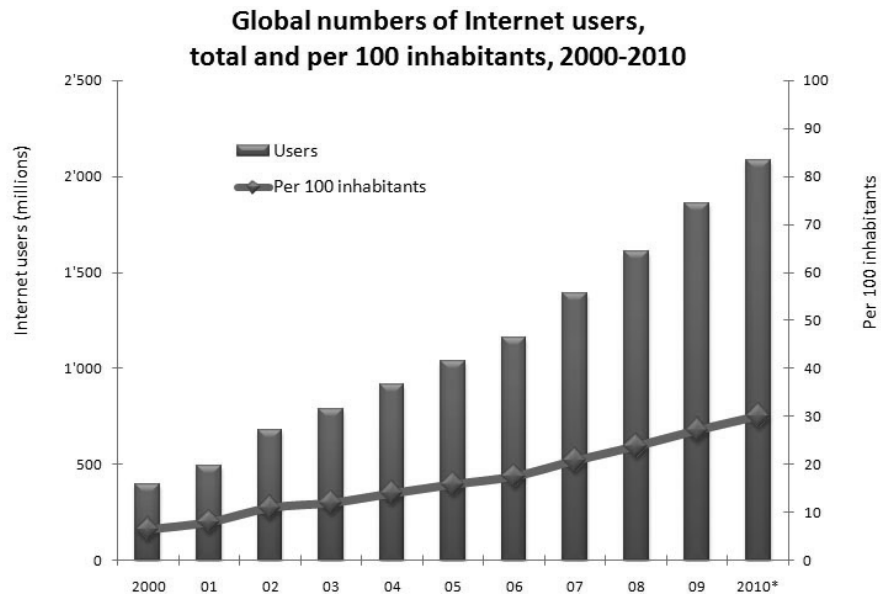
Figure 2.
Global number of Internet Users
Source: ITU World Telecommunication/ICT indicators database, *Estimates
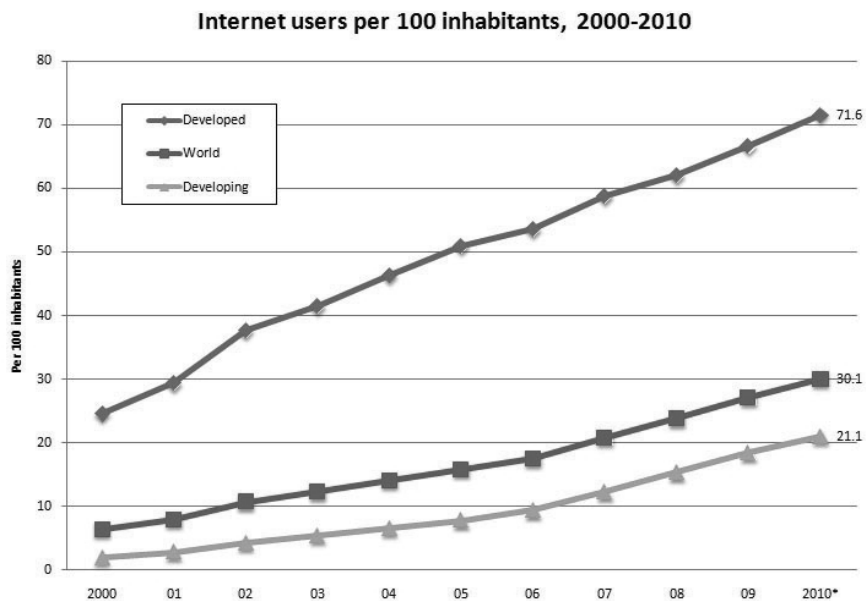
Internet users per 100 inhabitants, 2000-2010

Figure 3.
Internet Users per 100 inhabitants
Source: ITU World Telecommunication/ICT indicators database,*Estimates

The presence and importance of virtual worlds are unquestionable, the social impact created by them, the threats and the opportunities are yet to be analyzed, along with the challenges, gains and losses created by using virtual environments in education.

3. WHAT IS TO BE CONSIDERED AS A VIRTUAL ENVIRONMENT?

VEs and the attempts to produce an exact definition for what they are already have a history. As in the case of so many technology development NASA was the pioneer to assemble the first low cost versions of the virtual technology.

The basic definition comes from a NASA-based researcher from the early 1990s:

"Virtual environment displays are interactive, computer-graphics based, head-referenced displays that create the illusion that their users are in a place other than where they actually are." (Ellis, 1994)

In a few years time, just as the technology itself the definitions themselves develop into a more sophisticated manner, describing more complex features:

"A VE is a networked software environment that emulates those features of the physical world that are important for the support of the task at hand. At the minimum, it implements the concept of space, navigation, communication, and objects. In addition to emulation, it may also augment physical reality and interface with it." (Tomek, 1999)

By the mid 1990s VEs started to convert into virtual worlds, whose definitions as a major addition include the representation of people:

"Virtual world is an electronic environment that visually mimics complex physical spaces, where people can interact with each other and with virtual objects, and where people are represented by animated characters". (Bainbridge, 2007)
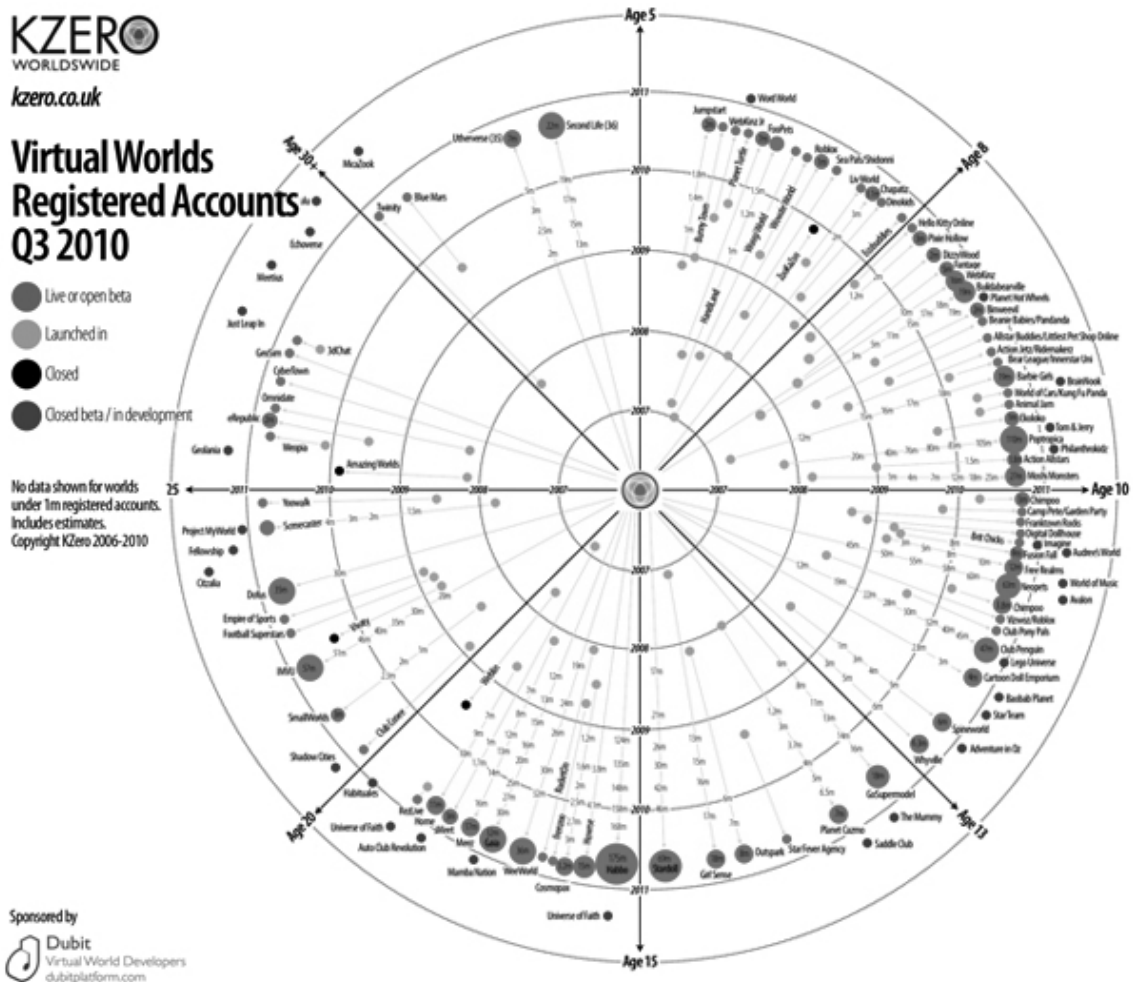

Figure 4.
Participation in virtual worlds
Source: KZero

From an educational point of view a virtual world has to develop into a virtual learning environment (VLE) in order to realize educational potentials. A set of features needs to be carried for this purpose best characterized by Dillenbourg-Schneider-Synteta (Dillenbourg 2002):

- A virtual learning environment is a designed information space.
- A virtual learning environment is a social space: educational interactions occur in the environment, turning spaces into places.
- The virtual space is explicitly represented: the representation of this information/ social space can vary from text to 3D immersive worlds.
- Students are not only active, but also actors: they co-construct the virtual space.
- Virtual learning environments are not restricted to distance education: they also enrich classroom activities.
- Virtual learning environments integrate heterogeneous technologies and multiple pedagogical approaches.

These features enable VLEs to meet most requirements that education sets for fulfilling its tasks and mission in an ideal environment, especially for those who represent a constructivist approach to teaching and learning.

4. THE EMERGENCE OF VIRTUAL WORLDS IN EDUCATION

Education is a priority in an emerging and globalizing knowledge society, and its major challenge is to reach and engage higher and higher portions of the population. New ways of providing access to education is an imperative in the 21st century.

The conventional education that characterized the previous century is unable to survive and function in the current era when the world lives through technologically exponential times. Technology and ICT penetrates into all walks of life, and new generations, net generations, the digital natives perform their social communication and collaboration "in a digital fashion". They create new demands towards education, the field they are immensely exposed to. Traditional teaching carries many features that do not meet the requirements established by new generations. It is bound in space and time, restricting interactions, rather inducing a passive, observational behaviour, this way representing an instructivist approach as opposed to a constructivist approach to knowledge transfer.

Educational technology started to handle – at least partially – the challenges traditional education has had to face for at least the past two decades. It has become one of the dominant issues in learning activities, changing dramatically the scenery in the educational arena, out/replacing the traditional face-to-face set-up with e-learning formats and different delivery modes, e.g. open learning, flexible learning, technology supported learning, on-line study, etc. These were considered to be effective products in the 1990s, but failed to create the most ideal world for education, the "educational utopia". The curve went down, and by the beginning of 21st century it became obvious that in order to build the most effective education strategy, traditional methods need to be intertwined with technological achievements along with new conceptual approaches. Tutor-lead and computer-lead, face-to-face and online, synchronous and asynchronous education – all needed to blend to maximise the learning experience and the output. (Power, 2008) By the 2000s the concept of blended learning started to prevail in education opening the way to integrate basically any technology that can contribute to the success of the educational mission.

Parallel to these trends and processes the world of technology has been undergoing "a major historical transition when video games and computer games are in the process of evolving into something much richer, namely virtual world". (Bainbridge, 2007)

It takes only one step further for education in its efforts to increase effectiveness and efficiency to meet and integrate virtual worlds (VWs) into its array of options.

One of the most prominent representatives of the virtual worlds that constitute virtual learning environment is Second Life (SL), keeping approximately 6.5 million user accounts. SL is probably the best example of how virtualisation in education conquers. SL was founded in 2003, and the first research conducted in 2007 showed that in four years approximately 170 accredited educational institutions were present and occupied a virtual location in SL. (Jennings, 2007) By the end of 2010 this number was close to 400. Education-related activities offered range from academic courses to social gatherings, facilities include classrooms, research labs, libraries and public areas. Among many others Harvard University have already offered courses in SL for academic credits.

5. THE IDEAL EDUCATIONAL SOFTWARE ENVIRONMENT: ALMOST BOUNDLESS POTENTIALS?

It is a must to find the ideal learning environment in order to deliver effectively and efficiently in a rapidly changing world which is dedicated to rely on knowledge-based societies.

The concept of virtual learning environment being the ideal learning environment has been introduced by Ivan Tomek testing virtual environments against a set of technical and contential features. Tomek claims that in our times a learning environment needs to be "dynamic and unpredictable" in nature, it must be networked, and include several communication tools, while it has to be "easy and fun to use". Therefore the software environment needs to be "easily and drastically customizable and extendible". Furthermore to ensure the collaboration aspect of education the ideal software environment has to be able to integrate sophisticated software tools that have already been used by education (e-mail, chat forum, learning management system, etc.) Finally, "as computing increasingly pervades physical reality, the software environment will increasingly require seamless integration with the physical world". It is concluded that virtual environments carry the properties that an ideal learning environment requires. (Tomek, 1999)

Educational principles that can make programmes in VWs successful include the NDSU World Wide Web Instructional Committee (WWWIC) (Slator, 1999):

- role-based learning, learning by doing, practice-oriented approach
- goal-oriented practice and repetition in problem solving
- spatially oriented set-up
- exploratory in nature, enabling students to control their experience and pursue their own interests
- game-like: engaging, entertaining, attractive
- highly interactive
- unintrusive tutoring: tutor as agent unintrusive but proactive, visit, when needed

Nearly all literature on virtual worlds claim that opportunities present an unprecedented range for education and research. From a methodology point of view the WWWIC provides the best summary of affordances provided by VEs:

- control virtual time and collapse virtual distance
- create shared spaces that physical or practical impossibilities
- support shared experiences for participants in different physical locations
- implement shared agents and artifacts according to specific pedagogical goals
- support multi-user collaborations and competitive play

When it comes to research advantages of VWs seem to be huge, and at the same time expectations are high. In addition to real time simulations, extended time dimensions, crossing of sociocultural boundaries, reaching and engaging larger numbers of subjects are all to be achieved and exploited. The most challenging opportunity for research might be experimenting under alternative conditions that are impossible in real life.

6. SOCIAL BENEFITS

Education needs to handle an increasingly diverse student body, which in addition have a rather practical than theoretical approach to their own education. The first generation of net-based – now called flat web – social settings have already overcome most of the shortcomings of traditional teaching modes. It offered the advantages of:

- low cost and easy accessibility
- unlimitedness in terms of geography
- time flexibility
- asynchronous communication

It also provided space to synthetic and constructivist learning methods.

With virtual environments emerging further capacities can be utilized opening the way to new perspectives in education and research. A new way of socialization will take place and establish itself.

Who benefits? Education in general will benefit. The majority of stakeholders find that potentials of education in reaching and engaging its audience increases. Educators and students find new roles in the process of teaching and learning. There will appear more guiding and less presenting on the teacher side, while more acting and less listening on the student side. This specific way of communication in a virtual context may make a positive impact on students with personality issues. When studying the per-

sonality characteristics of users of virtual environments it has been found that those who like to be present in these environments usually "do not perform well in spoken interactions, they are shy, reflective, and more comfortable with emotional distances, but have valuable contributions to share with others". (Dede, 1995) This recognition reinforces Rheingold's statement "Synthetic environments based on text and computer graphics dissolve boundaries of identity as well, enabling communication about very personal things through a depersonalised medium". (Rheingold, 1993)

Generations will benefit that feel more at home in a computerized media, people/students who prefer online collaboration and depersonalised communication channels. This audience which proves to be disadvantageous in traditional social settings will be supported to interact.

VWs when serving educational purposes will produce:

- larger participation in education
- higher level of engagement on the part of the students
- higher degree of student activity
- better success rate in acquisition

All these areas are crucial points of interest as education currently struggle hard to win battles in these issues.

7. WHAT IS AT LOSS?

The positive impact of VWs should not be overemphasized and their downsides should be seen, too.

Not in theory, but in practice equal opportunity in accessing this media is questionable. Virtual worlds are available only for those with access to high-end technology. As it has already been pointed out, the number of the potential and actual participants rapidly grow, learning in virtual environment is still not an alternative to economically disadvantageous layers of societies.

Important aspects of the physical co-presence are definitely lost in virtual environments, much of the human perspective suffers negligence. Human interaction turns into digital interaction, making a negative effect on conventional communication skills. The uniqueness of a real live communication is featured by the body language, gestures, mimics and facial expressions, and the tone of voices. As Dillenbourg pointed out the prevalence of how it is said over the

what is said is evaporates in the realm of cyberspace. (Dillenbourg 2002)

By the same token sociopsychology expresses reservations also referring to problems of addictive behaviour and to the ambivalent cognitive and emotional relationships between a human user and his or her online representation. (Bainbridge, 2007)

Personal acquaintance and interaction play indispensable role in social collaboration, which cannot be substituted by virtual features. Generally dealing with people is at loss to a large extent, the human factor is endangered by the exaggerated presence of virtuality.

8. PROPHECIES

Forecasts and predictions regarding the future applications of VLEs and VWs tend to be extremist. Those in favour go as far as stating that traditional education soon will come to an end:

"By 2025 traditional universities may be a thing of the past replaced by a consortia of course providers with delivery system that simply bypass the classroom." (Dunn, 2000)

"Eventually virtual worlds will permeate into every aspect of education. They (virtual worlds and education) will be one – inseparable, impossible to distinguish or differentiate. People will be able to attend a school solely in virtual worlds. Classes, from kindergarten to college, will be able to go inside a whale's stomach or visit ancient Rome, even design entire cities. The possibilities are endless and available."

Many scientists though recognising and appreciating the opportunities warn of severe dangers:

"Probably for the better but conceivably for worse virtual worlds are creating a very new context in which young people are socialized to group norms, learn intellectual skills and express their individuality." (Bainbridge, 2007))

There is a threat that those "graduating" from virtual universities may include many future engineers, natural scientists and social scientists who are ready to remake the real world in the image of the virtual worlds. (Bainbridge, 2007)

There are obviously arguments on both sides, and as always extreme ends need to be handled cautiously. It is not very likely that a "virtual revolution" would sweep away the sense of reality in general, but undoubtedly there are warning signs of personality distortions in the upcoming generations. This is why the role of reason and

responsibility is more in the focus then ever. While utilizing the unprecedented advantages of VWs in education, attempting to create an educational utopia, education as such need to be careful and soundly proportionate with VWs not to find itself in a dystopia.

9. CONCLUSION

Virtual environments can provide grand opportunities for educational functions, both in a technical and in a social sense, and this should be exploited to a larger extent when building educational strategies. Although VEs, VWs are being increasingly used in education, their use does not seem to show the same dynamism as other VE usages reflect. The design and employment of VWs will create not only technical but also social challenges, which is to be analyzed and handle with special care. There is no way to build limits to the spread of VW participation, educationists real challenge is to channel this immense participation into a beneficial direction.

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