Building the Bridge

DIGITAL DIVIDE

PSYCHNOLOGY JOURNAL

The Other Side of Technology

TABLE OF CONTENTS

Editorial Preface

The term Digital Divide (DD) began to be used by the US public administration to identify an unequal access to the computer services across the population (source: Wikipedia). Today, the concept is used more broadly to indicate the existing gap in accessing new technologies, due to wealth differences, to social relegation, to low education level, to poor infrastructure. The Digital Divide is a complex, multifaceted phenomenon, registered in both rich countries, where it strikes the weaker layers of the population, and in the developing ones, trapping them in an endless spiral where the impossibility of using technical resources brings about the impossibility to decrease the disadvantage in other critical dimensions. Data were eloquent after the first Internet boom in 1998: any 1000 people, in the US there were 661 telephone lines, 459 personal computers and 847 Tv sets; in Italy, 451 telephone lines, 173 personal computers and 451 TV sets; in Colombia, 173 telephone lines, 28 personal computers and 217 TV sets; in Pakistan, 19 telephone lines, 4 personal computers, 88 TV sets and in Mozambico only 4 telephone lines, 2 personal computers and 3 Tv sets (United Nations Development Programme, quoted by Digital-Divide.it).

Various answers, although still insufficient, are paving the way to what will hopefully be a solution. Starting from hardware recycling, the so-called "trashware", passing through hardware integration, which combines the computing power of several different machines, and arriving at open source software to be freely copied and distributed. The United Nations have set up a High-Level Expert Panel, which presented at the Millenium Assembly in 2000 the first global plan to overcome the Digital Divide. In 1998, during the Global Village, an India-based seminar on the Digital Divide, the *Bangalore Declaration on Information technology for developing countries* was written; in addition, the idea of creating a low budget computer, based on a visual language and possibly supporting on-line activities for disadvantaged markets took shape. Thus, guided by the Indian Institute of Science and Encore ltd, after only three years, the Simputer appears, and Nicholas Negroponte announces at the World Summit on the Information Society in Tunis the creation of the "$100 laptop".

The Digital Divide, widening as a problem (digitaldivide.org), has also emerged as a topic; several places on the Internet are devoted to debate the issue. The most popular is probably the Digital Divide Network, www.digitaldividenetwork.org, the Internet's largest community "working to bridge the digital divide". Our Journal tries to contribute, first by facilitating open access and dissemination at no fee of scientific content, and now dedicating a special issue to this topic, which will be the first of a series.

Iginio Gagliardone, writing his article "*Virtual enclaves or global networks? The role of Information and Communication Technologies in development cooperation*" from the field of a UNESCO intervention in Ethiopia, tracks the changes that the concept of digital divide has undergone since its appearance, 10 years ago. This paper opens the triad of contributions on the digital divide of this issue of PsychNology Journal, illustrating how the presuppositions supporting the discourse on digital divide have changed, as well as the spirit of the initiatives made with the overt purpose of bridging the digital gap. Gagliardone shows -with the help of examples, landmark scholarly contributions and statistics- that no universal recipes can help deal with the problem and that exporting habits from one country to the another may revert a solution into a problem.

The next two contributions consider the way in which the digital divide gets internal, as in the case of the "gender divide". They investigate the psychological aspects of ICT usage in the East Europe, a phenomenon that is poorly covered, and

discuss their results in comparisons with data on gender divide from other geographical areas. Olga V. Mitina and Alexander E. Voiskounsky in their "*Gender differences of the Internet-related stereotypes in Russia*", investigate with a questionnaire the nature of the stereotypes regarding various 'characters' connected to the Internet user and do so with a complex methodology based on 'multiple identification' paradigm. In particular, they show the effect of self-assessment (SA) on the nature of male and female stereotypes. Ioana Codoban describes a study on the usage of the Internet conducted in Romania, part of a broader survey involving also Italy, the Netherlands, Spain. In her article "*Internet usage and gender digital divide in a Romanian students' sample*", she presents the Romanian sample in general and then compares gender subgroups. She also hypothesizes that an important effect in this kind of studies can be played by cultural preference about self-rating. This is surely crucial, for the items of a questionnaire or their underlying dimensions cannot be assumed as being cross-culturally equivalent.

PNJ hosts two contributions in the 'other contents' section. The first one reflects on Bishoujo Games, and on the way in which non-Japanese players experience them. In "*The Impact of Telepresence on Cultural Transmission through Bishoujo Games*", Matthew T. Jones proposes an hypothesis, namely that these games allow the user to be teleported into another culture, and examines the strategies contributing to this

'travel'. According to Jones, in an hypothesis that is worth being pursued, the player act from an 'homunculus' position with respect to the virtual environment of the game, and in this way his/her presence in such environment is realized through *tele*presence. The second contribution to this section, "*The Effect of the Emotion-related Channel in 3D Virtual Communication Environments*" is authored by Mikio Kamada, Mioko Ambe, Katsushige Hata, Eiju Yamada and Yuichi Fujimura. This study addresses a topic that is attracting great attention, namely emotional computing. They investigate the use versus non use of emoticons in group communication among children from elementary school in Japan, and the effects on performance and satisfaction. Their results show the positive effects of graphic elements adding an emotive layer to textual communication.

We would like to express our gratitude to the persons who have joined the Editorial Board this year and to those who have served as referees for the manuscripts submitted to the journal. We all know that it is an anonymous yet necessary help they provide to the community and the Journal, ensuring with the carefulness and generosity of their help a good feed-back to authors and a good quality of the material that makes it to publication. Their work will not be appreciated enough. We also would like to thank the scholars who have chosen PNJ as scenery from which their work can be disseminated, and our readers, for their attention.

Sincerely,

Luciano Gamberini,
Anna Spagnolli

Virtual enclaves or global networks? The role of Information and Communication Technologies in development cooperation

Iginio Gagliardone ♠♦

♦ UNESCO
International Institute for Capacity Building in Africa –
Addis Ababa (Ethiopia)

ABSTRACT

This article investigates the evolution of the struggle for bridging the digital divide in developing countries. Taking into account tendencies that have been registered in disciplines other than development, such as urban sociology and social psychology, the author demonstrates how a frequent over-estimation of the potential of Information and Communication Technologies (ICTs) has influenced the previsions about their impacts and led to results and phenomena different from the expected ones. ICTs have been perceived more as a black box that can produce the same effects everywhere, independent from pre-existing cultural and socio-economic contexts, than as an open artifact, capable of integrating local needs in their functioning mechanism and being adapted according to different conditions of use.
Nevertheless 10 years have passed since the first pioneers launched their projects for reducing the digital gap and new approaches have emerged since then. ICTs are more and more at the heart of the strategies developed by international organizations for providing a better future to new generations and a new consciousness has emerged as a result of the many errors. The article describes some of the new approaches in the fight against the digital divide, explaining how they have a better chance to success and bring digital equity.

1. Introduction

This year is the tenth anniversary since the expression 'digital divide' was developed for defining the moral challenges of, and political responses to, the uneven diffusion of Information and Communication Technologies (ICTs) around the globe and among different social classes. First coined by the Clinton administration, the term was initially

---

♠ Corresponding Author:
Iginio Gagliardone
UNESCO International Institute for Capacity Building in Africa, Addis Ababa (Ethiopia).
E-mail: paleld@libero.it

used for internal purposes, framing actions aimed at calling on board the highest number of American citizens in the miracle Information and Communication Technologies were about to promote in the country[1]. Conscious that the power and value of networks is the result of the number of nodes that compose them[2], the fighters against digital exclusion were moved not only by their moral understanding, but by the perception that the highest number of users corresponded to the better performance of the new system. A similar vision, based on the mix of the right to access ICTs and economic growth ICTs could promote, is what has inspired the progressive exportation of the concept of digital divide outside U.S. borders, starting a new era of a "computer assisted" fight against poverty.

This article will investigate how the approach to the digital divide as a global challenge has changed in the past ten years. It has shifted from a technologically driven conception of development – the idea that poor counties should be equipped with ICTs to join the economic miracle that has been benefiting the industrialized world – to the less inspiring but more pragmatic conception of technology as a component of a more long-term development process.

The analysis of the main changes in the "ICT for Development" framework will take into account the tendencies that have been reported in other disciplines that have explored the impact of ICTs in different aspects of modern life, from social interaction to urban development. This exercise will help the reader in understanding the patterns that have characterized the investigation of the impact and potential of new technologies. I will demonstrate how a common idea of transformation brought up by technology has often caused an over-estimation of ICTs' real effects, partially mitigated only by case study research.

2. Before the digital divide: vanishing cities and vanishing bodies

In the past ten years many scholars have expressed their views and concerns on the risks of the digital divide and official documents have often incorporated recommendations on how to use ICTs for development[3]. Some formulas have been

---

[1] The apex in the fight against digital exclusion in the U.S. was reached after the publication of the Department of Commerce's report *Falling through the Net* (NTIA, 1999). The study demonstrated how the irregular diffusion of the Internet could have widened the gap among classes, thus requiring additional interventions by the government. This policy has completely changed with the Bush administration, more inclined to leave to the market the role of reaching who has been left behind by the Information Revolution.

[2] In 1973 Robert Metcalfe, the inventor of Ethernet, proposed an equation for showing how the value of a network increases exponentially with the increase of the number of its nodes. Metcalfe's Law states that the value of a network equals approximately the square of the number of users of the system . The equation is $V = n^{(n-1)}$ where n is the number of nodes of the network (see http://en.wikipedia.org/wiki/Metcalfe%27s_Law).

[3] See, among others, the Final Report of the Digital Opportunity Initiative (2001); African Information Society Initiative (AISI): an action framework to build Africa's information and communication infrastructure, published by the Economic Commission for Africa (1996); Challenge to the network:

elaborated on how to prepare efficient and promising information systems[4] and sceptics had the floor for expressing their doubts on the real potential of information and communication technologies[5]. They argue, for example, that there is a strong need to first address the most basic challenges poor countries have to face (such as access to water, primary education, HIV/AIDS, etc.), before jumping to the wiring of cities and villages.

There is no doubt, however, that the initial enthusiasm for the contribution new technologies could provide to the wealth of developing countries has progressively been substituted by a more cautious approach to the topic. It can also be argued that while ICTs remain at the centre of a revolution that many have compared to the one provoked by the 'automobile-highways-petrol system' [6], the lesson on over-estimating the impact of ICTs could have been learned far in advance. Political economists and technocrats should have looked to what was happening in other disciplines that had been dealing with the use and effects of ICTs.

An interesting example can be taken from urban sociology. At the beginning of the Information Revolution, a long-time before the invention of the World Wide Web in CERN[7] would have boosted the diffusion of the Internet on a mass scale, the idea that new technologies would provoke the end of the city was one of the most popular and fascinating within the discipline. New technologies were perceived as a means for generating a more sustainable and human-compatible system where people could tele-work from cottages in the countryside and interact without enduring the burden of overcrowded metropolis.

As Graham and Marvin (1996) pointed out through an attentive analysis of the literature on the future of the city, it is mainly the immaterial essence of telecommunications that has nourished these utopian visions that human beings would be liberated from their obligation to be components of the urban scenario and become intelligent nodes of a pulverized global network. Marshall McLuhan can be seen as the initiator of this tradition. In 1964 he predicted that the emergence of his global village would have meant that the city "as a form of major dimensions [had to] inevitably

---

Internet for Development by the International Telecommunication Union (1999) and the 2001 UNDP Human Development Report. Making new technologies work for human development.

[4] Many international organisations such as the United Nations Educational Scientific and Cultural Organisation (UNESCO), the United Nations Development Programme (UNDP), the International Telecommunication Union (ITU) and the World Bank have produced manuals and "cookbooks" on how to introduce ICTs into different aspects of economic and social life, from a guide on how to install and maintain a telecentre to how to write laws related to the use of ICTs. Most of these documents are available on the websites of the organisations listed above.

[5] The most recent and aggressive critique to the failure of ICTs in promoting development in poor countries comes from The Economist (see Vol. 374, N. 8417, March 12-18 2005)

[6] See, for example, The Information Age: Economy, Society and Culture (Castells, 1996)

[7] The CERN (Conseil Européen pour la Recherche Nucléaire) is where Tim Berners Lee started his internet-based hypermedia initiative for global information sharing, that in 1989 led to the invention of the World Wide Web (WWW).

dissolve like a fading shot in a movie" (McLuhan, 1964). In 1968, Melvin Webber stated that "for the first time in history, it might be possible to locate on a mountain top and to maintain intimate, real-time and realistic contact with business and other societies. All persons tapped into the global communications network would have ties approximating those used in a given metropolitan region" (Webber, 1968). And the futurologists Naisbitt and Aburdene, riding a wave of excited speculation in the late 1980s and early 1990s about the future Information Society, saw "a new electronic heartland of linked small towns and cities as laying the groundwork for the decline of cities". Anthony Pascal (1987) extrapolated this logic, arguing that:

> *"The era of the computer and the communication satellite is inhospitable to the high density city. What once had to happen in the city can now take place anywhere. With the passage of time [will come] spatial regularity; the urban system converges on, even if never quite attains, complete areal uniformity. The newly emerging technologies will soon begin to provide excellent substitutes for face-to-face contact, the chief remaining raison d' être of the traditional city" (Pascal, 1987, p.602).*

In contrast, Graham and Marvin demonstrated through their impressive analysis in *Telecommunications and the City (1996)* and *Splintering Urbanism* (2001) that the diffusion of telecommunication has rather encouraged the opposite phenomenon. The concentration of human and economic capital in huge metropolis, where the production of value and innovation is more and more taking place, has actually been further accelerated thus disconnecting global peripheries and suburban areas from the creation of wealth and knowledge.

It can be argued that behind the rhetoric of the dissolution of the city lies the belief that technologies are the raw materials used for building a world that can progressively substitute the previous one, assembling a new system with its own rules that does not necessarily have to adhere to the features of the previous one. The same idea of leaving behind the material past for embracing the new opportunities disclosed by technology is what has also characterized the initial researches in Computer Mediated Communication (CMC), which is essentially the social interaction among individuals through computers connected together. Most of the first explorations in this field have been carried out by social psychologists in laboratory settings with the aim of verifying

how efficient a team could be without sharing the same physical environment[8]. Lee Sproull and Sara Kiesler (1992), among others, pointed out how in CMC systems the lack of information on the social and physical background of the participants was encouraging more audacious behaviour and greater participation, thus equalizing the status of the participants.

These findings have also been sustained by the first academic journeying in virtual environments, such as Multi Users Dungeons (MUD), chat lines and Massive Multi-players On-line Role Playing Games (MMORPG). As Sherry Turkle (1997) has underlined through her first experiments of virtual ethnography[9], CMC systems allowed people for the first time to recreate multiple on-line personalities independently from their social and economic background and from their physical appearance. However, recent research has demonstrated how difficult it is to leave behind social and physical cues when part of more complex computer mediated interactions. According to Lea (2005) off-line social cues could be deduced or reproduced in a different way while connected to CMC systems but continue to be "attached" to users: they could be performed in a different way according to different social contexts, but they cannot just disappear. This is evident when we move apart from specific laboratory settings or game-playing scenarios that encourage and require in a way the creative reproduction of virtual personalities and behaviours and we shift to long term on-line presence, tracked by actions such as work correspondence, e-buying, registration to news alerts and mailing lists, etc.

These brief excursions in various disciplines demonstrate how the fascination stimulated by new technologies, rather than their real potential, has often influenced the initial research on the future impact of ICTs. It can be argued that in some cases sociologists and urban planners have approached the prediction of a technological future with a style more familiar to science fiction writers than to academic scholars. Science fiction worlds are not assembled completely from the scratch, but rely mainly on the capacity of socio-technical elements embedded in a given reality to evolve according to their potential, disconnecting them from the friction provoked by history and other social variables. Social and political theories instead have to take into greater account the force of gravity exerted by economic, cultural and social contexts, which, if

---

[8] These researches were primarily aiming at identifying the main differences between CMC systems and Face to Face interaction, considered intrinsically richer in terms of bandwidth, and increasing the productivity of groups interacting through computer networks for work related purposes.
[9] Virtual ethnography, a methodology developed in the early 90s, is based on a spatial metaphorization of cyberspace. It deals with Usenet newsgroup, chat lines, mailing lists or weblogs as places that can be explored by the researcher in a participatory way.

technology were to take off as hoped, constitute the preconditions for the effective development of functioning human-technology systems[10].

3. ICT for Development: a global solution or a localized support to poverty reduction?

A main critique of the first pioneers who exported the concept of digital divide outside the U.S. is that the idea of ICTs they had in mind was much grander than the mere technology. Embedded within the new tools there were also the uses people belonging to a particular culture and socio-economic context were making of them. As Castells reminds us, the Internet as we know it, anarchic and a-centric, was created by the singular mixture of Big Science, military research and a culture of freedom that could not be found anywhere but in the American West Coast. New information tools found their place within a given scenario that was characterized by massive investments in research and development, a corporate culture open to innovation, alternative movements eager to use computer for changing the world and rampant economic growth. These tools thus contributed to further accelerating the phenomena that were already taking place. These elements, and the many others that have contributed to the success and further development of electronic networks, are far from being common in most of the places on earth[11]. The problem is that all these factors have been condensed in technical artifacts that at a first glance could appear easy to use and capable by themselves of producing great things, but in a way that is simultaneously obscuring the systemic nature of these artifacts and the preconditions needed to put them to work. Some of the promoters of the propulsive role of technology forgot that "a

---

[10] In the case of the Information and Communication Technologies science fiction has played an important role in defining possible scenarios that in part have inspired both applied and academic research. As Lawrence Lessig writes in the introduction of his Code and Other Laws of Cyberspace (1999) sometimes science-fiction writers have the ability to capture phenomena that help the understanding of our world, positioning us in unusual perspectives. At the same time it is interesting to notice how a genre like the cyber-novel, that had its major names in William Gibson and Bruce Sterling, has progressively declined – not only in terms of selling but also in its creativity and appeal – with the progressive expansion in the real world of the same technologies used by the authors for building their imaginative worlds. In a way this demonstrates how fascinating are the potentials embodied in a given technology but how less inspiring is a technology when it reaches its maturity.

[11] Another interesting perspective of the risks of exporting technology in different context is the one of Cultural Attitudes towards Technology and Communication (CATaC). Charles Ess, for example, addresses the issue of the supposed democratizing power of ICTs and how this is impacting in non-Western Cultures. "During the 1980s and 1990s in the Western world, much of the moral imperative for the development and distribution of Computer-Mediated Communication (CMC) technologies such as the Internet and the Web derived from Marshall McLuhan's utopian vision of an "electronic global village." This wired village presumed that these technologies were accessible, culturally neutral, and communicatively transparent to all the peoples of the world: as such, CMC would facilitate the realization of ostensibly universal ethical and political values - equality, freedom of expression, democratic governance, and, of course, economic prosperity as the result of radically free and global trade. As the events of September 11, 2001, made tragically clear, however, Western - specifically American - visions of the Good, the True, and the Beautiful are not always as manifestly universal in their scope and validity as their proponents tend to assume. On the contrary, Western emphases on material prosperity through capitalism and free trade are seen - with considerable justification - to have enormous human and social costs, beginning with increasing problems of mal-distribution of important social and economic resources, as the gaps between rich and poor grow both within the United States and between the developed and developing nations. A particular reflection of these gaps is the "digital divide," the split between the *information* haves and have-nots. At a still deeper level, contemporary Western models are called into question as continuing forms of colonization, i.e., the imposition, through subtle and gross forms of force and coercion, of economic and political arrangements that both contradict and override the traditions, values, practices - indeed, the very identity - of diverse peoples and nations" (Ess, 2004).

technology is successful only when society is in the position to accept it" (Graham & Marvin, 1996).

3.1 The rhetoric on the ICT impact on economic growth and democratisation process

As a comprehensive study commissioned by the Organisation for Economic Co-operation and Development (OECD) pointed out, technology is only a part of a much broader range of changes that helps economies to enhance their performance. Firm-level research has showed that "the complementary factors which were found to have significant influence were: human capital, a firm's experience in innovation, its use of advanced business practices and the intensity of organisational restructuring" (OECD, 2004). Some of these elements have not been fully integrated into the corporate and innovation cultures of firms in many OECD countries, which have failed to provide evidence of productivity gains received from investments in ICTs. It easy to understand that if important factors such as those mentioned above are lacking in some of the most developed countries, the situation in poor economies is clearly worse[12]. A long process has to be undertaken in these countries for promoting a culture more open to research, innovation and change, before ICTs could possibly start to provide developmental effects in broad areas of economic and social life.

Also in the case of the popular idea of the democratisation effect of ICTs and of information in general[13] – promoted by futurologists such as Alvin Toffler – there are many counter-examples that demonstrate how the diffusion of new media in authoritarian and semi-authoritarian regimes is not directly promoting more open environments and democratic processes. The most famous cases can be found in countries like China and Iran, which, while strongly promoting the use and diffusion of ICTs for gaining a technological primacy in their respective areas of influence, are at

---

[12] OECD researches on the impact of ICT have demonstrated that, within a favorable environment, characterized by the ability of firms to absorb new technology, the introduction of new workplace organization and the availability of relevant know how, ICTs can foster growth:
– Through capital deepening, as ICTs are an important asset in overall business investment;
– Through multi-factor productivity (MFP) growth in the production of ICT goods and services;
– Through MFP growth thanks to the use of ICTs, either through efficiency gains in individual firms, or through network/spillover effects from ICT use (OECD, 2004).

[13] Arising from the struggle for the liberty of the press, there is a broad and deep body of European and American scholarship on the role of information in democratic and transitioning societies. Some of its most prominent early thinkers include Thomas Jefferson, John Milton, Thomas Paine, Jeremy Bentham, Alexis De Tocqueville and Max Weber. Various aspects as to how freedom of information is a natural right and how state censorship facilitates despotism and silences the truth have been put forward solidifying the role of a free media in general as an essential component to modern democratic society. A number of more recent social scientists, such as Robert Dahl (1971), Barrington Moore (1966), Robert Putnam (1993) and Joel Migdal (1988), have made substantial contributions to this area of study. In addition, international organizations such as the World Bank with its report *The Right to Tell* (2002) endorse the idea that information plays a fundamental role in promoting political accountability through increasing transparency. Similar scholarship has also been put forward by Amartya Sen (2000) and Joseph Stiglitz (2003), who argue that individuals and governments have asymmetrical information - increased information and transparency thus improves the ability for citizens to reduce this asymmetry and promote accountability.

the same time constraining the potential of ICTs bringing additional opportunities for empowering opponent groups and promoting a more democratic debate. However, as Cherian George (2005) has demonstrated in a recent article on the Internet's political impact in Malaysia and Singapore, it is not only strong state censorship and control that is hampering the flourishing of democratic arenas for free and fair exchange of ideas, but it is also the absence of a pre-existing tradition of social and political activism that is hindering the use of the Internet and other media for fuelling the public debate. In reality, as stated by Pippa Norris (2001), rather than the Internet creating new active citizens eager to take part in political and social life it has merely activated the ones already active by giving them new instruments for pursuing their goals.

3.2 Reducing the scale

If we shift our focus from states and regions to more limited areas and sectors, many ICT based projects seem to have provided an important contribution in improving the living conditions of individuals and communities in developing countries. In this sense the fighters against digital poverty have to be credited for the role they played in including the digital divide on the development agenda. They have activated different actors, from donor agencies to international organizations and NGOs, strengthening their commitment in the application of ICTs in their development programmes. The market of projects aimed at reducing the information gap has grown exponentially. "The social and commercial 'venture capital' element of the first experiences has been very positive and has generated huge amounts of essential knowledge. [The approach of] 'Let's try everything and see what works' has produced a lot that works" (Spence, 2003).

In the past ten years there has been a proliferation of applied research/pilots in poor communities or with organizations working directly with the poor. They have focused on livelihoods, education, health, community development and other sectors. Most of this applied research has been supported from the perspectives of ICT specialists and practitioners, who understood or predicted the large impact of ICTs earlier than most, and were in the position to carry out core technical parts of projects and investments. In the case of these kinds of projects we can find a plethora of successful examples, from the trade sector to health and education.

In the case of the application of ICTs to trade and commerce, great results have been achieved through initiatives such as the Virtual Souk or PEOPLink. They offer a valuable service to artisans in the Middle East and all over the world in selling their

handmade items on-line while showing their cultural richness. Artisans are trained to use e-commerce platforms to create their own web catalogue and get in contact with the global community on the Internet. As stated on the PEOPLink's website "this coordinated yet direct connection dramatically reduces the cost of the transaction by bypassing 2 or 3 levels of middlemen, thereby at least doubling the income that stays with the artisans for their handworks"[14].

Health has also been one of the sectors that has benefited most from the introduction of ICTs. In Peru, for example, Engineers without Borders has activated a network of health-posts connected together and to hospitals in main cities through wireless communications for providing real-time diagnosis for people leaving in remote areas where there is shortage of qualified medical personnel. Geographic Information Systems (GIS) and databases have exponentially increased the capacity of creating maps that show patterns of diseases and help understand the schemes of epidemics.

Telecentres installed by small NGOs or international organisations such as the United Nations Educational Scientific and Cultural Organisation (UNESCO) in remote communities have empowered people in rural areas to share information on issues relevant to them, to learn through the Internet and to produce local content for the Web.

All these projects share the common feature of being highly intensive in terms of human capital, training and specialization. To be effective, emphasis must be limited in scope, restricted to geographic areas where people can share a common vision on how to implement the new tools and on focused and intensive training on how to make the best use of ICTs.

At the same time, problems arise when these localized experiences are scaled up on too wide of a scenario. Thus, new technologies are used without adequate contextualization and are applied as stand alone systems that by themselves cannot provide a solution to a problem more rooted in the social cultural and economic background of a country. A good example of the risks of using the newest technologies in contexts not prepared to accept and make a proper use of them can be taken from an education programme recently launched in Ethiopia. The programme, known as Schoolnet, consisted of the installation in every secondary school across the country of Plasma TV sets that can receive, through a satellite communication, school lessons broadcasted in English on 8 different channels from the capital Addis Ababa. More than 600 schools were equipped with TV sets and dishes and 161 were provided computer laboratories. The reasons that pushed the government to start this enterprise were,

---

[14] See www.peoplink.com

according to the former Minister of Education Gennet Zewdie, "the lack of qualified teachers in secondary schools, the poor quality of education provided to secondary students and the necessity to improve students' command of English". But the results are far from the ones expected. Apart from the frequent power failures, malfunctioning Plasmas that have never been repaired and the high maintenance the system requires, the main problems relate to students' understanding of the lessons, both for their format and content. Most of students barely speak and understand English, lessons cannot be interrupted and the time for taking notes is too short. In addition, in remote areas some people have never seen a normal TV set and the system still appears obscure to them. Technology has not brought the expected improvements in the quality of education[15] and even if for the first time it could be said that everyone in the country has the same learning opportunities independent from where she or he is located, most of the students have not been adequately prepared to benefit from this opportunity. Thus, if the synchronization effect produced by the globalization of markets and communication has made available the newest technologies also for the Least Developing Countries including secondary schools in Ethiopia, it doesn't mean that there are the conditions for making adequate use of them.

4. Future scenarios

The previous examples, taken from various disciplines and sectors, account for a very simple assumption: the risk of focusing on single, even if astonishing, products and events generated by the diffusion of ICTs and generalizing them on a wider scale. If a professional can decide for the first time in history to live on a remote mountain while keeping in contact with friends and colleagues and being updated on what happens all around the world, this won't mean that cities will lose their citizens and other people won't need to move to urban areas for finding jobs and participate to the creation of knowledge and value. Similarly if it's possible to invent new personalities on the Net and leave to the new characters the role of interacting with other people, this won't mean that everyone will use this opportunity or will be in the conditions of using it 24 hours a day, leaving behind his/her body and identity for ever. And if a telecentre, a web catalogue or an e-learning program has been successful in expanding the opportunities of particular groups or categories of learning, earning money and communicating, this won't mean that these new projects will impact the economic performance of a whole country or allow it to join the Knowledge Era.

---

[15] See the Joint Review Mission Reports 2004 and 2005, commissioned by the Education Working Group of the Development Assistance Group (DAG) in Ethiopia (http://www.dagethiopia.org/education.aspx).

This, of course, doesn't negate the great transforming power that resides with ICTs. It contextualizes them as a component of a transformation that could not be driven by technology itself. As it has been claimed by Actor Network Theory, every configuration of elements has different characteristics that have to be carefully taken into account for reaching the expected results[16]. The same component in a different scenario could produce effects completely different from the one experienced in the past, but not necessarily in a direction beneficial for the new situation. These effects could be virtually embodied in different human, social and technical nodes of a network but are actualized only by the combination of the two (or of the many) as part of a new organism generated by their assembling.

Ten years of computer assisted development programmes and the fight against digital exclusion have produced a deeper understanding of the problems brought by the digital divide. After the enthusiastic endorsement of new technologies as a driving force for reducing poverty, more cautious and/or localized approaches have emerged. Among the many, three of them can be addressed as the prevailing ones.

The first one aims at providing technical high-level solutions for problems experienced in developing nations. Instead of exporting and applying the same artifacts produced in the industrialized world in different cultures and countries characterized by low levels of e-literacy, wealth and innovation, specifically adapted and tailored tools and solutions that can directly address the needs of the poorer need to be produced. Bill Gates has been one of the first who followed this path, but in a sector that has nothing to do with operating systems and office applications. His foundation in fact has been involved mainly in the health sector, sponsoring a model that strongly differs from the one usually adopted by cooperation agencies. It consists not in the building of – usually low quality – hospitals and clinics in Africa or Latin America, but in the strengthening of the research in the best laboratories of the developed world for finding vaccinations and medicines for diseases that almost disappeared from rich countries but still cause millions of deaths among the poor- such as malaria, infectious diarrhoea and acute respiratory infections[17]. In the ICT sector a similar approach has been recently

---

[16] When not all the interconnections among elements are taken into account the results of actions could be strikingly different from the expected ones. The following story illustrates why this is so important. In the early 1950s, the Dayak people of Borneo suffered from malaria. The World Health Organization had a solution: it sprayed large amounts of DDT to kill the mosquitoes that carried the malaria. The mosquitoes died; the malaria declined; so far, so good. But there were side effects. Among the first was that the roofs of people's houses began to fall down on their heads. It seemed that the DDT was also killing a parasitic wasp that had previously controlled thatch-eating caterpillars. Worse, the DDT-poisoned insects were eaten by geckos, which were eaten by cats. The cats started to die, the rats flourished, and the people were threatened by potential outbreaks of typhus and plague. To cope with these problems, which it had itself created, the World Health Organization was obliged to *parachute 14,000 live cats into Borneo.*

[17] On the other hand Microsoft Corporation is actively working for promoting its products in developing markets and in a way that could not be beneficial for developing nations. In fact, as many researches have demonstrated, the use of Free and Open Source Software (FOSS) could help developing countries in their struggle for digital development. In fact the low or null cost of FOSS, its capacity to be modified and localized

promoted by Nicholas Negroponte with his 100$ laptop. He managed to gather together some of the most important players in the IT sector to develop a product tailored on the needs of kids in developing countries but incorporating the most advanced solutions for reducing costs without constraining performances[18].

The second approach is the one promoted by international organisations and programs such as the African Information Society Initiative, the United Nations Educational Scientific and Cultural Organisation (UNESCO), the United Nations Development Programme (UNDP) and others. Their belief is that, while ICTs could be a fundamental ally in the fight against poverty, they require some basic preconditions and enabling environments capable of putting them to work for development. In this sense the efforts of these organisations have focused mainly on producing effective and tailor made policies and projects at the country and regional level, thus encouraging a comprehensive approach to communication and information. According to these organisations it is through education, public-private partnerships and major investment in research and development the diffusion of ICTs will be promoted to simultaneously encourage the growth of a culture open to innovation and creativity.

The third approach is more right-based and sees access to communication and information as a basic human right that governments and international organisations have to strongly promote and realise. This could be considered closer to the initial idea of digital-divide that centred mainly on the urgency of closing the gap between information haves and have-nots. However, the focus on components such as freedom of information, state censorship, and the concentration of media ownership has contributed to promote a deeper understanding of the functioning of media and ICTs as well as active solutions to the problems emerging in developing, particularly authoritarian, countries.

5. Conclusions

This article has demonstrated how the fight for bridging the digital divide as a global challenge has produced various, sometimes conflicting, approaches and solutions to the problem. It has also illustrated how the enthusiasm for the discovery of a new potential ally in poverty reduction has generated an excessive faith in the role ICTs could play in developing countries. Finally it has been argued how the translation of theories on the use of ICTs for development into concrete projects has re-oriented the

---

according to different needs, the model it promotes, that is based on the strengthening of local capacity and human capital could be a better solution for a large number of poor countries.

[18] For more detailed information on the *100$ Laptop,* visit http://laptop.media.mit.edu/

approach to the problem, producing effective examples of how ICTs can benefit communities and individuals on a small scale.

It is clear that ICTs can re-shape the way of working, learning and communicating not only in the rich world but also in poor countries. Nevertheless, up to now, the lack of adequate preconditions – such as a diffused culture of innovation, the availability of skilled human capital and a rich pre-existent media environment – has hampered the process of networking among the ICT-rich isolated enclaves that do exist within a country or region. Technological and information hot-spots are now flourishing everywhere, also in the poorest areas of the globe. What is still missing is a terrain conductive to their inter-connection, capable of transmitting their effects on a wider-scale and multiplying their influence outside limited borders. This terrain is made not only of wires and cables, but also of the needs of people and groups, the capacity to animate the new tools with local passions and aims and the perception of innovation as a support to local activities. On the one hand, technology has to be receptive and incorporate the requests coming from cultures different from the ones who firstly invented it. On the other hand, governments and international organisations in developing countries must further promote factors such as education, research and development and freedom of expression to adequately welcome these new technologies.

6. References

Castells, M. (1996). *The Information Age: Economy, Society and Culture. Vol. I.* Oxford: Blackwell.

Digital Opportunity Initiative (2001). *Final Report. Creating a Development Dynamic.*

Dahl, R. (1971). *Polyarchy; participation and opposition.* New Haven: Yale University Press.

Economic Commission for Africa (1996). *African Information Society Initiative (AISI): an action framework to build Africa's information and communication infrastructure.* Addis Ababa: UNECA.

Ess, C. (2004). *Computer-Mediated Colonization, the Renaissance, and Educational Imperatives for an Intercultural Global Village.* In Robert Cavalier (ed.), *The Internet and Our Moral Lives*, (pp. 161-193). New York: State University of New York Press.

George, C. (2003) *The Internet's Political impact and the Penetration/Participation Paradox in Malaysia and Singapore*, Working Paper No. 14, Singapore: Asia Research Institute, NUS.

Graham, S. & Marvin, S. (1996). *Telecommunications and the City: Electronic Spaces, Urban Places*. London: Routledge.

Graham, S. & Marvin, S. (2001). *Splintering Urbanism: Networked Infrastructures, Technological Mobilities and the Urban Condition*. London: Routledge.

International Telecommunication Union (1999). *Challenge to the network: Internet for Development.* Geneva: ITU.

Lea, M. et al. (2005). *A Social Psychology of the Internet.* London: Sage.

Lessig, L. (1999). *Code and Other Laws of Cyberspace.* New York: Basic Books.

McLuhan, M. (1964). *Understanding Media. The Extension of Man*. London: Sphere.

Migdal, J. (1988). *Strong Societies and Weak States*. Princeton: Princeton University Press.

Moore, B. (1966). *Social Origins of Dictatorship and Democracy: Lord and Peasant in the Making of the Modern World.* Boston: Beacon Press.

Naisbitt, J. & Aburdene, P. (1991). *Megatrends 2000. Ten Directions for the 1990s.* New York: Avon Books.

Norris, P. (2001). *Digital Divide: Civic Engagement, Information Poverty, and the Internet Worldwide.* New York: Cambridge University Press.

Organisation for Economic Co-operation and Development (2004). *The Economic Impact of ICT. Measurement, Evidence and Implications*. Paris: OECD Publication Service.

Pascal, A. (1987). The vanishing city. *Urban Studies*, 24, 597-603.

Putnam, R. et al. (1993). *Making Democracy Work: Civic Traditions in Modern Italy*. Princeton: Princeton Paperbacks.

Sen, A. (2000). *Development as Freedom*. New York: Anchor Books.

Spence, R. (2003). *Information and Communications Technologies (ICTs) for Poverty Reduction: When, Where and How?* Ottawa: IDRC.

Sproull, L. & Kiesler, S. (1992). *Connections: New Ways of Working in the Networked Organization*. Cambridge: The MIT Press.

Stiglitz, J. (2003). *Globalization and its discontents*. New York: W.W. Norton & Company.

The Economist (2005, March), Vol. 374, N. 8417, pp. 12-18.

Toeffler, A. (1990). Powershift : Knowledge, Wealth, and Power at the Edge of the 21st Century. New York: Bantam.

Turkle, S. (1997). *Life on the Screen: Identity in the Age of the Internet*. New York: Touchstone.

United Nations Development Programme (2001). *Human Development Report. Making new technologies work for human development.* New York: UNDP.

Webber, M. (1968). *The post-city age. Daedalus*, 97: 1091-1100.

World Bank (2002). *The Right to Tell.* Washington: WBI Development Studies.

Gender differences of the Internet-related stereotypes in Russia

Olga V. Mitina [♦], Alexander E. Voiskounsky [♠♦]

[♦]Psychology Department, Moscow State University after M.V.Lomonosov
Moscow (Russia)

ABSTRACT

Gender stereotypes of Russians toward the Internet were investigated, using multiple identification methodology. The questionnaire (45 items) catalogued various types of Internet-related behaviors. The following characters were evaluated: Typical Russian, Ideal Person, Internet User (all – female and male), and Myself. Respondents (N = 95, 47/48 males/females, mean age 22.9, s.d. 2.8) indicated the degree of likelihood that the characters conduct behavior of each type. Eight scales of the Internet use were selected: (1) profession and business, (2) education of children, (3) entertainment, (4) realization of personal goals, (5) compensatory, (6) cognition, (7) advanced work, (8) communication. Confirmatory factor analysis and nonlinear multiple regression were used to handle data. Results show that men's and women's self-stereotypes and gender stereotypes are close, especially on the self-reported upper levels of competence in the Internet use.

---

1. «Gender divide» in the Internet use and related issues

Gender aspects of the Internet use are being widely investigated (Jackson et al., 2001; Kennedy et al., 2003; Morahan-Martin, 1998). This is due to a considerable increase of girls and women in the world-wide Internet audience. As long as a decade ago, there were rather few females competent in electronic telecommunications, as well as web-sites organized by women and/or aimed at females as the target group.

The global "gender divide" problem (i.e., uneven presentation of females and males on the Internet) is evolving. While in some agricultural zones the earliest slogans are still in use (e.g., "females are welcomed to the friendly Net"), more diverse "gender divide" problems are characterizing advanced industrial areas. In case Internet-related behaviours are subject of ideological restrictions, the regulations rarely favour females' activity in the net use. Thus, the "gender gap" is of a multi-aspect nature. It is worth to

---

[♠] Corresponding Author:
Alexander E. Voiskounsky
Psychology Department, Moscow State University after M.V.Lomonosov
Mokhovaya st. 8/5, 103009 Moscow, Russia
Phone: +7(095) 291-97-51
E-mail: vae-msu@mail.ru

name only briefly several aspects, which will not be discussed in the Sections of the paper to follow.

The "generation gap" problem is multi-aspect itself (older people are underrepresented, adolescents tend to outnumber grown-ups in the Internet audience, etc.). Overlapping the "gender divide", one can expect exclusively young populations of females to be evenly presented on the Internet.

Accepting the "educational gap", one might expect that less educated people are less likely to use computers and the Internet. In the "gender divide" perspective, the expectations are correct, taken primarily developing countries. On the contrary, in many developed countries there are more high school- and college-educated women than men, though males mostly outnumber females within the national Internet audiences.

The "demographic gap" means that members of small nations represent too limited audiences to communicate and/or to develop websites using the native tongues. Thus, participation both in global and in local Internet-related activities is the prerogative of fluent speakers and/or competent readers of foreign languages, primarily English. Back to the "gender divide", there seems to be no universal rule: most often males are better taught, though in some ethnic groups females get better education; also, there are nations where foreign language education is not gender-bent at all.

The "life-style gap" includes obvious gender differences. For example, men are usually more mobile than women, and have a greater need for a mobile access to the Internet. Also, males tend to pursue risky behaviours, and are more likely to disobey restrictions both in accessing and developing websources containing unfriendly, illegal, or forbidden information. We will not go into details of many other life-style gender differences.

2. Gender Divide: An Overview

There are two main approaches toward bridging the gap of uneven presentation of females and males on the Internet. First, females should follow males who are many (at least several) steps ahead, and should make their best to reach the same level of the Internet use. Second, females and males execute differing and gender-specific styles on the Internet, and these styles will never be the same; moreover, gender-related styles of the Internet use are going to vary stronger and stronger. Both approaches are presented in the research literature.

2.1 Gender and Geo-Economics of the Internet Use

It is certainly useful to take a brief look at various geographical and economical areas on the globe from the perspective of the Internet use. In the USA, according to the Nielsen//NetRatings, female users outnumber male users since April, 2000. In Australia, the proportion of women and men on the Internet is nearly the same, even in rural areas (Singh, 2001). In the Western Europe and in Russia women are underrepresented in the total Internet audience: they compose 42% European users (Nielsen//NetRatings, May, 2003), and 41% Russian users – in this case, taken only adult population (see quarterly measures at www.fom.ru/projects/23.html). The number of females using the Internet slowly increases in some developing countries (for example, in India, Malaysia, or Brasil); it is reported that in Malaysia the females' attitudes towards the Internet and their willingness to learn and use information technologies is not different from that of males' (Awang & Jaffar, 2004). Contrary to that, the Internet is almost totally inaccessible for females in the most poor countries (Hafkin & Taggart, 2001). Also, it is not too widely accessible in these countries for males.

Ethnographic data show that poverty, lack of education, and dependence on men make it difficult for females in developing countries to start using computers and the Internet. In Asia, aside from the 'tiger' countries, "on the Internet, male perspectives and voices dominate over women's, who have neither taught nor trained to use this medium" (Bautista, 1999, p. 175). In Africa "it seems that women are particularly shy, even scared, of technology, and it takes quite some time before they will dare to try and use it" (Alloo, 1999, p. 157). This shyness is far from being universal: female college students in China have less access to computers than female college students in the UK, but nevertheless their expressed attitudes toward information technologies are more positive (Li et al., 2001). Progress is reported in Latin America (Burch, 1999), and especially in the Caribbean: "no significant difference in the degree of private use by males and females" was found in Trinidad (Miller & Slater, 2000, p. 49).

It would not be incorrect to state that one of the major tendencies of overcoming or decreasing the Internet-related problem of "gender divide" is dependent on economic growth and on progress in education of both females and males. Other tendencies deal with changing human attitudes and public stereotypes – either widely spread and in a way universal, or culture-specific. In the discussion of some of these attitudes and stereotypes to follow, we will partly refer to social norms and traditions, popular views,

or narrative descriptions of the "state of the art" in the field. The terminology should not be confusing, since social rules, prejudices and views have specific mental representations, which might be referred to under the heading of stereotypes. Our empirical research (see Sections 3 and 4) is dealing with the representations of these stereotypes.

2.2 Gender and Science/IT Education

In the developed countries the "gender divide", or the "gender gap" is more of a qualitative nature: girls and boys, women and men use the Internet differently (Jackson et al., 2001; Kennedy et al., 2003; Wallace, 1999). To sum up the expressed views, we may tell that compared to males, females feel greater anxiety encountering high-tech facilities, are not encouraged to master computers, use less services over the Internet, tend to underestimate their own competence and overestimate males' competence in new technologies – as a female lecturer in computer science formulated it in an interview, "I think a key problem is the attitude of women towards men, we value men more highly than ourselves and think we can't do the job" (Adeboye et al., 2004, p. 168). Most of those who carry out gender studies regrettably note that schoolgirls express relatively little interest in sciences, including IT-related disciplines, and compared to schoolboys, are less likely to select IT as their future profession. These points have been thoroughly compiled, convincingly stressed, and negatively evaluated, in a report «Tech-Savvy: Educating Girls in the New Computer Age» (www.aauw.org/2000/).

If the problem is ignored, the gender gap will increase, and the whole field of developing hardware and software products and IT applications has all the chances to turn into a sort of a "men's club". Metaphorically, the efforts aimed at introducing females to the IT environments might look like that: a current "room for men" should be step by step turned into a "limited (possibly – more broad) room for women", and finally into a "shared room for men and women" (Corneliussen, 2004). Quite a number of educational programs and mentoring initiatives have been launched, aimed at presenting exact sciences, including the IT field, as a favourable career for a female, especially a gifted one (Adeboye et al., 2004; Armaroli et al., 2004; Lupart et al., 2004). Educators try to introduce advanced technologies at high school; it is for example expected that gaining the fundamentals of technical design in the virtual reality mode, which is a rare and positively estimated experience, schoolchildren, and especially schoolgirls will become active in entering engineering colleges (see:

www.cmi.k12.il.us/~vanwalpa/vrsavvy/vrsavvy.htm). These attempts might get some support from an obvious finding, that "when women are present in any significant numbers in an occupation … the work they do is likely to be valued less than the work undertaken in occupations or sectors of the economy in which men predominate" (Harris & Wilkinson, 2004, p. 82).

2.3 Gender Differences in the Use of Various Internet Services

Up to now, users of various services, including for example e-learning, e-communication and e-chatting, e-gaming, e-shopping, e-gambling, etc. realize that all these services are related to the Internet. Possibly, the development of the services will result in partial or full separation: communicators and gamblers, web navigators and gamers will be completely unaware that they use the same fundamental service, i.e. the Internet. Before it happens, it is possible to differentiate the gender divide problems characteristic for various Internet related services.

On the Internet, both females and males share interest to virtual communication and e-shopping; at the same time men have first hand in what might be called Internet-mediated cognition, and most certainly – in online gaming and gambling; men are the first to adopt new services, gadgets and facilities, while soon after that women follow them (Jackson et al., 2001; Kennedy et al., 2003; Morahan-Martin, 1998; Wallace, 1999). It is widely believed that males are much more likely than females to practice gender swapping (Bruckmann,1993; Suler, 1999; Turkle, 1995), and females – gender concealment, for example the choice of a neuter or plural gender in gaming environments (Jazwinski, 2001).

Mixed-gender group discussions and chats seem to be comfortable for females (Witmer & Katzman, 1998), though their roles are most often far from opinion leaders. While males dominate, enlarge their within-group status, share information and propose themes to discuss, females undertake gender-stereotypic behavior: try to save group stability, give support, keep social ties and emotional balance (Jazwinski, 2001; Morahan-Martin, 1998; Postmes & Spears, 2002; Wallace, 1999). Less often one can come across evidences that males and females happen to exploit similar group strategies, which are not gender-specific (Wade & Fauske, 2004). Anonymity and gender concealment make it easier for females to decrease the dangers of cyberstalking and/or online harassment, which are otherwise more than likely (Morahan-Martin, 2004; Wallace, 1999). Females presenting themselves through personal webpages are also aware of high likelihood to be drawn into unwanted

contacts (Miller, Arnold, 2001). Contrary to this, female activists and cyberfeminists view the Internet as a new environment to oppose male dominance and male chauvinism (Adam, 1998; Morahan-Martin, 2004; Plant, 1996).

Research held in Singapore showed that young (before 21) females write and receive e-letters more often than males of the same age, but in the most of the other recorded activities males take first hand, namely in downloading files and computer programs, and in web navigation; no gender differences were found in web shopping patterns (Teo & Lim, 2000). The latter finding is supposedly characterizing the local culture, since it is widely believed that though females are more frequent visitors to e-shops, males are more frequent buyers, due to the two main reasons: first, the majority of e-shops sell electronics, programs and books, all of which are purchased primarily by men; second, women enjoy purchasing non-standard pieces, thus they browse e-shops to compare characteristics and prices, but prefer to visit offline shops to purchase the selected pieces.

Online gaming has always been a "boy's club". Some time ago game developers and providers turned their special attention to female gamers. The latter group is growing, though females are far from being half of online gamers. The exact statistics is not exact and is a bit misleading: indeed, females buy games, but often for brothers, sons, husbands and boyfriends, mates, etc.; interesting, all girls report playing group games with boys, though boys never report they play with girls (Jenson, de Castell, 2004). Game developers make various attempts to produce "chess for girls" (Cassell & Jenkins, 1998), or a "girls' game": minimally competitive (e.g., soap opera like); with a brave female character (Lara Croft like); traditional or non-complicated, taking short time to master and to enjoy the gained results; ensuring dialogues and polilogues between gamers; with easy-to-use tools to select/construct pretty-looking avatars, etc. No one can tell for certain which of the directions is the most fruitful; moreover, unequal decisions might correspond to females of different age groups: researchers warn that "unlike boys who play 'for fun', girls who continue to play beyond adolescence aren't really, by their own accounts, 'playing' at all, they are 'de-stressing', relaxing, or passing the time when they are bored'…" (Jenson, de Castell, 2004, p. 232). To meet this continuity of females' attitudes towards computer/video/online gaming is a challenge indeed.

In a sense, the Internet is an "identity game" – it is sometimes tempting to transform one's identity, moving closer to either ideal, or fantastic, or anyway an alternative Ego. Also, it is easy, and it is only rarely blamed. Among the most popular identity games is

the so-called gender swapping (Bruckman, 1993), or gender bending (Jazwinski, 2001). Researchers, including also Turkle (1995) and Suler (1999), believe that it is mostly a males' game; females rarely dare to present themselves as males. Gender swapping has been a common enough game at earlier periods of the Internet use; hypothetically, it is less common nowadays. Anyway, "the motivations for gender bending are not well known" (Jazwinski, 2001, p. 183). A pilot survey has been held recently by Kathryn Wright (see: www.womengamers.com/articles/gender.html, and www.womengamers.com/articles/gender2.html): male gamers were anonymously questioned, if they ever created female heroes/characters, and why. All the open-end reports (full replies gave about 30 respondents) have been interpreted and classified, resulting in about a dozen supposed motivations. To sum up, it is easy to note that the studies held up to now are not numerous, and this is not a surprise, since current research methods are restricted to tiresome interviews and surveys; thus, it is difficult to deny that the gender swapping phenomena have not yet been thoroughly investigated.

2.4 Culture-Dependent Attitudes toward the Internet Use

Dependent on culture, educational settings and occupational perspectives, gender attitudes toward the IT use differ (Durndell et al., 1997; Durndell et al., 2000; Houle, 1996; Li et al., 2001; Wallace, 1999). According to some findings, gender differences in attitudes towards the use of computers and IT gadgets are not significant within populations of primary/secondary school pupils (North & Noyes, 2002; Subrahmanyam et al., 2000); thus, mechanisms of socialization might include older females' (probably, adolescents') disinterest, and obvious adolescent males' interest, in competent use of information technologies. This sort of interest and disinterest may be referred to "gender divide" stereotypes.

Australian researchers investigated pictorial gender-related representations in two types of printed media: they report, first, that computer magazines have now, unlike earlier times, become gender-balanced, and second, that in popular girls' magazines there are few or no ads, in which the IT use had been depicted; since the majority of young girls are not likely to look systematically through IT periodicals, they are equally not likely to pursue IT-related careers (Lang & Hede, 2004). Besides, both at home and at school females are known to yield to schoolboys, fathers, brothers, husbands, boyfriends, etc. who enjoy priority in access to computers (Burke, 2001). In anonymous mixed-gender group discussions gender stereotypes are easily activated, partly

dependent on the masculine vs. feminine nature and content of group tasks (Postmes, Spears, 2002).

Culture specifics of the Internet related behavior has not yet been thoroughly investigated. Besides, a probable culture/gender matching may undergo transformations, which follow the change of the female/male ratio within the community of users. Thus, at the every stage of culture/gender matching this is a promising field of research. It looks even more promising, taken Russia with its rapidly growing Internet audience (Voiskounsky, 2002). Up to now, no thorough work has been done on gender aspects of the Internet use in Russia. In this paper we present research on gender stereotypes of Russians toward the Internet use. It seems to be the first empirical research on the theme, thus the results can hardly be compared to any other previously gained data.

3. Research Goals, Method and Procedure

The aim of research was to reveal stereotypes and self-stereotypes pertaining to females and males, and related to the use of the Internet by people of both sexes. Since stereotypes may depend on the respondent's competence in the Internet use, one of the aims was to investigate this possible dependence. The target group was all those who already have some experience in using the Internet. Also, an adequate method of carrying out this sort of research had to be worked out.

To do the research, the psychosemantic technique of "multiple identification" was used (Petrenko, 1997). The method is widely enough exploited in Russia, and it has proved earlier to fit well the investigation of public consciousness and public stereotypes (Petrenko, 1997; Petrenko & Mitina, 1997; Petrenko & Mitina, 2001). In practice, it consists of respondents' assessments of the degree of involvement of the proposed characters, often including the respondents themselves, into this or that sort of activity, or identification of characters with these or that ideas, slogans, social movements, etc.

The questionnaire revealing gender stereotypes related to the Internet use (see Table 1) was based on the pilot studies carried out earlier. It included 45 questions comprising 45 different kinds of Internet-related activities.

The following characters were to be scaled by respondents: *Myself, Female – Permanent Internet User, Male – Permanent Internet User, Typical Russian Woman, Typical Russian Man, My Ideal of a Woman, My Ideal of a Man.* Most of these characters/roles (for example, *myself* and *typical man/woman*) are usual for research

done within the "multiple identification" paradigm. The latter two characters (i.e., the *ideals*) are often included in order to reveal prospective stereotypes, in this case – prospective gender stereotypes relating to the Internet use. Behaviour specific characters (i.e., *permanent Internet users*) are usually included when respondents distance themselves (*myself* character) from exclusively competent experts in the field.

The list of characters was restricted to the mentioned above ones in order to keep the duration of respondents' work reasonably short – less than an hour and a half. The respondents were to assess the degree of involvement of a given character, including themselves (the *Myself* character), into Internet-related activities by ascribing integer ranks from 0 to 6. The range of these ranks was defined as follows: 6 – *always*, 5 – *usually*, 4 – *often*, 3 – *occasionally*, 2 – *sometimes*, 1 – *very seldom*, 0 – *never*.

The respondents were 95 college students in Moscow, 47 men and 48 women (mean age 22.9, s.d. 2.8), recruited as volunteers. Research was administered in person (no groupwork was accepted) either at colleges during the brakes in classes, or in dormitories. The experimenter provided the respondents with a short instruction and replied possible questions; after that the experimenter provided the questionnaire check-list and refused to give any additional comment or advice. The survey was administered by Olga V. Nelipa, a graduate student of the Psychology Department, Moscow State University, in 2003.

To process the obtained data, the confirmatory factor analysis and multivariate nonlinear regression were used. The confirmatory factor analysis is a further development of factor analysis. It allows to decrease the dimension of the space of observed variables (the items of the questionnaire) due to their grouping in the more capacious latent factors (scales), and also to test the statistical significance and psychometrical validity of such a reduction. The analysis of respondents' replies in the terms of scales/factors retains the basic information of the primary data. The use of nonlinear regression permits to reveal the effect of the interrelations of different independent factors in their influence on the variables that they determine (Aiken, West, 1991).

4. Results and discussion

All the materials provided by individual respondents contained the full list of ranks and were accepted for subsequent work. Thus, we had 95 sheets, each containing 45 ranks pertaining to the each of 7 different characters.

4.1 Analysis of the adequacy of the questionnaire

We refused to factorize the averaged response matrix, to escape the loss of information. Indeed, every respondent fills in his/her individual matrix, and thus the set of all answers represents a three-dimensional data cube (Petrenko, 1997). The averaging of the response matrix leads to a reduction from a cube to a two-dimensional array, one dimension less. To avoid the loss we analyzed the replies of the respondents by columns, separately for each character. As a result we obtained seven different matrices corresponding to respondents' ranks for each character.

Having combined the first columns of individual matrices corresponding to the *Myself* character, we composed the matrix of self-assessments (SA), i.e. the answers of the respondents about themselves. This aggregated array was subjected to confirmatory factor analysis.

Building up confirmatory factor analysis model it turned out to be possible to distribute all the questionnaire items over the following scales (see Table 1): *Professional and business uses of the Internet, Internet-based education of children, Entertainments, Competent Internet use in order to realize personal goals, Compensatory Internet use, Cognitive uses of the Internet, Highly qualified use of the Internet, Internet-mediated communication.* The results show that all factor loadings are significant, and the theoretical model corresponds quite well to experimental data: in our case chi-square ratio to the degrees of freedom was equal to 1.91.

Scales: titles and content	Factor loads
Scale 1. Professional and business uses of the Internet (Cronbach's α = .94)	
1. Be employed at a company supporting Internet-interactions between the employees	.683
2. Use e-mail at the workplace to communicate with colleagues and clients	.851
3. Search on the Internet information relevant for the current work	.860
4. Organize web-presentations of one's professional activity or the activity of the company one is employed at	.744
5. Use of the Internet to realize one's professional activity (e.g., distant trade, education, consulting service, etc.)	.849
6. Search professional contacts with persons and organizations through the Internet	.723
8. Recruit new employees using the Internet	.496
9. Systematically visit educational web-sites	.617
10. Whenever information is needed, prefer web encyclopedia over printed copies	.742
11. Give preference to the Internet instead of visiting a library, whenever there is a need to find something out	.718
12. Use the Internet to get access to media	.741
13. Use educational web sources to enhance the level of one's education	.537
17. Correspond with friends and personal acquaintances via e-mail	.816
25. Read books on the web	.461
29. Use the Internet for planning out a tour	.430
Scale 2. Internet-based education of children (Cronbach's α = .91)	
40. Use of the Internet to assist one's child in writing an essay, a control work, etc.	.735
41. Train one's children to use the web-based educational resources	.962
42. Train one's children to use the Internet to gain any information	.925
43. Train one's children to use the Internet	.733
Scale 3. Entertainments (Cronbach's α =.57)	
26. Read humorous web-pages	.434
45. Use the Internet for entertainment	1.000
Scale 4. Competent Internet use in order to realize personal goals (Cronbach's α = .65)	
23. See movies on the Internet	.419
24. Listen to music on the Internet	.994
28. Use the Internet to make reservations for plane or train tickets.	.467
Scale 5. Compensatory Internet use (Cronbach's α = .74)	
30. Use the Internet to overcome real-life deficiencies and to realize the needs which can hardly be realized in real life	.270
31. Play various games on the Internet	.345
35. Visit religious web-sites	.893
36. Visit personal web pages of movie/show-business stars	.731
Scale 6. Cognitive uses of the Internet (Cronbach's α = .70)	
15. Be a distant student in a licensed Web college, school, etc.	.511
21. Visit museum web-sites	.980
22. View pieces of art on the Internet	.476
Scale 7. Highly qualified use of the Internet (Cronbach's α = .71)	
27. Go shopping over the Internet	.420
33. Have one's own web-page	.477
34. Track real events in sports, science, culture and politics, etc. over the Internet	.718
37. Visit web-sites to update the software	.609
44. Communicate over the Internet to the members of your own family living with you	.375
Scale 8. Internet-mediated communication (Cronbach's α = .58)	
16. Spend time chatting	.188
18. Use the Internet to gain new acquaintances	1.000
19. Seek on the Internet the one to become your future spouse	.616
32. Send out web cards	.377

Table 1: Content of scales and factor loads.

Reliability indices (Cronbach's alpha) for the scales of the matrix of *Myself* self-assessment can be considered satisfactory (see Table 1). Scales 1 and 2 are the most reliable (α > .90), and scales 3 and 8 – the least reliable, but even for these scales α > .50. Reliability indices for the rest of six matrices corresponding to the ratings of different characters are even higher. This fact can be interpreted in the following way: subjects' assessments of the alien characters are rather stereotypical and devoid of the elements of individuality; at the same time, in self-assessments these elements are supposedly inevitable.

Thus, the questionnaire was proved to be an adequate measuring tool.

4.2 Analysis of gender stereotypes and self-stereotypes related to the Internet use

The results of the analysis of gender differences in self-assessments of one's Internet-related activity and in stereotypical representations of various degrees of involvement of men and women into the activity connected with the Internet use are given in the Table 2. The means and standard deviations of respondents' replies on every character and every scale are given. The total score is the sum of ratings by all eight scales.

Scales titles		I myself				Internet-user Female				Internet-user Male			
		Females		Males		Females		Males		Females		Males	
		Means	Std.Dev	Means	Std.Dev	Means	Std.Dev	Means	Std.Dev	Means	Std.Dev	Means	Std.Dev
1. Professional and business uses of the Internet	*	3.30	1.16	2.66	1.40	4.60	0.60	4.32	0.81	4.70	0.69	4.44	0.71
2. Internet-based education of children	**	1.59	1.23	2.43	1.68	3.66	1.05	4.18	1.42	3.67	1.15	4.15	1.46
3. Entertainments		2.54	1.02	2.20	1.40	4.07	1.25	4.19	1.17	4.40	1.12	4.49	0.99
4. Competent Internet use		1.28	1.16	1.06	0.82	3.55	1.10	3.33	1.55	3.74	1.15	3.45	1.41
5. Compensatory Internet use		0.92	0.85	1.14	1.05	3.07	1.06	3.36	1.04	3.20	1.01	3.36	1.03
6. Cognitive uses of the Internet	*	0.54	0.65	0.97	1.09	2.94	1.06	3.04	1.41	2.92	1.08	2.88	1.40
7. Highly qualified use of the Intthernet		1.57	1.08	1.98	1.13	3.62	1.02	3.67	1.12	3.92	1.08	3.86	1.03
8. Internet-mediated communication		1.39	1.00	1.36	0.95	4.19	0.85	4.12	0.96	4.13	0.90	3.85	1.06
Total score		13.13	4.91	13.80	5.57	29.70	6.65	30.20	8.05	30.65	6.74	30.47	7.62

Scales numbers		Typical Russian Woman				Typical Russian Man				My Ideal woman					My Ideal man			
		Females		Males		Females		Males		Females		Males			Females		Males	
		Means	Std.Dev	Means	Std.Dev	Means	Std.Dev	Means	Std.Dev	Means	Std.Dev	Means	Std.Dev		Means	Std.Dev	Means	Std.Dev
1	**	2.04	0.88	1.57	0.84	** 2.23	0.99	1.66	0.82	* 3.94	0.93	3.34	1.39		3.97	0.91	3.55	1.28
2	*+	1.34	0.93	1.87	1.24	1.73	1.04	1.88	1.23	3.16	1.10	3.25	1.30		3.14	1.09	3.25	1.36
3	+	1.88	0.87	1.90	1.10	2.27	1.10	2.02	1.07	* 3.06	1.11	2.46	1.26		3.09	1.10	2.61	1.31
4		1.13	0.83	1.00	0.96	1.36	0.84	1.05	0.95	** 2.96	0.72	2.30	1.27	**	3.03	0.72	2.29	1.26
5		1.26	0.69	1.21	0.89	1.53	0.82	1.18	0.89	1.61	0.78	1.44	1.10		1.62	0.76	1.45	1.09
6		0.99	0.73	0.82	0.80	1.00	0.74	0.79	0.82	* 2.65	0.93	2.10	1.61	*	2.64	0.98	2.04	1.48
7	+	1.21	0.69	1.20	0.89	1.58	0.87	1.25	0.89	3.09	0.95	2.84	1.44		3.13	0.95	2.93	1.41
8	**	1.92	0.97	1.35	0.82	** 2.01	1.10	1.26	0.83	** 2.80	0.92	1.74	1.14	**	2.78	0.93	1.73	1.10
Total score		11.77	5.40	10.92	6.60	13.70	6.43	11.10	6.50	* 23.26	5.22	19.47	8.40	*	23.41	5.26	19.86	8.17

* level of significance between samples means p<0.05, ** p<0.01, + level of significance between characters of different gender means p<0.05

Table 2: Values for every character (average, all the scales of the questionnaire).

Significant differences on two factors are connected with the *Myself* self-stereotype: female ratings exceeded male ratings in the *Professional and business use of the Internet*; men rated higher the *Internet-based education of children*. To explain the latter we may suggest that mothers are often anxious about their children's health, and computer is believed to affect negatively health status; fathers are attracted by non-standard educational applications of new technologies – perhaps, it is the new experience that men assessed higher than women.

Significant gender differences were found, taken the evaluation of the characters by the *Educational use of the Internet* scale. The differences might be referred to the men's tendency to domesticity. However, this result needs additional testing due to low absolute means (less than 1, which implies that the answers swing between "never" and "very seldom"), both in male and female samples.

The ratings of the character *Female – Permanent Internet user*, given by men and by women, were similar; there was only one significant difference on the mentioned above factor (i.e., *Internet-based education of children*). To a greater degree than women, men believed that a woman, competent in the Internet applications, should regularly use the Internet to educate children. The difference may be explained by the mechanism of identification of female respondents with the character being assessed, and their anxiety over the health of children, mentioned above.

There were no gender differences in the assessment of the *Male – Permanent Internet user* character. As one should expect, all kinds of the Internet-related activities were ascribed to this character in the greatest degree. Moreover, we revealed no gender differences in the assessments of a *Permanent Internet user* – both *male* and *female*. Though in average respondents ascribed lesser activity to *Female Internet user*, the difference is statistically insignificant.

According to our respondents, *Typical Russians* rarely go online. Once again we revealed significant differences in the assessment of the female character. Women ascribed to a *Typical Russian woman* greater activity in the *Professional and business use of the Internet* and lesser activity in the *Internet-based education of children* than male respondents. Possibly, the explanation is again close to self-identification. Assessing *Typical Russian man*, women respondents ascribed him greater (compared to males) activity in the *Professional and business use of the Internet*. Female respondents evaluated the involvement of both typical characters, irrespective to gender, in the *Internet-mediated communication* higher than male respondents. Generally, gender of a character in this case (*typical Russian*, be it *man* or *woman*)

was not important for male respondents, while taken female respondents we revealed significant differences on three scales: they ascribed to a typical man greater Internet-activity in *Internet-based education of children*, in *Entertainment* and in *Internet-mediated communication*.

The greatest differences depending on the gender of respondents were revealed in the assessment of the character *My ideal of a woman*. Women ascribed to this character greater Internet-related activity than men did; on five factors from eight and on the Total score these differences were statistically significant (see Table 2). Women also ascribed greater Internet-related activity to an *Ideal man* (there was a non-significant exception on the scale *Internet-based education of children*). Therefore, judging on the basis of the ratings which respondents gave to the *ideal* characters of both genders, we may ascertain that women regarded activity in the Internet use a more positive feature than men did. Assessing *ideal* characters, respondents made no gender distinctions, i.e. from the standpoint of the Internet-related activity the representations of an *ideal man* and an *ideal woman* were close.

On the basis of the ratings of all scaled characters we see that the respondents approved of regular, but moderate Internet use. In their opinion, the activity of Russians on the Internet remained low. Even self-assessment (SA) of their own activity on the Internet was far from their subjective ideal, though respondents, being students of Moscow colleges, were able to use the Internet more often than an average Russian.

Speaking about gender differences we would like to note their presence, though not on a very high level: there were only 19 positions of difference from 63 (i.e. less than 30 %). However, these differences are characterized by rather strong stability and in 12 cases were attributed to 3 scales out of 9, so we may state a revealed regularity. Women in the larger degree were involved in the *Professional and business use of the Internet*, while men were more inclined to the *Internet-based education of children* and to the *Internet-mediated communication*. Gender of the character being assessed exerted significant influence more seldom – only in 3 cases from 27 (i.e. nearly 10 %). As for the differences in the ratings of a *typical woman* and a *typical man*, the Table 2 shows that these differences were revealed only in female respondents.

4.3 Analysis of gender stereotypes' dependence upon self-assessments of the Internet use

To perform this type of analysis we used the model of multivariate nonlinear regression. It allows to determine the extent to what gender of respondents influenced

their representations about the degree of involvement of themselves and other characters in the Internet-related activities. Bearing in mind that gender of the character being assessed influenced the answers of the respondents less significantly than their own gender, we used the following regression formula:

$$Y = a_0 + a_1X_1 + a_2X_2 + a_{12}X_1X_2 \qquad (1)$$

X_1 – gender of the respondent ($X_1 = 1$ for females и $X_1 = 2$ for males),

X_2 – self-assessment (SA) of the activity in the Internet use; it is calculated as the sum by all scales in the *Myself* column of the questionnaire.

Y – the rating given by the respondents to the specified character by the selected scale.

The formula (1) turned out to be adequate; we also analyzed the model

$$Y = a_0 + a_1X_1 + a_2X_2 + a_3X_3 + a_{12}X_1X_2 + a_{13}X_1X_3 + a_{23}X_2X_3 \qquad (2)$$

X_3 – sex of the character being assessed.

We found that the coefficients a_{13} and a_{23} were insignificant. The quotient a_{12} reflects the effect of the interaction of the independent variables X_1 and X_2 (i.e. gender of the respondent and his/her SA) in the influence upon the dependent variable Y. Thus, if the regression model fits empirical data and the coefficient a_{12} significantly differs from zero, we can state interaction of the corresponding independent variables. If only quotients a_1 and a_2 are significantly different from zero, then one may conclude that there is no interaction effect of the independent variables affecting the result, and each of these variables influences (or doesn't influence) the dependent variable Y per se. As there are three characters and nine scales (including the index of the Internet-related activity in general counted as the sum of all the Internet-related activities), it is necessary to analyze 27 equations. We are interested now in cases when the regression model fits empirical data and a_{12} is significantly different from zero. We obtained 13 such equations from 27 (see Table 3).

To estimate the slope angle of regression line reflecting the dependence of the variable Y from the variable X_2 under the fixed values X_1, the equation (1) can be rewritten in the following way

$$Y = (a_0 + a_1X_1) + (a_2 + a_{12}X_1)X_2 \qquad (3)$$

On the other hand, fixing the meaning of X_2 we may estimate the angle of inclination of the regression line for the dependence of the variable Y from the variable X_1 and rewrite the same equation as follows:

$$Y = (a_0 + a_2 X_2) + (a_1 + a_{12} X_2)X_1 \qquad (4)$$

Table 3 contains numerical results of general and partial regression under the fixed values of independent variables. The interpretation might be the following.

Roles	Scales	Significant coefficients of interaction	Partial Regression on SA of the Internet use (respondent's gender is fixed)		Partial Regression on respondent gender (respondents' SA of the Internet use is fixed)		
			women	men	Low SA	Medium SA	High SA
Internet user	4. Competent Internet use in order to realize personal goals*	$a_{12}<0$**	Y=0.11+0.30**X	Y=-0.09-0.14*X	Y=-0.43+0.24X	Y=0.32-0.20X	Y=1.06-0.64**X
Internet user	7. Highly qualified use of the Internet*	$a_{12}<0$*	Y=0.02+0.35**X	Y=0.00+0.04X	Y=-0.60+0.28X	Y=0.05-0.03X	Y=0.71-0.33X
Typical Russian	1. Professional and business uses of the Internet**	$a_{12}>0$*	Y=0.26-0.22*X	Y=-0.30+0.24**X	Y=1.50-1.02**X	Y=0.83-0.56**X	Y=0.16-0.11X
Typical Russian	8. Internet-mediated communication**	$a_{12}>0$*	Y=0.32-0.20*X	Y=-0.35+0.15*X	Y=1.54-1.02**X	Y=0.98-0.67**X	Y=0.43-0.31X
Ideal	1. Professional and business uses of the Internet**	$a_{12}>0$**	Y=0.24+0.46**X	Y=-0.27+0.83**X	Y=0.68-0.89**X	Y=0.76-0.52**X	Y=0.85-0.15X
Ideal	2. Internet-based education of children**	$a_{12}>0$**	Y=-0.02+0.27**X	Y=-0.01+0.75**X	Y=0.18-0.47**X	Y=-0.04+0.02X	Y=-0.26+0.50**X
Ideal	3. Entertainments**	$a_{12}>0$**	Y=0.22-0.05X	Y=-0.26+0.54**X	Y=1.33-1.07**X	Y=0.70-0.48**X	Y=0.06+0.11X
Ideal	4. Competent Internet use in order to realize personal goals**	$a_{12}>0$*	Y=0.34+0.33**X	Y=-0.37+0.58**X	Y=0.97-0.95**X	Y=1.06-0.71**X	Y=1.14-0.47**X
Ideal	5. Compensatory Internet use**	$a_{12}>0$*	Y=0.69**+0.22*X	Y=1.03**+0.69**X	Y=0.59*-0.12X	Y=0.34+0.34**X	Y=0.10+0.81**X
Ideal	6. Cognitive uses of the Internet**	$a_{12}>0$**	Y=0.24+0.29**X	Y=-0.26+0.63**X	Y=0.78-0.83**X	Y=0.73-0.50**X	Y=0.69-0.16X
Ideal	7. Highly qualified use of the Internet**	$a_{12}>0$**	Y=0.12+0.47**X	Y=-0.15+0.86**X	Y=0.30-0.66**X	Y=0.39-0.27**X	Y=0.48+0.11X
Ideal	8. Internet-mediated communication**	$a_{12}>0$**	Y=0.45-0.12X	Y=-0.50+0.58**X	Y=2.21-1.65**X	Y=1.39-0.95**X	Y=0.57-0.25X
Ideal	Total**	$a_{12}>0$**	Y=0.28+0.31**X	Y=-0.32+0.89**X	Y=1.15-1.18**X	Y=0.87-0.59**X	Y=0.59-0.01X

* and ** significant level (0.05 and 0.01), the regression model satisfies experimental data (column 2), coefficient a_{12} not equal 0 (column 3), the coefficients for partial regression are not equal 0 (columns 4-8).

Table 3: Significant results of multidimensional and partial regression by scales.

When self-assessment of the Internet use grew, women evaluating the *Permanent Internet user* by the scales *Competent application of the Internet* and *Highly qualified use of the Internet* gave higher ratings; men gave lower ratings on the first scale, and on the second scale their own SA did not affect the evaluation.

The assessment of a *Typical Russian* by the scales *Professional and business use of the Internet* and *Internet-mediated communication* was completely the opposite. With SA of the Internet use growing, men evaluated the characters by these scales higher, and women lower.

In the assessment of an *Ideal* the situation was different again. The higher was the male respondent's SA, the higher rating he gave in evaluating an *ideal* character of either gender. Women showed a similar trend, with the exception of two scales – *Entertainments* and *Internet-mediated communication*. However, the ratings given to an *ideal* character by men grew substantially faster with the increase of the SA, than

the ratings given by women, which grew slower. In the two cases when women's regression quotient was negative, it was insignificant. That's why we can consider it negligible, and thus it did not violate the general view of relations between male and female ways of assessing ideal characters.

Now let us consider the relation of gender stereotypes under the fixed level of the SA in the use of the Internet. As such levels we chose medium (defined on the basis of belonging to the interval "the mean plus or minus the standard deviation"), low (the value was located to the left of this interval) and high (the value was located to the right of the interval). Most frequently (in 8 cases from 13) we face the situation when the dependence of character's ratings upon gender of the respondent was significantly negative under low and medium SA, and non-significant (i.e. slightly greater or slightly less than zero) under high SA. It means that under low SA men tended to evaluate all characters on every scale lower than women did. Nevertheless, the higher was the SA level, the less noticeable was the difference between genders, and it ceased to exist under high SA.

Such a relationship was revealed in the assessment of a *Typical Russian* by the scales *Professional and business use of the Internet* and *Internet-mediated communication*, and in the evaluation of an *Ideal* by the scales *Professional and business use of the Internet, Entertainments, Internet-based education of children, Highly qualified use of the Internet, Internet-mediated communication*, and Total score. There was the same trend in the evaluation of an *Ideal* by the scale *Highly qualified use of the Internet* (men gave lower ratings, and the difference between genders was diminishing with the growth of the SA), but the difference remained significant under high SA. The scale *Compensatory use of the Internet* revealed a different pattern for an *Ideal*: differences grew with the increase of SA, men gave higher ratings than women. With the growth of SA the two genders differed also in the assessment of a *Permanent Internet user* by the scale *Highly qualified use of the Internet*: men with high SA gave lower rates than women with high SA.

Therefore we have the reasons to ascertain that as far as SA grew (i.e. the activity in the use of the Internet increased) men formed a positive image of this quality faster than women. Men regarded mastering any skill connected with the Internet as the approach to their ideal and thus a useful acquisition. Women were more skeptical in this respect. We may suggest that from their standpoint the activity in the application of the Internet, though useful, was far from the real approach to the ideal.

We can also make certain conclusions about the *ideal* that was characteristic for the respondents (in relation to the Internet use). Thus, for instance, on the General scale the ideal position was significantly close to the middle of a conditional segment between a *Typical Russian* and a *Permanent Internet user* (.54). However, on the majority of other scales (seven out of eight) the ideal position divided the segment "*typical Russian – permanent Internet user*" in the ratio which was close to the "golden mean" (values from .61 to .74). In five cases the ideal position was closer to the right end, i.e. reflected the readiness to take more active position in the application of the Internet, and in three cases it was nearer to the left end; these results confirm the disinclination of the respondents to substitute traditional and familiar "technologies" by the new ones, connected with the Internet. It applies to the sphere connected with communication, entertainment and especially with the compensatory use of the Internet (the position of the ideal is clearly shifted to the left). This result can be interpreted as respondents' disinclination to include information technologies fully into their life. The respondents preferred to leave room for the familiar ways of communicating with people, traditional entertainment and customary means of achieving personal goals.

5. Conclusions

In Russia, men's and women's stereotypes towards the Internet, as investigated in the paper, did not differ too much, especially on the self-reported upper levels of competence in the Internet use. Assessments of heavy Internet users were close to be gender-neutral. Self-stereotypes were far from traditional: women rated high business applications, while men rated high communicative and educational applications. These data contradict to the findings relevant for other geo-economic areas. We might think of a following tentative explanation. New culture of the Internet use, being formed in Russia, is oriented towards competence and mastering. Gender specifics in the use of new technologies, including the Internet and its applications and services, might get projected on later developmental stages, when the audience becomes more advanced and tending to variegate the Internet-related behaviours.

With possible separation of differing Internet-related services (cognition, communication, entertainment, shopping, etc.) into independent human activities connected with the Internet only indirectly, gender specifics in the Internet related stereotypes is expected to become more evident and more standard. Since there are some significant differences corresponding to the scales that we selected and discussed in the paper, and the scales refer to possibly separate services, we may

expect that in perspective it will be possible to find important gender differences in stereotypes related to these would-be independent services.

The research methodology worked out in the study proved to be adequate and reliable. We have used several elaborated techniques of handling empirical data in order to find some "digital divide" stereotypes characteristic for the Russian Internet users. The result shows that the stereotypes pertinent to the "digital divide" problem are currently not too important and essential in Russia.

6. References

Adam, A. (1998). *Artificial Knowing: Gender and the Thinking Machine.* London: Routledge.

Adeboye, K., Flynn, V., & Darlington, K. (2004). Gender Issues in the Career Development of Computer Science Staff. In K. Morgan, C.A. Brebbia, J. Sanchez, A. Voiskounsky (eds.), *Human Perspectives in the Internet Society: Culture, Psychology and Gender* (pp. 165-172*).* WIT Press: Southampton, Boston.

Aiken, L., West, S. (1991). *Multiple Regression: Testing and Interpreting Interactions.* London: Sage.

Alloo, F. (1999). Information Technology and Cyberculture: The Case of Zanzibar. In W. Harcourt (ed.), *Women@Internet: Creating New Cultures in Cyberspace (*pp. 156-161*).* London & New York: Zed Books.

Armaroli, C., Costantini, E., Guerzoni, F., Malacarne, C., Mich, O. (2004). Gender in Information Technology: Review of a Mentoring Initiative. In K. Morgan, C.A. Brebbia, J. Sanchez, A. Voiskounsky (eds.), *Human Perspectives in the Internet Society: Culture, Psychology and Gender* (pp. 209-216). WIT Press: Southampton, Boston.

Awang, H., Jaffar, M. (2004). An Outreach Venture: Bringing Computer Literacy to Rural Women in Malaysia. In K. Morgan, C.A. Brebbia, J. Sanchez, A. Voiskounsky (eds.), *Human Perspectives in the Internet Society: Culture, Psychology and Gender* (191-197*).* WIT Press: Southampton, Boston.

Bautista, R.O. (1999). Stalking their Claim: Women, Electronic Networking and Training in Asia. In W. Harcourt (ed.). *Women@Internet: Creating New Cultures in Cyberspace* (pp. 173-183*).* London & New York: Zed Books.

Bruckman, A. (1993). Gender swapping on the Internet. Paper presented at *The Internet Society Conferente INET '93.* San Francisco, CA, August. Retrieved from http://www.cc.gatech.edu/~asb/papers/old-papers.html#INET.

Burch, S (1999). ALAI: A Latin American Experience in Social Networking. In W. Harcourt (ed.), *Women@Internet: Creating New Cultures in Cyberspace* (pp. 197-205*)*. London & New York: Zed Books.

Burke, C. (2001). Women, guilt, and home computers. *CyberPsychology & Behavior*, 4(5): 609-615.

Cassell, J., Jenkins, H. (1998). Chess for girls?: Feminism and computer games. In J. Cassell, H. Jenkins (eds.), *From Barbie to Mortal Kombat: Gender and Computer Games* (pp. 2 - 45*)*. Cambridge, MA: MIT Press. Retrieved from
 http://www.media.mit.edu/gnl/publications/gg_introduction.pdf.

Corneliussen, H. (2004). "I don't understand computer programming, because I'm a woman!": Negotiating Gendered Positions in a Norwegian Discourse of Computing. In K. Morgan, C.A. Brebbia, J. Sanchez, A. Voiskounsky (eds.), *Human Perspectives in the Internet Society: Culture, Psychology and Gender* (pp. 173-182*)*. WIT Press: Southampton, Boston.

Durndell, A., Cameron, C., Knox, A., Stocks, R., Haag, Z. (1997). Gender and computing: West and East Europe. *Computers in Human Behavior,* 13 (2): 269-280.

Durndell, A., Haag, Z., Asenova, D., Laithwaite, H. (2000). Computer self-efficacy and gender: East and West Europe. In E. Balka, R. Smith (eds.), *Women, Work and Computerization: Charting a Course to the Future* (pp. 78-85*)*. Boston: Kluwer.

Hafkin, N., Taggart, N. (2001). Gender, Information Technology, and Developing Countries: An Analytic Study. *Report for the USAID's Office of Women in Development.* Retrieved from http://www.usaid.gov/wid/pubs/it01.htm.

Harris, R., Wilkinson, M.A. (2004). Situating Gender: Students' Perceptions of Information Work. *Information Technology & People,* 17 (1): 71-86.

Houle, P.A. (1996). Toward understanding student differences in a computer skills course. *Journal of Educational Computing Research*, 14 (1): 25-48.

Jackson, L.A., Ervin, K.S., Gardner, Ph.D., Schmitt, N. (2001). Gender and the Internet: Women Communicating and Men Searching. *Sex Roles,* 44 (5-6): 363-379.

Jazwinski, Ch. H. (2001). Gender identities on the World Wide Web. In Ch. R. Wolfe (ed.), *Learning and Teaching on the World Wide Web* (pp. 171-189*)*. San Diego: Academic Press.

Jenson, J., de Castell, S. (2004). Fair Play: Gender, Digital Gaming and Educational Disadvantage. In K. Morgan, C.A. Brebbia, J. Sanchez, A. Voiskounsky (eds.),

Human Perspectives in the Internet Society: Culture, Psychology and Gender (pp. 227-234*).* WIT Press: Southampton, Boston.

Kennedy, T., Wellman, B., Klement, K. (2003). Gendering the Digital Divide. *IT and Society,*1 (4).

Retrieved from http://www.stanford.edu/group.siqss/itandsociety/v01i04.html.

Lang, C., Hede, T. (2004). Gender and IT: Do Stereotypes Persist? In K. Morgan, C.A. Brebbia, J. Sanchez, A. Voiskounsky (eds.), *Human Perspectives in the Internet Society: Culture, Psychology and Gender* (pp. 287- 296). WIT Press: Southampton, Boston.

Li, N., Kirkup, G., Hodgson, B. (2001). Cross-cultural comparison of women students' attitudes toward the Internet and usage: China and the United Kingdom. *CyberPsychology & Behavior*, 4(3): 415-426.

Lupart, J.L., Cannon, E., Telfer, J.A. (2004). Gender Differences in Adolescent Academic Achievement, Interests, Values and Life Role Expectations. *High Ability Studies*, 15: 25-43.

Miller H., Arnold J. (2001). Breaking away from grounded identity? Women academics on the Web. *CyberPsychology & Behavior*, 4 (1): 95-108.

Miller, D., Slater, D. (2000). *The Internet: An Ethnographic Approach.* Oxford & New York: Berg.

Morahan-Martin, J. (1998). Males, Females, and the Internet. In J. Gackenback (ed.). *Psychology of the Internet: Intrapersonal, Interpersonal, and Transpersonal* (pp. 169-197). San Diego: Academic Press.

Morahan-Martin, J. (2004). Paradoxes in the Impact of the Internet on Women. In K. Morgan, C.A. Brebbia, J. Sanchez, A. Voiskounsky (eds.), *Human Perspectives in the Internet Society: Culture, Psychology and Gender* (pp. 275-286*).* WIT Press: Southampton, Boston.

North, A.S., Noyes, J.M. (2002). Gender Influences on Children's Computer Attitudes and Cognitions. *Computers in Human Behavior*, 18 (2): 135-150.

Petrenko, V.F. (1997). *Obschaya Psikhosemantika* (General Psychosemantics). Moscow: Moscow State University Publ.

Petrenko, V.F., Mitina, O.V. (1997). The Psychosemantic Approach to Political Psychology: Mapping Russian Political Thought. In D.F. Halpern, A.E. Voiskounsky (eds.), *States of Mind: American and Post-Soviet Perspectives on Contemporary Issues in Psychology* (pp. 19-48*).* N.Y. & Oxford: Oxford University Press.

Petrenko, V., Mitina, O. (2001). A Psychosemantical Analysis of the Dynamics of Russian Life Quality (1917 to 1998). *European Psychologist,* 6 (1): 1-14.

Plant, S. (1996). On the Matrix: Cyberfeminist Simulations. In Shields, R. (ed.), *Cultures of Internet: Virtual Spaces, Real Histories, Living Bodies*. London: Sage.

Postmes, T., Spears, R. (2002). Behavior Online: Does Anonymous Computer Communication Reduce Gender Inequality? *Personality and Social Psychology Bulletin*, 28 (8): 1073-1083.

Singh, S. (2001). Gender and the Use of the Internet at Home. *New Media & Society,* 3 (4): 395-416.

Subrahmanyam, K., Kraut, R.E., Greenfield, P.M., Gross, E.F. (2000). The impact of home computer use on children's activities and development. *The Future of Children. Children and Computer Technology*, 10 (2): 123-144. Retrieved from http://www.futureofchildren.org/usr_doc/vol10no2Art6%2E.pdf.

Suler, J. (1999). *Do boys just wanna have fun? Gender-switching in cyberspace.* Retrieved from http://www.rider.edu/users/suler/psycyber/genderswap.html.

Teo, Th.S.H., Lim, V.K.G. (2000). Gender differences in Internet usage and task preferences. *Behaviour & Information Technology*, 19 (4): 283-295.

Turkle, S. (1995). *Life on the Screen: Identity in the Age of the Internet.* N.Y.: A Touchstone Book.

Voiskounsky, A.E. (2002). Internet: Clusters of Attractiveness. *Electronic Journal of Communication / La Revue Electronique de Communication.* 12, (3-4). Retrieved from, http://www.cios.org/getfile/voiskoun_v12n34.

Wade, S.E., Fauske, J.R. (2004). Dialogue online: prospective teachers' discourse strategies in computer mediated discussions. *Reading Research Quarterly*, 39 (2): 134-160.

Wallace, P. (1999). *The psychology of the Internet.* Cambridge: Cambridge University Press.

Witmer, D., Katzman, S. (1998). Smile When You Say That: Graphic Accents as Gender Markers in Computer-Mediated Communication. In F. Sudweeks, M. McLaughlin & Sh. Rafaeli (eds.), *Network & Netplay: Virtual Groups on the Internet* (pp. 3-11*)*. Menlo Park, Cal., Cambridge, Mass., London: AAAI Press/ The MIT Press.

Internet usage and gender digital divide in a Romanian students' sample

Ioana Codoban ♠

♠ Dipartimento di Elettronica e Telecomunicazioni,
Università degli studi di Firenze – Firenze (Italy)

ABSTRACT

Little data is available about East-European countries on Internet adoption and gender digital divide issues. Romania is a good case study given its past communist history and current developments, as well as Internet penetration. Students are the focus of the present research as they might provide the basis for further evolution trends. The results of a 275-subject research questionnaire indicate a complex situation as regards Internet adoption and usage: the digital divide is present as regards knowledge, ability and experience. Based on the data, other indicators and demographic information are evaluated and discussed.
Gender differences seem limited for general access, but are significant for aspects such as time spent on-line/per week and knowledge (p<0,01). An overall impression of the positive impact of Internet in various aspects of daily life is characteristic of the sample. Similarities and divergences with studies from different realities are discussed, indicating the qualitative differences of the divide.

1. Spread of the Internet and the East European countries

The spread of the Internet has become a common fact in academic and business environments; it is no longer a surprise. Although there are no reliable data on the size of the world's on-line population, estimates suggest that the number of Internet users around the globe has surged from 4.4 million in 1991 to 10 million in 1993, to 40 million in 1995, to 117 million in 1997, to 277 million in 1999, to 502 million in 2001, and to more than 600 million in 2002. Thus, the global penetration rate of the Internet has increased from less than 0.1 percent in 1991 to 2 percent in 1997, 7 percent in 2000, to over 10 percent of the total world population in 2002. (Wellman and Hogan, 2004)

The percentage of individuals regularly using the Internet in the EU is 39%, with 61% of those in the16-24 year age-group, 53% in the 25-34 year age-group, and 45% in 35-

---

♠ Corresponding Author:
Ioana Codoban
Università degli Studi di Firenze, Dip. Elettronica e Telecomunicazioni, via S. Marta no. 3, 50100 Firenze (FI), Italy
Phone: +390554796382
Fax: +39055438883
E-mail: ioana.codoban@unifi.it

44 segment. The percentage of males using the Internet is 44% while that of females is 34%. Among students, a high percentage of frequent users is registered: 74% (Eurostat, accessed 2005). Moreover, the percentage of individuals having ordered/bought goods or services for private use over the Internet in the last three months reaches an overall general figure of 17%, (20% male and 14% female). (Eurostat, accessed 2005)

As we can see, there are abundant data available especially for the North American and Western European countries, and for some of the newcomers to the Internet, such as China (see: Wellman and Hogan, 2004). However, there is a lack of evidence for nations with European culture, which have a different historical background. The Eastern European region includes states with former communist leadership, which have discovered democracy together with the new technologies. Keeping in mind the fact that the iron curtain was removed around the 1990s, and that the spread of the Internet took place following this event, it is easy to understand why this region is an interesting case study as regards the adoption of the Internet and the digital divide. Are there different patterns of adoption and usage? Are the observed differences similar, or is culture determining the variations?

Romania's past communist history impacts its openness to communication and innovation, as well as gender differences. Currently, it is in a transition phase characterised by economical hardship and changes in mentality. Nevertheless, official data indicate that Internet use increased from: 4.6% in 2001 to 16% in 2002 (MCTI, 2003, www.mcti.ro). Even if the percentages are lower then those related to Western Europe, the rise in a one-year period is significant if one is to interpret the future trend. Few detailed indicators were available before the beginning of the present study, as research was still in the early stages.

The University is one of the environments that quickly adopted the Internet; it began to use and promote it as far back as the '70s. The rapid spread of Internet usage in and between Universities was later mirrored by the evolution it had in other environments. This is one of the reasons for choosing students as our target population, as we believe that their behaviour could represent not only the present situation but also future usage trends. We note also that, as mentioned earlier, at a European level, students register higher percentages of usage then other categories of users. Thus, the present paper focuses on a student sample hoping also to highlight the future developments expected in Romania and the Internet through the data obtained.

Apart from demographic characteristics, in the present research we explored Internet usage and experience, the perceived personal-skills for different on-line activities, the impact on communication and on other relevant every-day aspects such as study and work.

1.1 Gender digital divide

The Internet originated in a highly masculine context and under male domination. Females have only lately entered this new space, and research has shown that numerous aspects are not facilitating women's use of the Internet, on the contrary: they encounter many barriers. In fact, the typical Internet user which still represents the major group present "on-line" is the young white male in higher education (see for example Wellman & Haythornthwaite, 2002).

The stratification between those with and without Internet access is creating a digital divide (Katz & Aspden, 1996). 'The rich are going to be getting even richer in terms of information. The information-poor will become more impoverished because government bodies, community organizations, and corporations are displacing resources from their ordinary channels of communication into the Internet' (Katz & Aspden, 1996). Moreover, the Internet offers the possibility of contacting and maintaining relationships with people at a distance with an impact on the extension of social and professional affiliation with people met both on-line or in face-to-face situations (Morahan-Martin, 1998).

Gender-related Internet usage has been an ongoing problem as access, in the beginning, was overwhelmingly masculine. More recently (see for example NITA, 2002), usage data indicates no gender difference in Internet use in the USA. Moreover, the case study on China, as a country with relatively recent Internet adoption, demonstrates that rapid changes occur. In five years, the proportion of female users has risen from 12% to 39% (CNNIC, 2002). In a cross-cultural comparison, Chen and Wellman (2004) underline that gender differences disappear in time only in the case of the USA, but remain strong in other countries. The share of female Internet users is lower than their share in the general population in the countries surveyed. Yet, there is a tendency towards narrowing the gender divide (for example in the UK, Japan, Korea, China, Mexico); Germany and Italy constitute an exception and present marked divides. The gender divide issue is not entirely solved, as is noticed in (Liff & Shepherd, 2004): the problem is no longer quantitative, but rather a qualitative one affecting

quality of access, the ability to use the Internet effectively and the way in which Internet use affects access to goods and services.

In this context we analyse access in a detailed way, starting with defining the relevant sub-categories. Based on the proposal by Liff and Shepherd (2004), in the following research we focus on four major aspects of Internet access:

- Technical access: such as physical access to an Internet-ready device
- Ability to use access: the extent to which men and women perceive the skill levels they have attained
- Take-up of access: whether men and women are Internet users; any variation in length of use; how much use they make of access; and the range of activities they use it for.
- Impact of access: the degree to which Internet use has changed patterns of activities, and the perceived impact of Internet.

The present paper is centred on a research, which focuses on these themes. Specifically, each of these four points is addressed. Internet and PC technical access are evaluated in terms of computer and connection possibilities. With regard to perceived skill-level, self–assessment for the most used functions is explored. PC and Internet mastery is surveyed also with the help of two important indicators: use of the Linux system for PC literacy and Personal Web-page ownership for Internet literacy (used also in prior studies such as Calenda, 2003). Moreover, experience in terms of years of use and frequency of usage as hours/ week spent on-line is investigated. Furthermore, usage patterns are addressed, as well as the perceived impact of Internet on diverse aspects of everyday life such as studies, work and relationships.

The next part of the article addresses the description of the methodology and data presentation, as well as a discussion and conclusions.

2. Methodology

2.1 Questionnaire development

Based on prior study' items and newly theory-formulated ones, a basic pool of possible questions (and possible answers) was formed. These were screened by three domain-experts, reviewing the items, rephrasing them or excluding them if considered not suitable. The questionnaire is part of a research effort currently being carried on in

Italy, Holland and Spain, with the aim, not only of describing and comparing present situations, but, also, of testing new indicators.

A 45-item questionnaire was formulated and a suitable presentation format was chosen. Not all of these items are presented, and, furthermore, some of the themes were excluded from the present analysis. The reasons for this choice were: relevance of subject, research objectives of present paper, time and space limitations, and importance of results. Examples of the themes excluded include: political communication, personalisation technology usage, on-line offline media consumption, political attitudes, etc.

2.2 Sample and data collection

The target population for the sample was that of Babes-Bolyai University students (Cluj-Napoca, Romania). Subjects were reached during lectures or on the university campus. As regards those reached during lectures, the questionnaire was completed and handed-in voluntarily, assuring anonymity. Those who filled in the questionnaire while on the university campus, were reached in their rooms or study/recreational chambers and asked to take part in the research voluntarily and anonymously. For the main indicators, no significant differences were found between the two data-gathering-type samples.

Because of the data collection procedure described above, the sample is not a representative one either for the Babes-Bolyai University population or for the general (student) population, as there is an over-representation of students enrolled in Psychology and Philosophy specialisation courses (given our easy access to this study-population during lectures).

2.3 Data processing

Almost none of the distributions are normal ones, and many categorical variables have been used, this is why the chi square test was preferred in order to test the hypothesis. General descriptive statistics and graphics were used in order to describe the data. The SPSS processor was used in order to process the data and Excel was used to create graphical representations. The open-ended questions were analysed classifying responses and summarising frequencies.

We present subjects number for each item in order to facilitate understanding, as these numbers could vary in base of the context of the question.

3. Results and analysis

3.1 Internet usage data

Those who filled in the questionnaire are students from Babeş-Bolyai University, Romania (275 students – 56.5% female and 43.5% male – the percentages are very similar with the general gender proportion of attendees for the given faculties). The age interval ranges from 18 to 31 years. The largest category is 18-21 years, representing 47.4 %, with an average of 20 (see figure 1). 52.2% own a PC at home, and 28.1% with an Internet connection.
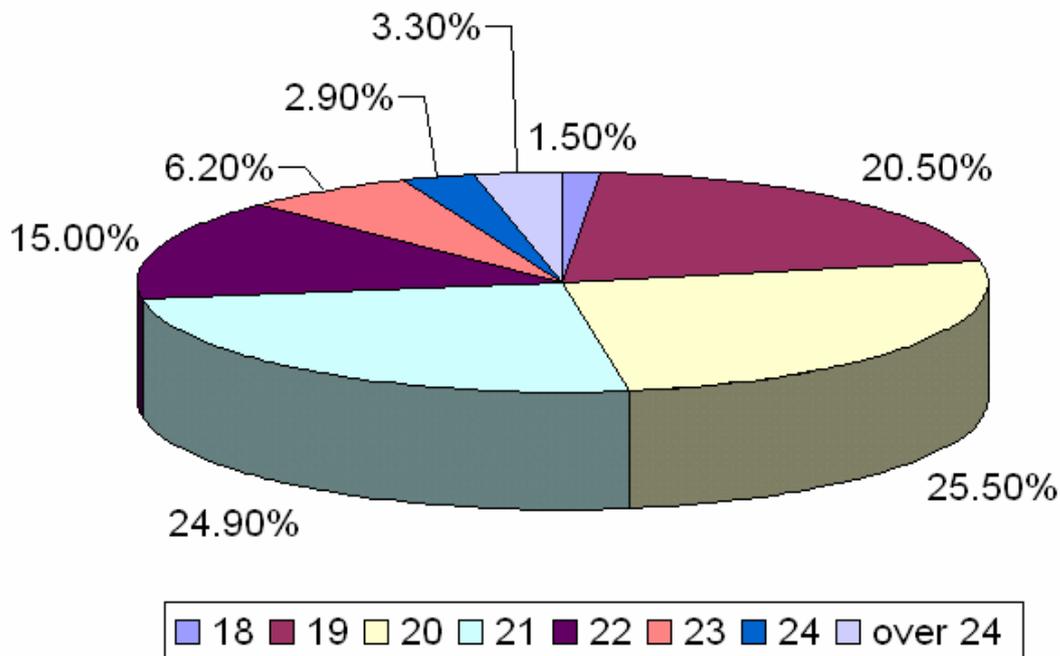

Fig. 1: Sample age-distribution (N: 273).

The students are enrolled in 24 different faculties; most of them are studying psychology (26.7%) and philosophy (12.7%) covering up to 41.2% of the general distribution (N: 275). These faculties are over-represented because of the data collection procedure. This part of the sample represents the questionnaires applied during lectures. Other faculties include: Computer Sciences, Economics, Geology, Biology, Mathematics, Physics, etc. The best represented category is that of the Social Sciences.

In terms of years of Internet usage, the majority of respondents report 2-5 years of experience; this represents 78.1% (see figure 3). Students are used to accessing

Internet for 1-3 hours per week in a proportion of 49.4%, followed by a 24.7% of 4-7 hours of on-line activity (N: 275) (see figure 2).
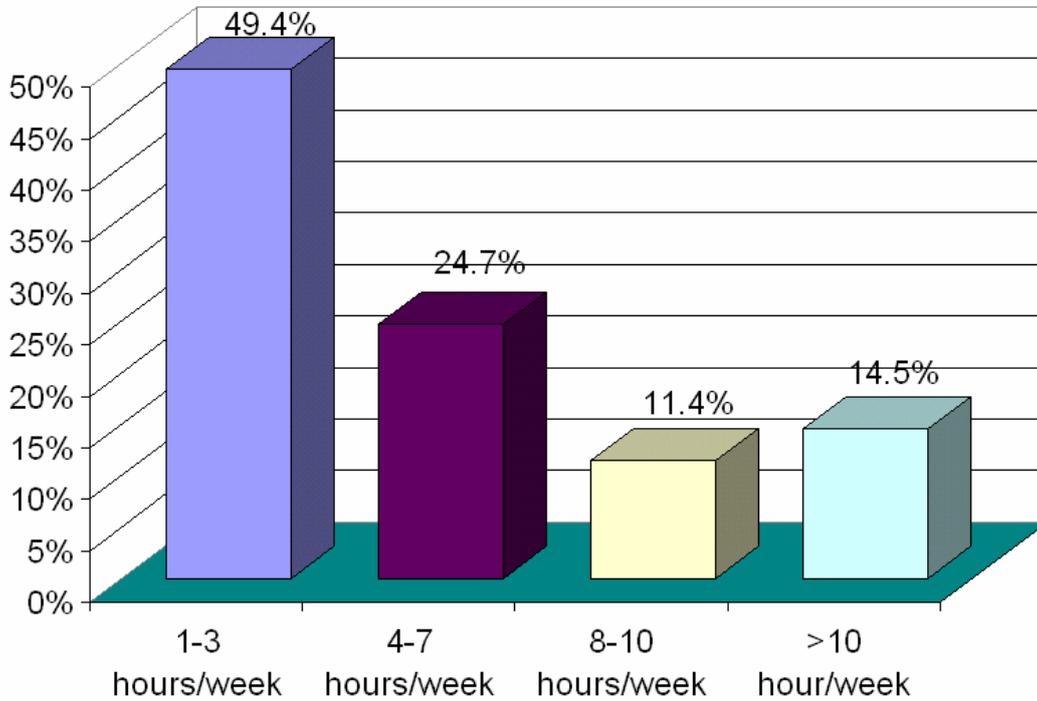
Fig. 2: Hours/week spent in on-line connections (N: 271).

An overwhelming 90.9% of the entire sample speaks English, while 66.9% declare they are familiar with French, 20% with German, and 19.6% respectively 14.2% with Italian and Spanish (N: 273). Other languages are also present, such as Hungarian, Russian and Ukrainian, but, for the present research, we focus on the first group, especially on English as being the most common in Internet usage. The percentage of those who do not speak English (still considered the main language for Internet content) is not high enough in order to permit comparisons or further considerations.

On the basis of the chi square test, no significant difference is noticed as regards a technical option of faculty/specialisation for experience in Internet use. However, the difference is significant (p<0.000) for the time spent in on-line activity.
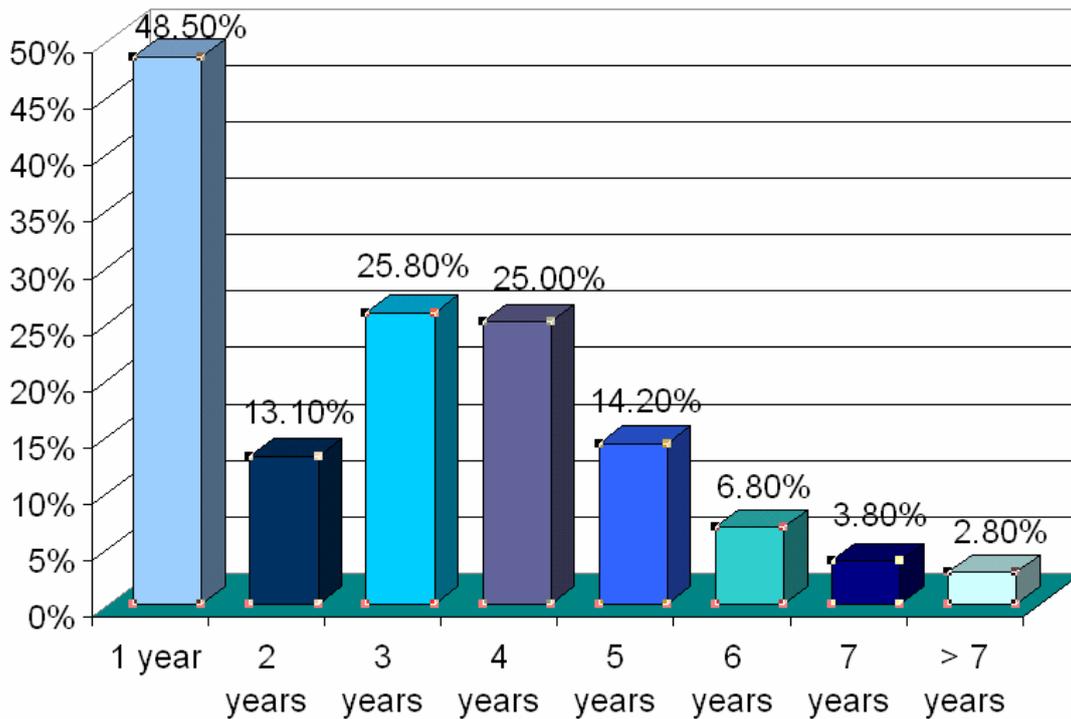
Fig. 3: Years of experience with Internet (N: 260).

3.1.1 Internet functions

Few people declare they do not use e-mail (13 of the total number of subjects), while 181 consider themselves to have a high level of ability in using it. Also, 80 of the total do not use chat, while 38 report a high level experience.

Few subjects use on-line shopping opportunities given that some 205 individuals declare they have never used it.

By far the most popular activity seems to be information search, as 253 (92%) respondents declare they have an average to high ability in doing so, while only 4 subjects do not use it at all. The reasons for searching for information on-line usually reside in the fact that these contents cannot be found in other sources (44.6%), and because the Internet offers the most comfortable access to information (45.3%) (N: 267) (see figure 4).
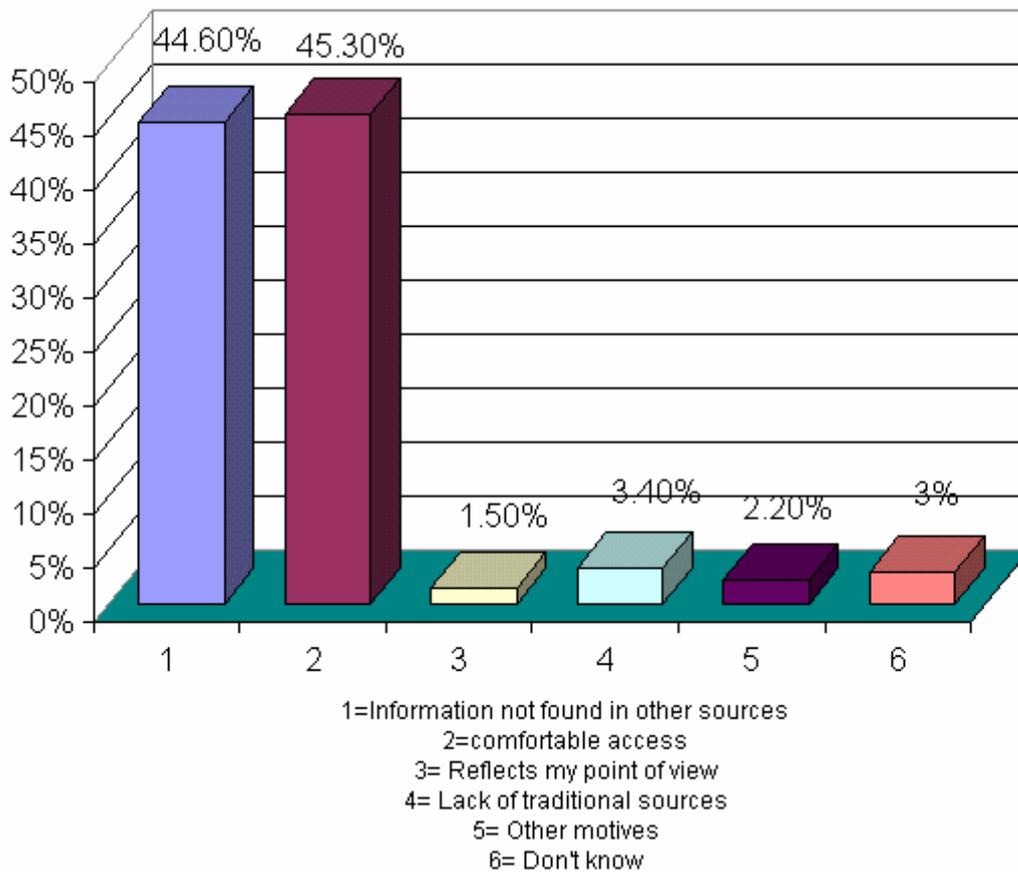
Fig. 4: Reasons for searching for information on the Internet (N: 267)

Only 34 subjects declare that they share their email account with others (such as: family members 12, friends 15, partner 3, colleague 1, other 3), while 230 have an independent e-mail account.

Those who own a web page number 19 while 248 declare they have not one. The data are too low to carry out further comparisons.

Some 83.6% of the subjects say they are not familiar with the Linux system. Only 2.2% use it, while 14.1% knows of it but do not use it. Interestingly, 31.9% are willing to learn it and would like to use it in the future.

3.1.2 Communication

The Internet impact on socialisation spaces is perceived as a positive one, increasing opportunities, for 47.6% of respondents, while 42.1% consider it has remained the same, and 1.1% maintain it has worsened, and the remaining 9.2% do not know (see figure 5).
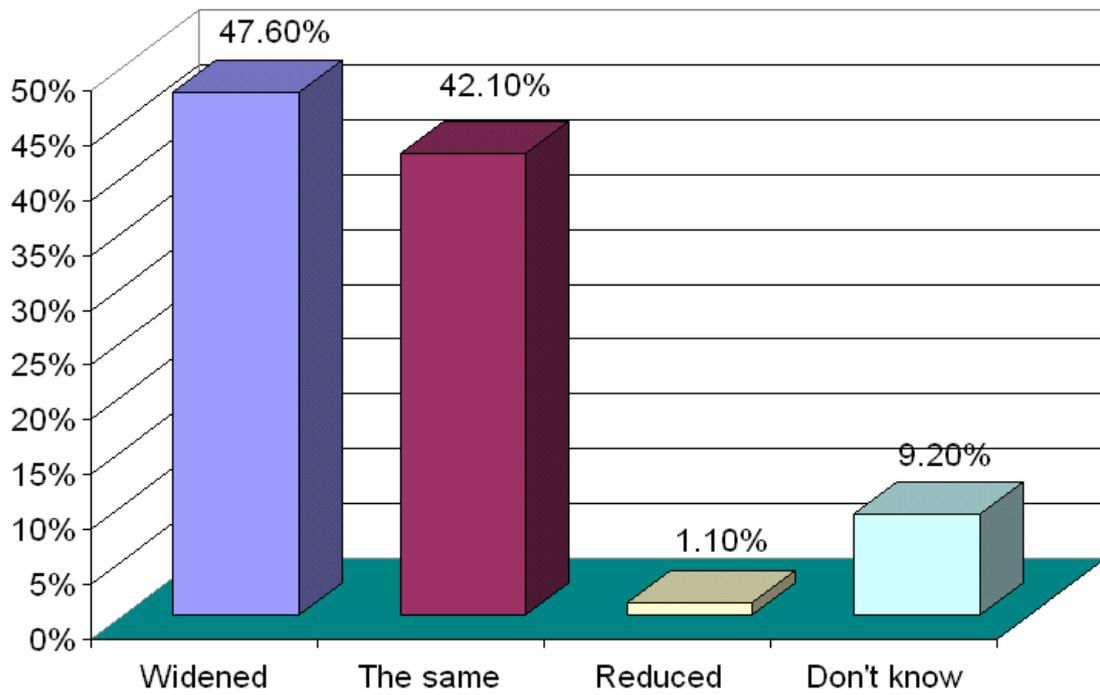
Fig. 5: Perceived impact of the Internet on socialisation spaces (N: 273).

Moreover, 44.4% consider that the qualitative impact is positive, 48.5% remains neutral and 2.6% considers that quality has been reduced (see figure 6).
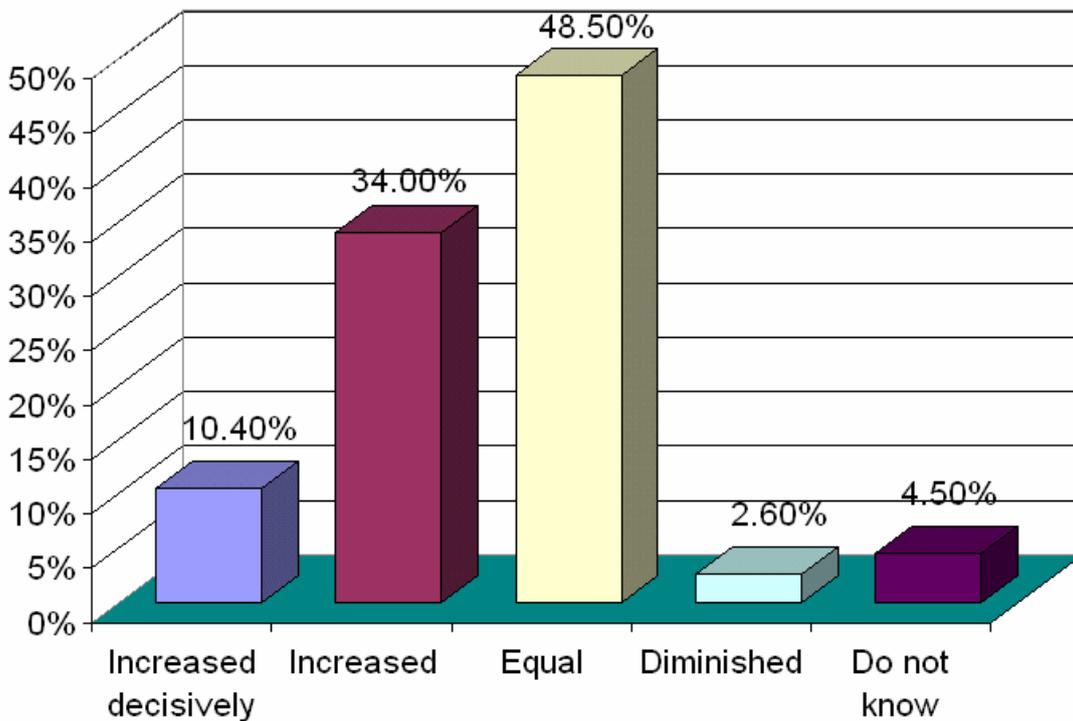

Fig. 6: Impact of Internet on the quality of socialisation spaces (275 answers)

74.2% of the subjects communicate via Internet with persons living in the same country but in different cities, while the next group (37.8%) communicate with friends and relatives abroad, followed by those communicating with persons living in the same city (30.9%), and, lastly, by persons communicating with persons of different nationalities (29.5) (multiple answer).

Most of the subjects communicate with persons known before using the Internet and with whom they frequently meet face-to-face (40.7%). Persons known before, but rarely met in real situations, form the second largest category of communication partners via Internet (32,6%). 11,9% is the percentage of students talking with strangers met on the Internet and never seen face-to-face, while 14.8% met in a virtual context and then face-to-face (see figure 7).
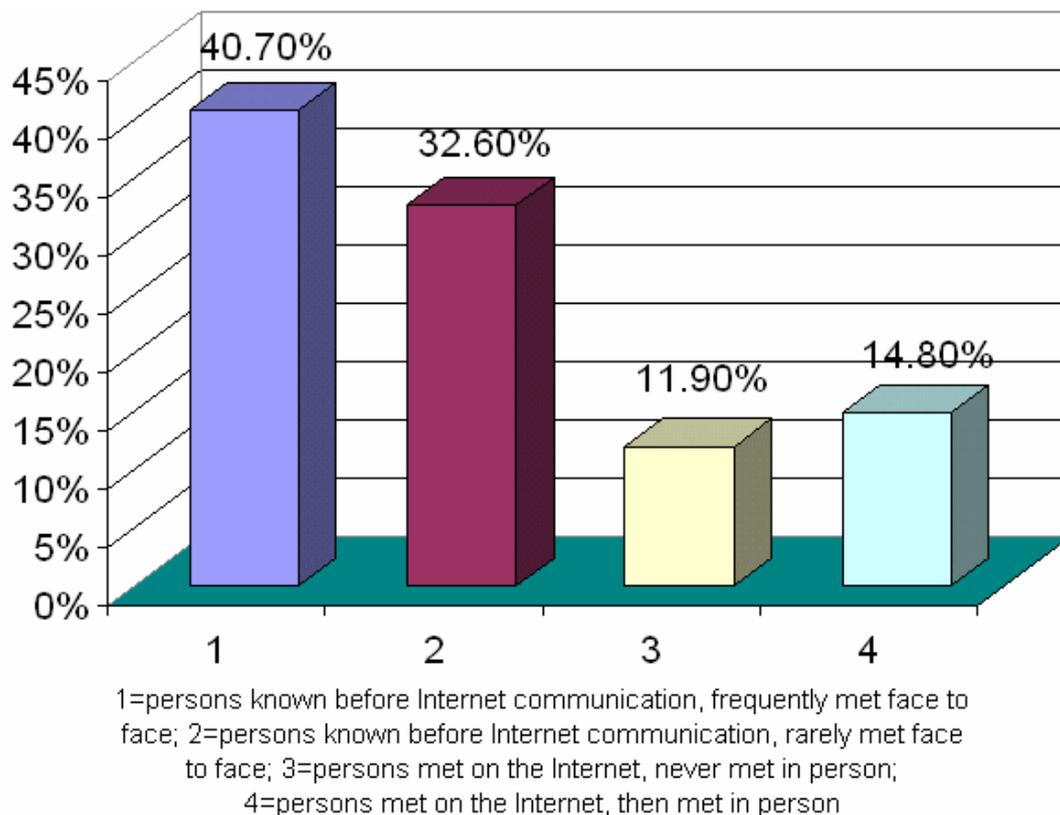
Fig. 7: On-line communication partners (N:270)

The main way of meeting a new person for a total of 119 subjects is: through chat (declared by 78 of the respondents), participating in a discussion-group is another possibility (15 subjects), while 26 respondents met new persons in Internet intermediate by a friend.

The main motives for getting in touch with new people include: curiosity (53.5%), personality match (21.3%), common interest (12.4%) and taking part in the same discussion-group (7.9%) (202 respondents).
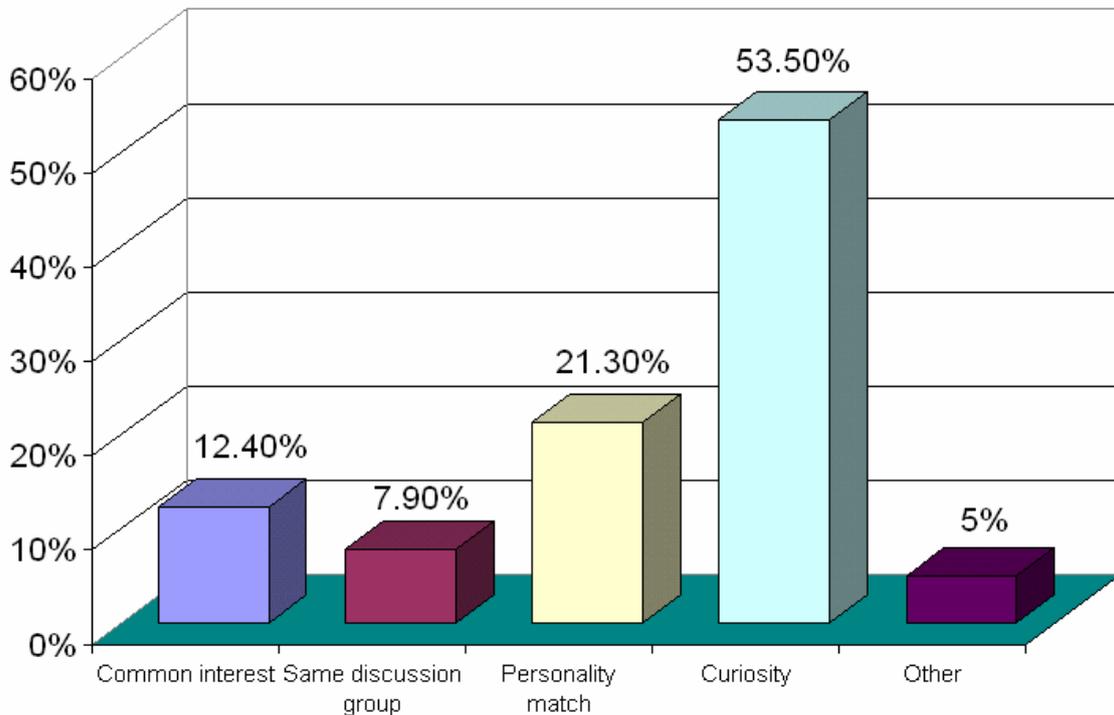
Fig. 8: Main reasons for getting in touch with new persons on-line (N:202)

3.1.3 Virtual communities

Only 34 persons (12.9% of 264 respondents) take part in a virtual community, with 16 taking part in more then one. Moreover, 26 get in touch with the community at least once a week, while 9 communicate daily or almost daily. The main obstacles to participation in a virtual community for 65 respondents are: trust for 19 respondents, of technological nature for 13, 12 students have problems in getting accepted by the old members of the community and 11 have problems with understanding community language. Moreover, 10 subjects do not have a reason or do not care about joining a community.

3.1.4 Impact perception

Opinions about the impact of Internet usage on job opportunities shows that 87.5% of the respondents consider Internet will help them (see figure 9).
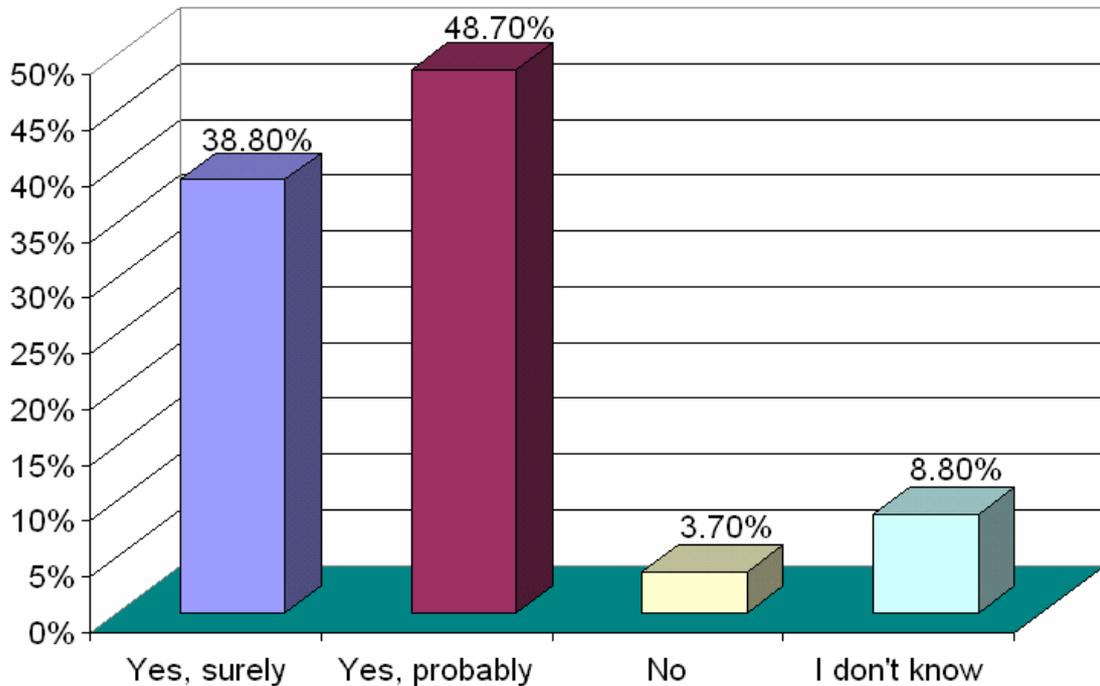

Fig. 9: Opinions about Internet usage impact on job opportunities (N:263)

Moreover, 87.2% consider that Internet will have a positive impact on their work (versus 12% who believe it will have no influence, and 0.8% that consider it will worsen it); furthermore, and 92.8% agree with the positive impact also in the case of studies (versus 6.1% no impact and 1.1% worsen) (see figure 10).
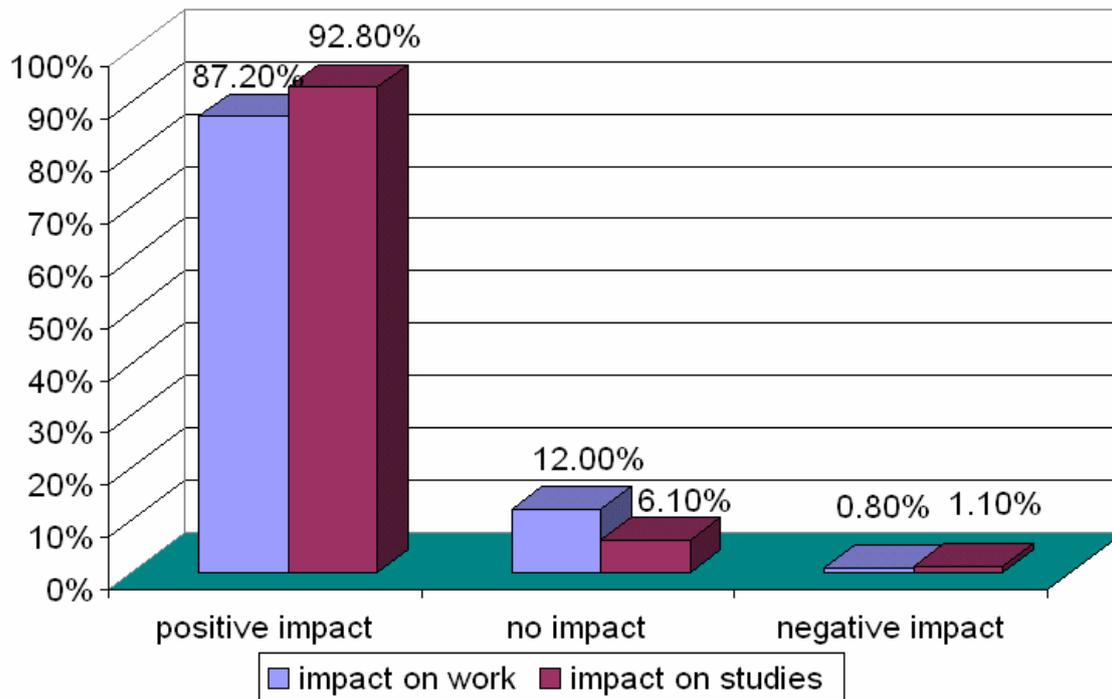
Fig. 10: Perceived Internet impact on work and studies (N: 261)

3.2 Gender digital divide results and analysis

There is a significant difference between the faculty choice of females and males (chi square, p= 0,01). Females are mostly enrolled in Social and Humanistic faculties, while males choose scientific fields. (N: 259)

The proportion of females and males with a PC at home seems to be quite similar, the difference is not significant and the observed frequencies are quite close to the expected ones (N: 273). The same can be noted in the case of Internet access at home: the difference is not significant (N: 201).

In the case of females vs. males, there is a clear tendency for males to declare more years of experience on the Internet then females, but, in reality, there is not a significant difference (chi square test, N: 259). Gender is a significant factor (N: 269, p<0.000) in relation to time spent on-line per week, with males registering more hours then females, dominating the over 8h/week category (47 subjects are males vs. 22 females) (see Figure 11).
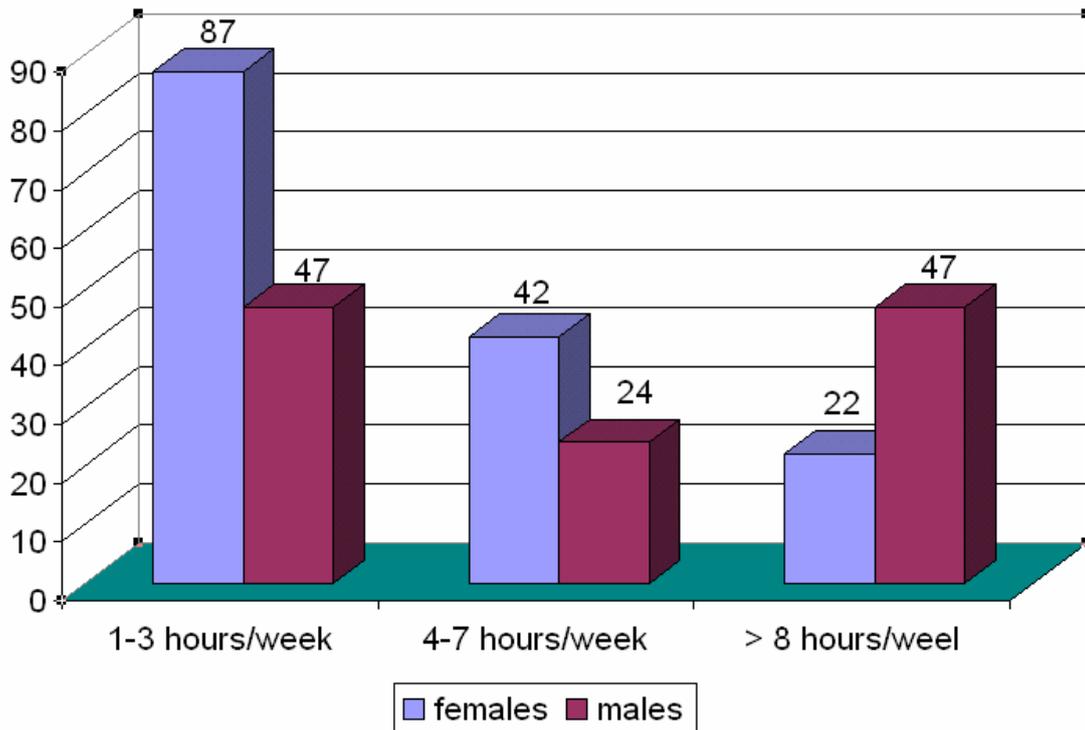
Fig. 11: Male and female time spent on-line per week period (counts) (N: 269)

3.2.1 Gender and Internet functions

E-mail

A total of 4 females vs. 9 males do not use e-mail, with a tendency for females to exceed males with regard to perceived ability in using this functionality. No significant differences were found (using the chi square test) (N: 270). Even if there are few people sharing their e-mail account with somebody (34 out of 264 answers), females present a tendency towards having shared accounts (25 out of 150) in comparison to males (9 out of 114), but this is not a significant difference.

Chat

Some 45 females and 35 males do not use chat, while 21 females and 17 males declare they have a high level of ability. Nevertheless, the data does not exceed expected frequencies, thus there is no significant difference between the two groups. (N: 261)

On-line shopping

Few subjects, from our sample, buy on-line (29 females and 23 males). (N: 253) The data are too low to be able to formulate an opinion about gender differences.

Information search

Females as well as males tend to vote for information searching as the most popular Internet activity. One can note a slight tendency on the part of males to be more prone towards this functionality then females, but there are still no significant differences. (N: 270)

Owning a personal web page is characteristic of 8 females (out of 141) and 11 males (out of 116), the number of subjects owning a webpage is not enough in order to permit a further analysis (N: 265).

A significant difference (chi square, p=0,01, N: 267) can be noticed in the case of Linux knowledge and usage. Females clearly do have less knowledge and use it less then males. But this difference is not visible in the willingness to learn how to use it. (chi square, N: 246)

There are no significant (chi square) differences in the way the Internet is perceived to impact on work and studies (impact on work N: 239, impact on studies N: 261). But in the case of the latter, there is a tendency, close to a significance level (p = 0,077) for females to be more positive then males in appreciating the Internet's impact on their studies. The same happens with regards to Internet usage impact on job opportunities, where females tend to position themselves in the extreme positive category in comparison to males who are in the moderate one.

3.2.2 Gender and Internet communication

The perception of the socialisation possibility changes is not different for males and females (chi square), of 271 respondents, 129 consider their socialisation spaces have widened, while 114 consider it the same. Moreover, the quality of social contacts is not perceived in a different way by the gender groups (N: 266, chi square test).

From the 268 general answers, there is not a significant difference with regard to the relationships via the Internet (the individuals with whom subjects entertain communication relationships via the Internet are: "known before Internet communication and usually frequented": Females: 62, males: 47; "known before Internet communication but rarely frequented": Females: 48, Males: 39; "Meet in virtual space, never met in person": Females: 16, Males: 16; "Meet in virtual space and currently frequenting": Females: 26, Males: 15; Total number of females: 152 and males: 116 answering).

While 121 females and 83 males communicate with persons living in the same country but in different cities, 46 and 39 respectively keep in touch with persons from the same town. The subjects who have relationships with persons of different nationalities record 47 for females and 33 for males and 64 and 40 respectively maintain contact with friends or relatives abroad. On the whole, there are no significant (chi square test) differences between females and males for these variables.

Females present a significant tendency (chi square, p=0,05, N: 265) to communicate also telephonically with the persons communicating through the Internet, while males do so less frequently.

There are no significant differences with regard to how new persons are met in virtual space or the main reason for this meeting.

3.2.3 Virtual communities

There are not enough data in order to provide relevant information for this category (only 34 subjects declare they take part in a virtual community).

4. General discussion

There were more females then males in our sample, a possible explanation is the over-representation of Social and Humanistic faculties, which present a higher rate of females, but also the general tendency of over-representation of females in the general student population. However, the proportion is similar to the percentages registered for the given faculties. The subjects are mainly young, in their first year of studies, as already stated, the major background is in Social and Humanistic sciences (mainly students from Psychology and Philosophy specialisation, due to data-gathering procedure and subject availability).

A vast majority speaks English (90.9%, N: 275), but also other foreign languages are well represented, among which: French, German and Italian (we considered these languages for their importance in regards to the Internet content languages; other well represented languages were: Hungarian and Russian).

The percentage of persons owning a PC is quite high 52.2%, if we consider that in Tuscany, Italy (one of the most developed regions of this western country), only 45% of the families have a PC at home (Regione Toscana, Area Statistica, Servizio Servizi Telematici, 2003). But the Internet connection is more problematic as only 28.1% have one at home in Romania, while 36.6% families have one in Italy (Regione Toscana, Area Statistica, Servizio Servizi Telematici, 2003). Considering the economic situation

of Romania, it can be argued that the values for physical access to technology (PC and Internet connection) are quite high. Also, we have not compared the type of Internet access, this could be one of the explorative points for future research.

The spread of personal web pages is an indicator for Internet familiarity. As the data shows, there are few individuals in our sample that have a personal web page. This might be due to the fact that Internet has a short history in Romania, and the subjects did not have the time to come to know it in depth. It is also indicative of the novelty this technology represents in Romania, in comparison with other countries. Even if the young people on whom this research is centred, accept and adopt Internet usage, its depth of influence still has to be achieved, we have not yet reached the full impact. In fact, Web-site creation was used in other researches (see Liff and Shepherd, 2004) as a relatively more sophisticated indicator of Internet usage to identify the subjects with more knowledge and experience with this new media.

Linux is an indicator of "computer literacy" as it reflects in-depth knowledge about operating systems. As in the case of the above-mentioned spread of webpages, this indicator points out the fact that this technology is still new for Romanians, and we have still to achieve the profound changes other countries are facing at the present moment. The difference between this indicator and personal web pages resides in the fact that web pages refer strictly to Internet technology impact, while the use of Linux is more general, reflecting computer literacy on a broad spectrum.

Future tendencies reflected in the desire to learn and use Linux show that the participants want to further develop their abilities in the technical field, moreover they are willing to try new systems and face new challenges. Extrapolating, we can say this is a reflection of optimism and importance of technology in daily life, as persons are ready to invest time and other resources in order to improve their technology interaction and usage.

Internet information searching proves to be the main activity in our sample, followed by e-mails. The need for information can be explained by the lack of other sources and by the facility of access (for example low cost). The majority of subjects searches for information on-line because they do not have access to it in other ways, this reflects the Romanian reality of information access. Even in the university system there is still a lack of critical educational contents. The reaction of searching novel as well as relevant information on-line is an answer to the lack of printed information, but also a sign for the need to reform the educational system, in terms of access to information, and of the general information system. The second main reason for choosing the Internet as an

information base is the facilitated access in terms of comfort: having a world encyclopaedia on your home desk - with no need to move and use transportation, or loose time - is something to be appreciated.

Communication is also important, especially asynchronous communication (e-mails), probably also as a means to overcome the costs of a continuous connection (connecting just for receiving and sending e-mail is a frequent behaviour meant to lower line costs).

Few students share their e-mail account with others, demonstrating the perception of privacy and intimacy of Internet communication.

Chatting is not that widespread in our sample, students demonstrate a rather critical attitude towards it. Nevertheless, chat is mentioned as the main modality for meeting new persons.

Very few subjects do their sopping on-line. Explanations can reside in the economic situation of Romania, the critical view of service providers towards eastern buyers on the basis of negative past experiences, and the credit card services provided by banks in this East-European country, which are fairly scarce. Of course, these are possible explanations that might need further research and data in order to be understood and generalised.

As the data on e-mail usage abilities show, most of the students use the Internet for communication purposes. The general positive attitude is reflected also in this field as most of the respondents appreciate the Internet's impact on socialisation possibilities and on the quality of on-line relationships as a positive factor. The Internet's impact on other communication channels, in this case telephone communication, should be further investigated. Current data show that 50% of our subjects communicate by phone with the persons they communicate with via Internet, but this data should be compared with other phone usage data in order to provide an adequate interpretation.

Most of the subjects communicate with known persons who they meet often or little in face-to-face situations, persons residing in the same country but also in other cities, as well as friends and family living abroad. But the percentages for other categories (persons living in the same city and persons of different nationalities) are also quite high, demonstrating that the Internet is opening-up communication and socialisation possibilities, extending the prior "action scale", and thus improving personal communication. This affirmation is sustained also by the fact that many of the relationships formed on-line tend to become also relationships in face-to-face contexts. Katz and Aspden (1997) report similar findings that encourage us to argue that new

individuals are often met on-line and some of these relationships are carried on offline as well, reciprocally confirming the fact that the Internet is a new medium for intermediation.

The majority of new Internet acquaintances is met via chat, and the main reason is curiosity, the data underlining again the widening socialisation and social exploration spaces supported by technology. Personality match and common interests are other reasons for meeting new people, and the possibilities are offered by on-line discussion groups (or communities) and common friends.

Little participation in virtual communities seems not to be due to technological knowledge problems, as only 13 persons fear them, but the reduced level of response to this question is another indicator of the level achieved by Internet adoption and skills, which is shallow.

Optimism about the Internet's impact regards job opportunities, work and studies. The majority of our respondents think that the Internet will bring improvements in these areas, while very few people consider it will worsen the situation. These data raise the question if the novelty of such technology is the only reason in determining this line of thought, or if there is a real perceived-need for more knowledge and usage experience. The working environment is suffering critical transformations as a result of the impact of IC technologies. Just taking into account the modifications in communication, we can say that organisations are revolutionising themselves in the light of new possibilities. Critical as well as positive opinions about this effect have been presented, but practical reasons overcome scepticism, as the Internet is more and more used in common work settings. Maybe this reason is strong enough in order to give students a positive impression of Internet knowledge and usage impact on future job opportunities and work in general. The tendency here highlighted should be understood as a suggestion for education authorities towards focusing efforts on giving the needed information and experience for the better preparation of students for the field of work. Such educational system changes would bring real competitiveness not only for educational institutions but also for the work force as well.

4.1 Gender Digital Divide discussion

More men then women are enrolled in the technical-scientific faculties, confirming the trend observed in the literature (see for example Cukier et al., 2002). This confirmation is another sign, which highlights the importance of offering an equal advantage educational system, and promoting females' entry into technical-scientific fields.

Technical access

The data shows that we are not dealing with a physical access problem to technology, as females and males own PCs and have Internet connections in a proportional measure. This underlines the fact that the causes of the gender digital divide are mainly located at a psychological-social level and that interventions to reduce them should be centred at these levels.

On the contrary, Liff and Shepherd's study (2004) indicates significantly less access points for women in comparison with men in the UK. Thus, the Romanian gender divide is different from this perspective.

Ability to use access

There are no significant differences in Internet usage skills, as reported by the respondents. These data are contradictory with other research studies, such as Jackson et al. (2001), that have noted a marked difference, with females communicating via Internet and males searching for information. Culture differences might be a cause, but more data is needed in order to better understand the given relationships. A tendency for self-underrating has been noted in women with regard to Internet abilities (Liff & Shepherd, 2004); this is not the case with the Romanian student sample. Nonetheless, there are no reasons to think of a divide at this level of Internet usage in Romania, in spite of its existence in other countries.

Take-up of access

Males spend more time on-line then females, who tend to classify themselves in the medium-low Internet frequency usage categories. As the results show, males are more "computer literate" then females, this fact that does not surprise as more males can be found in the technical-scientific faculties, thus, they are better prepared and more knowledgeable. But the fact that the differences disappear when we examine the willingness to learn and use Linux, shows the tendency towards bridging the digital gap between the two groups. More data are needed in order to be sure about this developmental direction, but if data are confirmed this represents good news with regard to the gender digital divide.

In addition, more males own a personal web page. We can say that males are clearly advantaged by their background, since they are more computer and Internet knowledgeable. Future studies should try to identify if the differences are due to

interests or disadvantages, and, if the first is the case, understand what creates the differences and if they really are a handicap for females; in the latter case, it would be necessary to provide adequate intervention measures at a social level.

Similar, Internet use in Britain is still significantly divided by gender, reflected also in creating Websites while males spend more time on-line then females (Liff & Shepherd, 2004). This aspect indicates common points in the gender digital divide across cultures.

Impact of access

Although the Internet impact perception data is not significantly different (chi square test), the females' tendency to have a more positive opinion than males with regard to impact on their studies could be related to an involvement desire in this new media. Certainly, this is just a hypothetical explanation that needs further research in order to be proved or rejected. Keeping in mind also the second results, on Internet usage impact on job finding possibilities, we can say that a pattern of more female positive-thinking can be supposed. Of course, more evidence and in-depth data should clarify the situation also because the international situation indicates that females are usually less positive then males with regard to the Internet's impact.(Liff and Shepherd, 2004)

Returning to the discussion about interests or disadvantages that cause gender digital divide, the data about female positive opinions suggests rather an interest in women for technology and an understanding of its importance. Should this be the case (the need for further data is to be underlined), the problems should be located in the disadvantages category and, thus, represent a failure of the system.

Moreover, there are no perception differences as regards the positive impact the Internet has on socialisation spaces and quality of social contacts, for females and males. This means that the Internet is equally perceived as opening-up new possibilities (or not intruding and worsening present ones) in communication, socialisation and general relationship formation.

With regard to the integration of different communication channels (the Internet and Phone in our case), females clearly tend to integrate. This data needs further support as regards phone usage patterns in females and males, in order to provide a valid explanation. As a hypothesis, we can say that females are probably more prone to phone in general, in comparison to males, and that the present difference might be due to this (based also on the general communication needs of females).

5. Conclusions

The present study has focused on two main objectives:

- Giving a general perspective of Babes-Bolyai University students (Cluj-Napoca, Romania), as an example of the general Romanian student population.
- Analysing gender differences in technology adoption and usage.

The data shows that physical access is limited, the sample owning PCs and Internet connection represents average-level. The most used Internet functionality is the information search, followed by e-mailing. These results confirm other present in the literature, such as Cobb Payton (2003) that indicates the same preferences for Internet functions (most used: search, followed by e-mail, chat and e-shopping in this order).

The information accessed via the Internet is usually information not accessible by other means, but another factor for Internet usage is the comfort the user associates with it.

Keeping in mind European data for e-commerce, with 17% of the entire population using it (Demunter, 2005), on-line shopping is scarcely used by our subjects, and should be closer analysed as e-commerce is an important evolution, critical, at the present moment, for the transition phase.

Communication is one activity that suffers an important impact, but the result is perceived as rather optimistic: socialisation spaces and quality of communication relationships are on the increase. In other countries as well, interpersonal communication is the main motivator of Internet usage, and is perceived as being highly positive (see for example Kraut et al., 1998).

With regard to the digital divide, we can say that the level of technological access, in terms of access to a PC, does not seem to be a problem. However, Internet access is still not common and indices of computer and Internet literacy demonstrate a shallow knowledge by the majority of the sample. In fact, Romania is below the European average with regard to Internet access possibilities (Demuter, 2005). Social access and use seem to be encouraging rather then hindering on-line activities. The optimism and positive attitude shown by the subjects encourages us to argue that the digital divide, for the population under consideration in this research, and from this perspective, is not a problem.

The situation is quite different for the gender digital divide, which seems to be quite strong. Even if females have reported the same physical access opportunities as males, and their skill levels are not so different, the frequency of time spent on the Internet, and the amount of experience and knowledge are clearly in favour of males. Nevertheless, the quality of the divide is different to that of other countries, especially with regard to abilities and impact perception.

In general, it can be concluded that there is still a certain digital divide, present mostly in the in-depth knowledge and experience the subjects have. Males have more computer and Internet knowledge and experience then females, and tend to use these technologies more, so that the gap might be widening. On the other hand, there are aspects in which gender differences are not significant and a demonstrated positive attitude on the part of females - ready to adopt and use new technology, in the case they did not already do so - exists. Other studies (such as Schumacher and Morahan-Martin, 2001) indicate, not only differences in knowledge and usage, but, also, in attitudes towards the Internet and the perception of new technologies. In brief, females are supposed to have lower levels of experience and more negative attitudes than males. Also Liff and Shepherd (2004) report wider divides between genders, especially with regard to the perceived impact and self-assessment of abilities. From this point of view, the present data indicate a rather positive attitude of Romanian female students and no significant differences for perceived abilities. Even if these results can be interpreted as having various causes (for example a lack of the self-underrating female attitudes), it can be concluded that the divide is different to that/those in other European situations. Explanations might be found in the communist past in which there were more female engineers and less gender divide as regards PC usage (Durndell et al., 1997).

Further studies, especially in the form of longitudinal research, are required in order to prove this tendency or to highlight a widening of the digital divide, so that interventions can be planned. In this sense, the scarce participation of females in technical-scientific faculties is to be noted, as a negative evolution in comparison to the past (Durndell et al., 1997) and adequate measures encouraging females and influencing them to choose this career path should be considered and implemented. Such measures have already been taken in developed countries.

The present study not only gives a picture of the situation, but also indicates some relevant variables to be used in future studies, as well as a hypothesis and important points, providing a basis for further research. We underline here the potentialities of the

variables involved in PC and Internet literacy (usage of Linux and owning a personal web page, as well as participating in a virtual community), together with the need for in-depth studies about the problems of e-commerce (as on-line shopping is the for less used functions). Furthermore, more data is needed on the differences between genders and usage groups in order to understand if identified trends (and hypothesised evolutions) are confirmed, if there is a need for -social-level intervention, and how this evolution could be constructed and implemented.

The present data provides the basis for further developments, which can expand current knowledge in more directions. There is a need for more qualitative and in-depth data about computer mediated communication through the Internet, as well as of virtual communities. A study of the current public administration and e-commerce sites in Romania, together with an in-depth study of how people access and use these sites, would help to analyse the impact of e-services.

Universal access should be explored taking into account the critical groups, such as the elderly and those with special disabilities, together with an analysis of the implementation of current standards for accessibility, at least of the public administration services offered on-line on the basis of the recommendations by W3AI.

The digital divide represents a very important issue for modern society. Further studies are needed in order to explore the divide that exists at the general level of the population, for example between rural and urban areas, as well as between individuals with different levels of education. Longitudinal studies exploring the evolution of digital divide patterns and usage group dynamics would clarify better the Romanian picture.

Moreover, in-depth analysis of gender differences should explore the qualitative differences present, as well as their causes, gender attitudes in relation to technology and, especially, the Internet, as well as differences in activities on-line, etc.

As previously mentioned, the present research is just the beginning of a wider and more detailed analysis meant to facilitate understanding of the state-of-the-art of the Romanian Information Society, as well as to delineate future directions for intervention and evolution, in order to facilitate the development of the e-society.

7. References

Calenda, D. (2003). Gli effetti personalizzanti delle nuove tecnologie: nuove tensioni tra controllo sociale e libertà individuale, Ph.D. Thesis, Electronics and Telecommunications department, Engineering Faculty, University of Florence, Italy.

Chen, W. & Wellman, B. (2004). Charting Digital Divides: Comparing Socioeconomics, Gender, Life Stage, and Rural-Urban Internet Access and Use in Eight Countries. In W. Dutton, B. Kahin, R. O'Callaghan, & A. Wyckoff (eds.), *Transforming Enterprise*, Cambridge MA: MIT Press.

CNNIC (2002). *China Internet Network Information Center, 11th Survey Report*, www.cnnic.net.cn.

Cobb Payton, F. (2003). Rethinking Digital Divide, *Communications of the ACM*, 46(6): pp. 89-91.

Cukier, W., Shortt, D. & Devine, I. (2002). Gender and Information Technology: Implications of Definitions, *ACM SIGCSE Bulletin*, 34(4): 142-149.

Demunter, Ch. (2005). Digital Divide in Europe, Statistics in Focus, European Communities,
Retrieved from http://epp.eurostat.cec.eu.int/cache/ITY_OFFPUB/KS-NP-05-038/EN/KS-NP-05-038-EN.PDF.

Durndell, A., Cameron, C., Knox, A., Stocks, R., & Haag, Z. (1997). Gender and Computing: West and East Europe, Computers in Human Behavior, 13(2): 269-280.

Eurostat, Retrieved (February 2005) from http://epp.eurostat.cec.eu.int/portal/.

Jackson, L.A., Ervin, K.S., Gardner, Ph.D., & Schmitt, N. (2001). Gender and the Internet: Women Communicating and Men Searching, *Sex Roles*, 44(5/6): 363-380.

Katz, J. & Aspden, P. (1996). Motivations for and barriers to Internet usage: Results of a national public opinion survey. *A paper presented at the 24th Telecommunications Policy Research Conference*, Solomons, MD., October. Retrieved from: http://www.markle.org/J96329pd3.html#Users.

Katz, J. & Aspden, P. (1997). A nation of Strangers?, *Communications of the ACM*, 40, (12): 81 - 86

Kraut, R., Mukhopadhyay, T., Szczypula, J., Kiesler, S., & Scherlis, W. (1998). Communication and Information: Alternative Uses of the Internet in Households, *Proceedings of CHI 98*, 18-23 April, Los Angeles, USA, pp. 368-375.

Liff, S. & Shepherd, A. (2004). An Evolving Gender Digital Divide?, *Oxford Internet Institute, Internet Issue Brief*, No. 2. Retrieved from: http://www.oii.ox.ac.uk/resources//publications/IB2all.pdf

MCTI (Ministerul Comunicatiilor si Tehnologiei Informatiei) (2003). *Raport de Evaluare a Stadiului de Dezvoltare a Societatii Informationale in Romania*, Retrieved from www.mcti.ro

Morahan-Martin, J. (1998). Women and Girls last: Females and the Internet, Presented at *IRISS'98* conference, 25-27 March, Bristol, UK. Retrieved from www.sosig.ac.uk/iriss/papers/proceed.html.

NITA (National Telecommunications and Information Administration) (2002). *A Nation On-line: How Americans are Expanded their Use of the Internet,* Washington DC: US Department of Commerce.

Regione Toscana, Area Statistica, Servizio Servizi Telematici (2003) *Indagine campionaria "Le famiglie Toscane e Internet", Marzo-Aprile 2003*. Retrieved from www.regione.toscana.it.

Schumacher, P. & Morahan-Martin, J. (2001). Gender, Internet and computer attitudes and experiences, *Computers in Human Behaviour* 17: 95-110.

Wellman, B., & Haythornthwaite, C. (eds.) (2002). *The Internet in Everyday Life,* Oxford: Blackwell

Wellman, B. & Hogan, B. (2004). The Immanent Internet. In Johnston McKay (ed.), *Netting Citizens: Exploring Citizenship in a Digital Age* (pp. 54-80). Edinburgh: St. Andrew Press.

The Impact of Telepresence on Cultural Transmission through Bishoujo Games

Matthew T. Jones ♠♦

♦ Temple University
Philadelphia, PA (USA)

ABSTRACT

Japanese *bishoujo* videogames take on the characteristics of highly detailed "choose your own adventure" novels. The current case study seeks to present a series of "classic" bishoujo videogames and explain how they function to orient the Western player to the culture of modern Japan through the phenomenon of telepresence. Aspects of telepresence that include transportation and immersion are considered toward the end of offering the player a degree of access to some aspects of modern Japanese culture. It is suggested that, by experiencing a sense of telepresence through inhabiting a Japanese avatar, the non-Japanese player has the potential to obtain a heightened level of competence in negotiating Japanese culture.

1. Background

Videogames have become a popular subject for researchers concerned with both the positive and negative effects of interactive media. Investigations into aspects of videogame play that include addiction (Phillips, Rolls, Rouse & Griffiths, 1995; Rosenfeld, 2001; Soper & Miller, 1983) and violence/aggression (Anderson & Dill, 2000; Fleming & Rickwood, 2001; Funk, Buchman, Jenks & Bechtoldt, 2003; Gentile, Lynch, Linder & Walsh, 2004; Panee & Ballard, 2002; Uhlmann & Swanson, 2004) have documented some undesirable peripheral effects of playing videogames (particularly with regard to children) that include decreased empathy, increased violence, diminished academic accomplishment and poor development of interpersonal skills.

♠ Corresponding Author:
Matthew T. Jones
Affiliations, Address: 309 Princeton Ave., Philadelphia, PA 19111
Phone: (215) 725 4466
E-mail: matjones@temple.edu

Conversely, videogames have also been explored for their potential to provide desirable effects such as therapy, including pain and stress relief for cancer patients undergoing chemotherapy (Kolko & Rickard-Figueroa, 1985; Redd, Jacobsen, Die-Trill & Dermatis, 1987; Vasterling, Jenkins, Tope & Burish, 1993) and cognitive training for individuals suffering from attention deficit disorder (Kwan, 2002).

Videogames have also been researched for their potential to act as aids to education (Rosas, Nussbaum, Cumsille, Marianov, Correa, Flores, Grau, Lagos, Lopez, Lopez, Rodriguez, & Salinas, 2003). Specifically, research has demonstrated the potential for videogames to assist in violence prevention and education (Fontana & Beckerman, 2004), improvement of spatial skills (Subrahmanyam, 1996), increased proficiency in visual multitasking skills (Greenfield, deWinstanley, Kilpatrick & Kaye, 1994, 1996), development of AIDS awareness (Cahill, 1994), improved computer literacy skills (Greenfield, Camaioni, Ercolani & Weiss, 1994) and increased reading speed and comprehension (Radencich, 1984).

As the increased sophistication of technology and social themes in videogames begins to change the role that they occupy in society, both negative and positive potentialities will increase multifold. It is the responsibility of media scholars to understand the evolution of videogames and continue pointing out the potentially helpful and harmful effects associated with them. We begin here with a short discussion of the relationship between technology and social themes with respect to contemporary videogames.

It has recently been observed that innovations in videogame hardware, software and components have made some gaming experiences seem to converge with the experience of watching film (Crowson, 2005; Gnatek, 2004; Hebert, 2004). This trend can be witnessed in the overlap that has come to exist between professionals in the videogame industry and professionals in the movie industry. Hebert (2004) specifically comments that, "The creative people who conceive and develop games often do similar work – under similar titles – as their film counterparts. And it becomes more true as technology lets games become more complex and lifelike" (World of Video Games…). This complexity and true to life quality has even caused some to compare certain gaming experiences to the fictional "holodeck" of *Star Trek* (Enderle, 2005; *Gizmag*, 2004). Mike Fortier and Kit McKittrick of Holo-Dek Gaming® have even gone so far as to invest millions in videogame theaters that bring the most advanced technology in gaming to the consumer at a reasonable price (*Gizmag*, 2004).

Other advances in videogame systems have created associations with the world of virtual reality. Popular games that are already available, such as *Dance Dance Revolution*, bring the environment of the game off of the screen and into real space. Similarly, the "BigBen Bodypad Virtual Fight Simulator" makes use of sensors to transform fighting games such as Tekken from exercises in thumb coordination to exercises in total body coordination (*I4U*, 2005).

Development of videogames has not, however, been circumscribed to advances in technology. Storylines and characters within videogames have developed to make full use of subtler and more detailed virtual interactions. Hebert (2004) asserts that, "More games are featuring complex plot lines and actual character development, rather than relying on nothing but nonstop action" (World of Video Games…). Game designer Richard Rouse (2005) also notes the trend in modern gaming toward using technology to allow players control over their own stories.

One form of videogame, the Japanese bishoujo game, has been particularly eager to embrace thematic complexity within the medium. Yukino (2000) comments that, "the later nineties wasn't just about technology revolutionizing the [bishoujo] industry. [Fans] wanted good, mature themes, and vivid characters. They wanted a visual and aural experience. They wanted games that could make them think, laugh and cry" (PC Bishoujo Games…).

As themes in bishoujo games have become more intricate, culture has come to play an increasingly important role in mediating the gaming experience. A close look at several key bishoujo games will illuminate how this mediation works.

2. Bishoujo Games

To begin with, the Japanese word bishoujo (or bishojo) translates to "pretty girl" and bishoujo games have been defined as "a type of Japanese video game centered around interactions with attractive anime-style girls" (TheFreeDictionary.com, n.d.). In terms of appearance, these games are unique in that many of them have three distinguishing features in common: (1) a large square box in the center of the screen for images, (2) a horizontally oriented rectangular box (located just below) for text, and (3) a background that encompasses both the image box and text box and extends to the edges of the screen (see Figure 1).

Fig. 1: An illustration of the game interface from *May Club*.

As a product, Bishoujo games are extremely popular in Japan. *Bishoujo Gaming News* (n.d.) reports that, "Over 25 percent of software in Japan are interactive adult games of some kind" (Japanese Dating-Sim Game Report). It has also been estimated that approximately fifty new bishoujo titles are released every month in Japan (Peach Princess, 2004). Many of these can be classified under more specific subgenre headings such as "dating simulation" games, "ren'ai" (romantic) games, "hentai" (pornographic) games, and more.

The advent of bishoujo games came about in 1982 with the Japanese release of *Night Life*, a PC adventure game. NEC's PC 88, PC98 and early DOS PCs were the platforms of choice for early bishoujo designers (*Bishoujo Gaming News*, n.d.). However, bishoujo gaming did not come to fruition until the late nineties when Widows 95 and CD-ROM technology were able to support vastly improved sound, imagery and storage capacity (Yukino, 2000).

Eventually, bishoujo games were manufactured (in Japan) for game consoles such as Sega Saturn, Sega Dreamcast and Sony Playstation (TheFreeDictionary.com, n.d.; Yukino, 2000). Such popular enthusiasm has not been the case in the United States where bishoujo games are unavailable to consoles and the influx of games has been lukewarm even for the PC market. Despite this, however, companies such as JAST USA, Peach Princess, G-Collections and Himeya Soft have persevered in distributing these games to the West and, as a result, 2003 and 2004 were relatively prosperous years for bishoujo game translators and distributors in the United States. This success

is in part do to the popularity and acceptance of other Japanese entertainment products such as anime and manga (TheFreeDictionary.com, n.d.).

In an effort to better understand the current and potential future impact of these unique, complex and culturally mediated games, the theoretical perspective of telepresence will be addressed.

3. Telepresence

In a detailed concept explication, Lombard and Ditton (1997) define the general concept of presence (referred to here as telepresence) as "the perceptual illusion of nonmediation" (Concept Explication). More specifically, they identify two types of telepresence that are of central concern to the study of videogames. These are "presence as transportation (you are there)" and "presence as immersion" (Concept Explication).

"You are there" transportation occurs when "the user is transported to another place" (Lombard & Ditton, 1997, Concept Explication). Defined in this way, "you are there" transportation becomes a fundamental concept to understanding how videogames in general, and bishoujo games in particular, constitute a sense of telepresence. Put simply, the goal of most game designers (with the likely exception of puzzle/strategy game designers) is to transport the player to another place: the world of the game. Highlighting the objective of game designers, Retaux (2003) explains: "As a person cannot be geographically present in two places at the same time, you must see to it that he believe that he is physically in an environment that in actual fact he isn't present in" (p. 286).

A second aspect of telepresence that is of key importance to the videogame experience is known as immersion. Both Lee (2004) and Lombard and Ditton (1997) use Biocca and Delaney's (1995) definition of immersion: "the degree to which a virtual environment submerges the perceptual system of the user" (p. 57). Slater (2003) provides further elaboration, writing that "The more that a system delivers displays (in all sensory modalities) and tracking that preserves fidelity in relation to their equivalent real-world sensory modalities, the more that it is 'immersive'" (Immersion and Presence).

This understanding of immersion, referred to specifically as perceptual immersion by Lee (2004) and Lombard and Ditton (1997), is unsatisfactory when conceived of as the exclusive way that telepresence can be constituted. There are many examples of telepresence experiences that do not rely on numerous sensory channels or high

perceptual fidelity. Schubert (2002) in his discussion of the "book problem" points out that "Immersion is only the source of stimuli from which the users creates [sic] a mental model of the virtual environment and his relation to it" (p. 1). Thus, it can be asserted that even relatively iconic and unrealistic stimuli are capable of provoking presence since they are merely source material for what the user constructs cognitively.

The difficulty with applying a purely perceptual (as opposed to psychological) theory of immersion to bishoujo games is that their content tends to be highly iconic (see Figure 2) and the player is unlikely to have the sensation of being immersed in the game, at least as compared to other technology such as virtual reality. An alternative approach to understanding how these games immerse the user is psychological immersion.

Fig. 2: An illustration of iconicity in *Season of the Sakura.*

Lee (2004) and Lombard and Ditton (1997), in their respective concept explications, draw from Palmer (1995) in describing psychological immersion as the quality of feeling involved with, absorbed in, and engrossed by a virtual environment. This description of immersion takes into account the active role of the player in constructing the virtual space of the game. Schubert describes this construction process by noting that "[t]he content presented in the media is only the raw source of the mental model building, not a direct determinant of the presence experience" (2002, p. 3). Klimmt and Vorderer (2003) similarly point out how players make use of memory and previous experience in order to mentally simulate an environment based on stimuli that may not be highly immersive.

Because the construction of memory and experience can be construed as a profoundly social phenomenon, popular culture plays an important role in mediating perception. Especially relevant to this discussion is the experience of international and intercultural encounters. Fontaine (1993) reports participant experiences of telepresence (including "realness" and "vividness") in this context, demonstrating the potential to experience a sense of "being there" across the gap of cultural difference. Further, Mantovani and Riva (1999) make special note of the impact culture has on presence experiences, explaining that "[s]peaking of mediation means speaking of culture, i.e., a network of instruments making up the everyday reality in which we live" (p. 541). This understanding of the relationship between culture and telepresence is exhibited in Peter Payne's description of bishoujo gaming: "You're reaching out and touching a little piece of Japan in the game – you really feel like you're experiencing love and life vicariously through the game characters" (*Bishoujo Gaming News*, n.d.).

In what follows, an effort will be made to dissect the process by which telepresence is experienced through the lens of culture in six particular bishoujo games. Attention will be paid to aspects of transportation as well as perceptual and psychological immersion, in an effort to understand how translations of Japanese bishoujo videogames work to transmit cultural knowledge about Japan.

4. Case Study

The games presented in this case study are titles currently available through JAST USA, a company specializing in the distribution of English translations of bishoujo games. Selection of games was guided by the intention to include games that were "classic," or popular and representative of some of the major subgenres of bishoujo gaming.

The following six games compose the cases that are examined in terms of their strategies for evoking telepresence cross-culturally:

1. *Runaway City*
2. *Season of the Sakura*
3. *Three Sisters' Story*

These three games were selected because they were each included in the *JAST USA Memorial Collection* which is described on the CD-ROM cover as a "collection of three classic Japanese love-sim games." Due to the fact that these games were compiled on

one disc and are among the earliest English translations, they were deemed appropriate for inclusion.

4. *Nocturnal Illusion*
5. *May Club*

These two games were included based on their belonging to the *Milky House Memorial Collection* that is similarly described on the CD-ROM cover as a "collection of three bishoujo classic titles." One title, *Borderline Collection vol. 1,* was excluded from examination on the basis that is a picture gallery and not an actual game. Similar to the JAST USA collection, these are early English translations of bishoujo games.

6. *Little My Maid*

This game was included because it is among the newest releases available in English translation and distributed in the United States. In addition, this game has received a great deal of attention from distributors leading up to the time of its actual availability.

As a customer of JAST USA and Peach Princess, and as a member of the J-List listserv, I received much information about this hotly anticipated title: "…our long-delayed title Little My Maid has gone Golden Master and is being duplicated right now" (Peach Princess, 2004, Bishoujo Gaming Update), "We're extremely happy to announce that Little My Maid, the long-awaited dating-sim game from Peach Princess is finally in stock and shipping now" (J-List, 2004, Greetings from J-List), "For the hundreds who have waited patiently for Little My Maid for so long, we are happy to announce that the game is in stock and shipping now!" (JAST USA, 2005, What's new at JAST USA?).

While these cases cannot claim to be representative of all English-translated bishoujo games, they are arguably important titles based on popularity and availability.

5. Strategies

5.1 Transportation

5.1.1 Transportation through demystifying reflexivity.

"You are there" transportation is defined above as the transportation of the user to another place that is, for our purposes, the world of the bishoujo game. Beginning with

this definition, I start by exploring how some of these bishoujo games transport their users to another place through a strategy that I will call *transportation through demystifying reflexivity*.

Informed by Stam (1985) and Ames (1997), Jones (2005), in an examination of reflexivity in comic art, defines demystification as "the act of revealing the mechanisms of production responsible for creating the particular text" (p. 276). It could be said that, in this way, the nature of the text as an artificial construction is revealed. But is this truly the case? By revealing the falseness brought to life through the production process, a world-within-a-world scenario unfolds because the mechanism acting to reveal the production process simultaneously disguises its own production process. As Ames (1997) points out with respect to Hollywood movies:

"When movies about the movies reveal cinematic fakery or show, they generally put forward an alternative reality that contrasts with the illusion of the movies. But because the entire film inevitably is trapped in the cinematic realm for the viewing audience, the identification of genuine truth about Hollywood becomes paradoxical" (p. 6).

Similar to this, in terms of "you are there" transportation, demystifying reflexivity within some bishoujo games acts to situate the player in the world of the game through comparison with a virtual or fantasy world that is embedded within the game. This is to say that, by comparison to the world within the game world, the game world itself becomes less removed from the player's own reality. This is particularly the case when the player moves from the game world proper to the world within the game world because the sense of transportation is made doubly apparent: on the one hand the player is transported into the game by playing the game, and on the other, he/she has been transported once again by entering a realm that exists within the larger space of the game world.

Perhaps the most obvious example of this concept occurs in the virtual reality simulator game titled *May Club* – a dating simulator game wherein the player enters a separate virtual world through the initial virtual world of the game.

May Club's story, as presented in the instruction manual, reads as follows: "In the year 2023, the "final" communication method became reality with the creation of the May Club VR system, a virtual world in which ever [sic] aspect of reality is recreated by computer control" (Milky House Memorial Collection Readme File ver. 1.0, 2003). This

description, of course, neglects to mention that the encompassing virtual world of the bishoujo game itself is placed in a position that supplants the "real" world existing not only outside of May Club (the virtual reality simulator), but also outside of *May Club* (the bishoujo game).

As a consequence of the separate worlds within *May Club*, transported telepresence plays a critical role as Hajime Kudo (the player) is perpetually moving between the May Field virtual world and the "real" world within the context of the game. In control of Hajime's actions, the player moves from his bedroom to the "May Club center" to May Field, back to his bedroom in a continuous loop of transportation.

Potentially the most effective aspect of transported presence within *May Club* is due to the absolute similarity between the games' representation of the real world, and its representation of May Field. In fact, the exclusive difference between these realms is a logo in the lower right portion of the screen that reads "VR May Club" in stylized lettering. So when the player moves from one world to the other, the transition is all but imperceptible. It is the imperceptibility of this transition that the game relies on in order to, in the end, provide the player with a feeling of transported telepresence. One potential game outcome, for example, finds Hajime (the player) and Keiko (his romantic partner) exiting May Field together and entering the game's "real" world where they make love in a scene that occupies the entire screen. In this example, the player's sense of being transported to the world of the game is made very powerful by its contrast the less elaborate environment of May Field.

Other games develop based on the premise that the protagonist is transported to a fantastic or mysterious world where the events of the game unfold. One example of this occurs in *Nocturnal Illusion* when our character (Shinichi) is swept away by a typhoon and, upon regaining consciousness, finds himself in a strange place inhabited by people who don't remember their past. Similarly, *Little My Maid* begins with Ohji (our character) being transported over the sea and through a dense fog to a mansion on the water. When he arrives, the mistress tells him "This place is a world of dreams where the sad, transient real world can be forgotten."

In these examples, the player is transported from the "real" world that is associated with the game to a virtual or fantasy world that exists only within its context. In games where the player is not made conscious of a world-within-a-world scenario, this strategy is obviously inapplicable.

5.1.2 Transportation through the homunculus and external retina.

Beyond the transportation between worlds discussed above, there is also a transportation that occurs between avatars. In *May Club*, for example, the protagonist (Hajime) who serves as our avatar in the game must also inhabit his own avatar when he transports himself to May Field (the virtual reality world in May Club). Thus, in a literal sense, when Hajime enters May Field, the player has the status of being transported not just into an avatar, but also into an avatar of an avatar. Before continuing, however, it should be qualified that the avatars referred to here are not avatars in the sense that they are conventionally thought of in the telepresence literature (e.g. Lok, Naik, Whittan, & Brooks, 2003; Slater & Usoh, 1993; Usoh, Arthur, Whitton, Bastos, Steed, Slater & Brooks, 1999). Specifically, Lok et al. (2003) define the self-avatar as "the user's virtual representation" (p. 616). For the games included in this case study, it is relatively rare (although not unheard of) for the player to actually see his/her virtual representation. Instead, players are embodied in such a way that, although they inhabit a different identity, they see the game-world directly through the avatar's eyes, and, in this sense, the avatar's body is experienced first-hand as their own. Thus, to elaborate on the functioning of this unique type of avatar, I turn to the concept of the homunculus.

According to TheFreeDictionary.com, the homunculus is "a tiny fully formed individual that (according to the discredited theory of preformation) is supposed to be present in the sperm cell" (www.thefreedictionary.com/homunculus). When used to describe visual perception, however, the homunculus is the metaphorical "little man (or woman) in your head" who interprets incoming sensory stimuli.

Although Gibson (1979) articulates good reasons as to why the metaphor of the homunculus is incorrect in its application to visual perception, we will use it here in the special circumstance of the videogame because, as players, we literally do inhabit avatars and interpret/respond to sensory stimuli that they encounter in the game. Thus, when we play videogames that require the use of an avatar, we are acting as homunculi to our avatars.

During the player's occupation of the homunculus position within the avatar, the screen serves as an external retina used to interact visually with the virtual environment. Whatever happens to the screen simultaneously happens to the player's eyesight in the virtual world.

Demonstrating thorough understanding of this concept, some bishoujo game developers have used various techniques to impact the player's external retina so that

a sense of actually being transported into the avatar is experienced. To illustrate, the screen will flash (*Season of the Sakura, Three Sisters' Story*) or shake (*Nocturnal Illusion*) if the avatar experiences an impact in the game. Similarly, a black screen is used to indicate covered eyes (*Runaway City*), sleep (*Season of the Sakura*), and unconsciousness (*Little My Maid, Nocturnal Illusion*).

In terms of sound perception, perhaps speakers can be considered external eardrums. Pitch, timbre, range and directionality play an important role, not only in transporting the player to the world of the game, but immersing him/her in the world of the game.

With this last point on the subject of transportation, the concept of immersion becomes prominent because, once the player has been transported into a virtual world, there must be something perceptually or psychologically compelling if he/she is to stay. This is not to say that the experience of telepresence necessarily derives from the experience of immersion (or vice versa), only that transportation and immersion are two distinct components of the experience and that (at least in the context of these bishoujo games) transportation seems to be a necessary, though not sufficient, prerequisite to both immersion and telepresence experience.

5.2 Immersion

One strategy used to visually immerse the player in the world of the game relies upon different levels of image focus. Three particular games, *Runaway City, Season of the Sakura*, and *Three Sisters' Story* employed this strategy by designing the all-encompassing box of the background screen to be a soft-focus extension of the picture in the image box. This effect imitates the natural behavior of the eye in perceiving objects that fall into the periphery of vision less sharply than objects that occupy the focal point of vision. Because this visual interface mimics our natural tendency to focus on what is straight ahead, the softness of the encompassing image has the effect of enveloping the player in the world of the game and fixing vision on the action.

As briefly mentioned above, sound is an important ingredient in facilitating a sense of immersion in the game. Both *Little My Maid* and *Nocturnal Illusion* make use of sound effects that correspond to physical actions in the game.

Little My Maid, by far the most sophisticated of the six games, went further still to include voice and synchronized lip movements. In this sense, it can be said to be the most perceptually immersive of the cases that were explored because it provides the most sensory channels with the largest variety of stimuli.

Although, as stated previously, perceptual immersion is responsible only in part for the presence experience, it plays an important role in giving foreigners an access point into this uniquely Japanese product. After all, we share the same perceptual system regardless of culture.

5.2.1 Psychological immersion.

There are several ways that the perceptual information provided by these bishoujo games is supplemented by psychological factors. For one thing, the bishoujo characters with whom the player interacts are less realistic representations than they are iconic signs. Furthermore, character movement is limited to the occasional eye blink, changing facial expression or gesture. These qualities indicate that the realism of bishoujo characters rely heavily on the player's ability to imagine them.

Exaggerated postures and expressions speed recognition of character feelings and dispositions while the action described at the bottom of the page shapes the player's fluid conception of the character icon. In other words, the iconic image presented onscreen requires the player to mentally reconfigure the depiction in the service of imagining events as they occur and are described in the text at the bottom of the screen. Bishoujo games bear a clear resemblance to comic art in this regard and have an especially strong relationship to manga (Japanese comics) due to closely related sets of stylistic conventions. It might even be said that some bishoujo games serve as an interactive extension of manga, permitting the player to assume the identity of a character similar to those he/she is already familiar with.

Hearing (in bishoujo games that lack sound effects and voice) is also highly iconic. Most frequently, enclosing an onomatopoetic word in asterisks indicates sound effects. For example, *squish*, *slurp*, *splat*, *splooch*, *splurch*, *crash*, *gong*, etc. all represent non-speech sound effects that, in combination with onscreen depictions and previous experience with the physical world, permit players to conjure sounds internally.

For games that lack voice sounds, players must imagine what characters sound like based on their appearance. However, even in the most sophisticated of games (such as *Little My Maid*), the voice of the player is necessarily missing. Instead of being a drawback, though, it brings about one of the strongest examples of psychological immersion possible because, when the player responds to audible voices with a silent line of dialog at the bottom of the screen, he/she brings his/her voice into the game

through reading. This interaction between audible character voice and silent player voice creates the natural back and forth rhythm of conversation.

3. Cultural Implications

By providing a protagonist/avatar with a Japanese identity through which the player is able to interact with a distinctly Japanese world, these bishoujo games offer access to a level of cultural knowledge that is unsurpassed by other media forms. This is attributable to bishoujo games' ability to transport and psychologically immerse the player, providing the potential for creating a sense of telepresence.

In a certain respect, these bishoujo games attempt to offer a level of cultural access and understanding that even travel and live interpersonal communication cannot: an intimate perspective on another culture. Stepping into a Japanese identity, but retaining the ability to make decisions permits a sense of belonging and identification that would be impossible in the flesh.

The six games that were the subject of this case study offered a wealth of cultural knowledge that was accessible on the deep level that only a telepresence experience can provide. This knowledge can be partitioned into four categories that include language, cultural events, stories and media.

Beginning with language, common Japanese terms necessarily become part of the player's vocabulary. Words such as "Oniichan" (big brother) are defined through the context of gameplay. An even more advanced understanding of language can be gained from games that make use of character voices. In such games, the Japanese speech presented in conjunction with translated subtitles in the dialog box serves as a tutorial for both vocabulary and pronunciation.

Beyond language, elements of traditional and popular culture intermingle; giving the player what Peter Payne of JAST USA refers to as "a snapshot" of Japan (*Bishoujo Gaming News*, n.d.). In one game in particular (*Season of the Sakura*), the player experiences one full year of Japanese secondary school where various holidays (such as Golden Week) and events (such as the Sakura Dance, White Day and the Christmas party) are played out. Here it is interesting to see how traditional elements coexist with newer Western traditions.

Another domain in which Japanese and Western traditions coexist within bishoujo games is in the realm of stories and legends. Often, to situate action within the game, common narratives are referenced to provide context. These narratives, however, are drawn from both Japanese and Western culture. For example, in *Little My Maid*, when

Ohji first finds himself at the mansion on the sea, he compares what has happened to the Japanese *Legend of Urashima Taro* and the Western story of *Alice in Wonderland.* Other references, such as *The Little Mermaid* (mentioned in *Nocturnal Illusion*) draw from a common exposure to an emerging global culture formed from entertainment media.

Along these same lines, popular manga that have become increasingly available and in demand worldwide are frequently referenced in bishoujo games. This phenomenon provides non-Japanese players with a sense of expanded cultural understanding and commonality because those who play bishoujo are also particularly likely to read manga. Thus, this sort of intertextuality forms the foundation of an intercultural common ground based on popular media.

A final category of cultural transmission and learning that should be mentioned with respect to these bishoujo games includes sexual culture. This should come as no surprise given the erotic content of many bishoujo games. Japanese establishments such as the "soapland" (erotic public bath), the "ran-pabu" (lingerie pub) and the "love hotel" (specialized hotel facilities where people go to have sex) are just a few of the many examples of sexual culture that populate bishoujo games. A separate investigation that specifically addresses the intercultural transmission and representation of sexuality in bishoujo games would be a worthy and informative undertaking that would illuminate the understanding of how culture impacts sexuality and sexual practices. For one thing, it might be observed that the initially lukewarm popularity of bishoujo games may be due to different attitudes toward sexuality, the body and women.

Lastly, it should be noted that the small companies responsible for the majority of bishoujo translations in the United States and other Western countries actively pursue intercultural leaning as an objective. For example, JAST USA occasionally provides parenthetical notes that explain certain cultural differences to players. In one instance (in *Season of the Sakura*) the class stands up to greet the teacher. Beneath it is noted: "(Japanese students do this every day when the teacher enters the classroom.)"

Other examples of intentional efforts to educate the Western player in Japanese culture are evidenced by the inclusion of "linear notes" in the readme files of some games and optional membership to the J-List listserv. Linear notes explain in detail the cultural references and nuances found in the game, and the J-List listserv sends out periodic emails that offer interesting facts and news events related to Japan.

In closing, bishoujo gaming represents an excellent example of how psychology, technology and popular culture can work together to bring about a shared understanding between and among diverse populations. As previously stated, the utilization of telepresence-provoking technologies have the potential to give these bishoujo games a particular advantage in providing the player with a more intimate perspective in experiencing and understanding cultures that might not otherwise be accessible.

4. References

Ames, C. (1997). *Movies About the Movies: Hollywood Reflected.* Lexington, KY: The University Press of Kentucky.

Anderson, C. A. & Dill, K. E. (2000). Video games and aggressive thoughts, feelings, and behavior in the laboratory and in life. *Journal of Personality & Social Psychology,* 78 *(*4): 772-290.

Biocca, F. & Delaney, B. (1995). Immersive virtual reality technology. In F. Biocca & M. R. Levy (eds.), *Communication in the age of virtual reality* (pp. 57-124). Hillsdale, NJ: Lawrence Erlbaum Associates.

Bishoujo Gaming News: The Hentai Dating-Sim Gaming News Source, vol. 2[a] (n.d.). Japanese dating-sim game report.

Cahill, J. M. (1994). Health works: Interactive AIDS education videogames. *Computers in Human Services,* 11 (1-2):159-176.

Crowson, B. (3/14/05). Virtually real. *The Birmingham* (Alabama) *News.* Retrieved (3/15/05) from: http://www.al.com/entertainment/birminghamnews/index.ssf?/base/entertainment/1110795432190180.xml.

Enderle, R. (3/7/05). The evolution of online games and the next ipod. *TechNewsWorld.* Retrieved (3/8/05) from: http://www.technewsworld.com/story/The-Evolution-of-Online-Games-and-the-Next-iPod-41112.html.

Fleming, M. J. & Rickwood, D. J. (2001). Effects of violent versus nonviolent video games on children's arousal, aggressive mood, and positive mood. *Journal of Applied Social Psychology,* 31 (10): 2047-2071.

Fontaine, G. (1993). The experience of a sense of presence in intercultural and international encounters. *Presence: Teleoperators and Virtual Environments,* 1(4): 1-9.

Fontana, L. & Beckerman, A. (2004). Childhood violence prevention education using video games. *Information Technology in Childhood Education Annual,* 16*:* 49-62.

TheFreeDictionary.com by Farlex (n.d.). Retrieved from http://www.thefreedictionary.com.

Funk, J. B., Buchman, D. D., Jenks, J. & Bechtoldt, H. (2003). Playing violent video games, desensitization, and moral evaluation in children. *Journal of Applied Developmental Psychology,* 24 *(*4): 413-436.

Gentile, D. A., Lynch, P. J., Linder, J. R. & Walsh, D. A. (2004). The effects of violent video game habits on adolescent hostility, aggressive behaviors, and school performance. *Journal of Adolescence,* 27 (1): 5-22.

Gibson, J. J. (1979). *The Ecological Approach to Visual Perception.* New Jersey: Houghton Mifflin Company.

Gizmag "a multiple-medium magazine covering invention, innovation and emerging technologies" (2004). Holo-Dek offers new concept in interactive gaming. Retrieved 12/15/04 from: http://gizmag.com/go/3536/.

Gnatek, T. (11/4/04). Giving voice to video games. *New York Times.* Retrieved (11/19/04) from:
http://www.nytimes.com/2004/11/04/technology/circuits/04voic.html.

Greenfield, P., Camaioni, L., Ercolani, P. & Weiss, L. (1994). Cognitive socialization by computer games in two cultures: Inductive discovery or mastery of an iconic code? *Journal of Applied Developmental Psychology,* 15 (1): 59-85.

Greenfield, P., deWinstanley, P., Kilpatrick, H. & Kaye, D. (1994). Action video games and informal education: Effects on strategies for dividing visual attention. *Journal of Applied Developmental Psychology,* 15 (1): 105-123.

Greenfield, P., deWinstanley, P., Kilpatrick, H. & Kaye, D. (1996). Action video games and informal education: Effects on strategies for dividing visual attention. In P. M. Greenfield, (Ed.), *Interacting With Video.* Westport, CT: Ablex Publishing.

Hebert, J. (11/26/04). World of video games grows increasingly like – and intertwined with – Hollywood. *San Diego Union-Tribune.* Retrieved (12/27/04) from: http://www.signonsandiego.com/news.features/20041126-9999-lz1c26games.html.

I4U "Future Technology News" (2005). BigBen bodypad virtual fight simulator. Retrieved (3/9/05) from: http://www.i4u.com/article3000.html.

JAST USA (2005, January 1). What's new at JAST USA? – Bishoujo Gaming Update. Message posted to JAST USA electronic mailing list.

J-List (2004, December 30). Greetings from J-List – your friend in Japan. Message posted to J-List electronic mailing list.

Jones, M. T. (2005). Reflexivity in comic art. *International Journal of Comic Art,* 7(1): 270-286.

Klimmt, C. & Vorderer, P. (2003). Media psychology "is not yet there": Introducing theories on media entertainment to the presence debate. *Presence: Teleoperators & Virtual Environments,* 12 (4): 346-359.

Kolko, D. J. & Rickard-Figueroa, J. L. (1985). Effects of video games on the adverse corollaries of chemotherapy in pediatric oncology patients: A single-case analysis. *Journal of Consulting & Clinical Psychology,* 53 (2): 223-228.

Kwan, G. (2002). Play attention! Can custom-made video games help kids with attention deficit disorder? *Berkeley Medical Journal.* Retrieved (1/4/05) from: http://www.ocf.berkeley.edu/~issues/spring02/ADDplay.html.

Lee, K. (2004). Presence, explicated. *Communication Theory,* 14 (1): 27-50.

Lok, B., Naik, S., Whitton, M., & Brooks, F. P. (2003). Effects of handling real objects and self-avatar fidelity on cognitive task performance and sense of presence in virtual environments. *Presence: Teleoperators & Virtual Environments,* 12 (6): 615-628.

Lombard, M. & Ditton, T. B. (1997). At the heart of it all: The concept of presence. *Journal of Computer-Mediated Communication, 3,* 2. Available online: http://www.ascusc.org/jcmc/vol3/issue2/lombard.html.

Milky House Memorial Collection Readme File ver. 1.0 (2003). May Club.

Montovani, G. & Riva, G. (1999). "Real" presence: How different ontologies generate different criteria for presence, telepresence, and virtual presence. *Presence: Teleoperators and Virtual Environments,* 8 (5):540-550.

Palmer, M. T. (1995). Interpersonal communication and virtual reality: Mediating interpersonal relationships. In F. Biocca & M. R. Levy (Eds.), *Communication in the age of virtual reality* (pp. 277-302). Hillsdale, NJ: Lawrence Erlbaum.

Panee, C. D. & Ballard, M. E. (2002). High versus low aggressive priming during video-game training. Effects on violent action during game play, hostility, heart rate, and blood pressure. *Journal of Applied Social Psychology,* 32 (12): 2458-2474.

Peach Princess (2004, December 25). *Bishoujo Gaming Update from Peach Princess.* Message posted to Peach Princess electronic mailing list.

Peach Princess (2004). *What is bishoujo gaming*? Retrieved 12/22/04 from http://www.peachprincess.com/Merchant2/gaming.mv.

Phillips C. A., Rolls, S., Rouse, A. & Griffiths, M. D. (1995). Home video game playing in schoolchildren: A study of incidence and patterns of play. *Journal of Adolescence,* 18 (6):687-691.

Radencich, M. C. (1984). From Dick and Jane to Tron? *Reading World, 24,* 2, 1-3.

Redd, W. B., Jacobsen, P. B., Die-Trill, M. & Dermatis, H. (1987). Cognitive/attentional distraction in the control of conditioned nausea in pediatric cancer patients receiving chemotherapy. *Journal of Consulting & Clinical Psychology,* 55 (3): 391-395.

Rosas, R., Nussbaum, M., Cumsille, P., Marianov, V., Correa, M., Flores, P., Grau, V., Lagos, F., Lopez, X., Lopez, V., Rodriguez, P., Salinas, M. (2003). Beyond Nintendo: Design and assessment of educational video games for first and second grade students. *Computers & Education,* 40: 71-94.

Rosenfeld, D. (2001). Psychotic addiction to video games. In Williams, Paul (Ed.), *A Language for Psychosis: Psychoanalysis of Psychotic States.* London: Whurr Publishers.

Retaux, X. (2003). Presence in the environment: Theories, methodologies and applications to video games. *PsychNology Journal,* 1(3): 283-309.

Rouse, R. (2005). The evolution of game design. *Gameinformer, 142,* p. 34.

Schubert, T. (2002). Five theses on the book problem: Presence in books, film and VR. Paper presented at *Presence 2002 – 5th Annual International Workshop on Presence.* Porto, Portugal.

Slater, M. (2003). A note on presence terminology. *Presence-Connect, 3,* (3).

Slater, M. & Usoh, M. (1993). The influence of a virtual body on presence in immersive virtual environments. *VR 93, Virtual Reality International, Proceedings of the Third Annual Conference on Virtual Reality,* 34-42.

Soper, W. B. & Miller, M. J. (1983). Junk-time junkies: An emerging addiction among students. *School Counselor,* 31(1): 40-43.

Stam, R. (1985). *Reflexivity in Film and Literature: From Don Quixote to Jean-Luc Godard.* Ann Arbor: UMI Research Press.

Subrahmanyam, K. (1996). Effect of video game practice on spatial skills in girls and boys. In P. M. Greenfield (Ed.), *Interacting with Video.* Westport, CT: Ablex Publishing.

Uhlmann, E. & Swanson, J. (2004). Exposure to violent video games increases automatic aggressiveness. *Journal of Adolescence,* 27 (1): 41-52.

Usoh, M., Arthur, K., Whitton, M., Bastos, R., Steed, A., Slater, M., & Brooks, F. (1999). Walking > virtual walking > flying, in virtual environments. *Proceedings of SIGGRAPH 99,* 359-364.

Vasterling, J., Jenkins, R. A., Tope, D. M. & Burish, T. G. (1993). Cognitive distraction and relaxation training for the control of side effects due to cancer chemotherapy. *Journal of Behavioral Medicine,* 16 (1): 65-80.

Yukino, Y. (2000). Features. *Freetype.* Retrieved (12/22/04) from: http://www.freetype.net/features/games/galgame/pl.html.

The Effect of the Emotion-related Channel in 3D Virtual Communication Environments

Mikio Kamada, Ph.D.♦♣, Mioko Ambe♦, Katsushige Hata♦,
Eiju Yamada♦, Yuichi Fujimura♣

♦Sony Corporation,
Tokyo (Japan)

♣ Naruto University of Education,
Tokyo (Japan)

ABSTRACT

An emotion-related channel was combined with electronic chat in a 3D virtual communication environment. Users can convey specific feelings by manipulating the facial expressions and gestures of their 3D characters (avatars). To examine the effects of the emotion-related channel, an experiment was carried out in two elementary schools with fifty-five student participants. It was found that the children were able to communicate more freely and effectively than by simple electronic chat sessions. In addition, the emotion-related channel also served to stimulate textual dialogue between partners. Our findings indicate that text-based media communication environments could be greatly enhanced with an emotion-related channel.

1. Introduction

Text-based media communication such as e-mail and electronic chat have been widely distributed and become to be popular and indispensable tools. However, such forms of communicative media using only a verbal channel are ineffective in conveying one's emotions (Mehrabian & Ferris, 1967; Mehrabian & Wiener, 1967). Mehrabian et al estimated the contribution of three different communication channels; words, voice intonation, and facial expression, to convey the emotions of like, neutrality, and dislike. It turned out that the contribution of the word channel was a mere 7%.

Using emotional-icons known as emoticons embedded in e-mail messages is an useful channel in communicating emotions. Consider the following example: for a grin, one would simply type :} or for a smile, one would type :-} and insert them into the text of an e-mail message to alert any reader not to take the message too seriously. There are a number of reports studying the effect of usage of emoticon (for example;

♣ Corresponding Author:
Mikio Kamada, Ph.D.
Sony Corp., 6-7-35 Kitashinagawa, Shinagawa-ku, Tokyo 141-0032 Japan,
Phone: +81-3-5448-2111
Fax: +81-3-5435-3962
E-mail:micky@aic.sony.co.jp

Mikropoulos & Strouboulis, 2004). Rivera et al (1996) found that communicators were more satisfied with a system employing emoticons than one in which emoticons were not present, including group discussions. Walthier et al (2001) reported that emoticons used in computer-mediated communication supplement the nonverbal cues. These findings about the effects of emoticons suggest the high potential of introducing emotion-channels in text-based communication environments.

The communication environment used in this experiment is one of CVEs; collaborative virtual environments (Mak & Palia, 2005; Benford & Greenhalgh, 1995), named Community Place. It is a communication environment utilizing 3D virtual spaces on the Internet which enable users to control the motions of their virtual characters or avatars as they move around the space (Lea et al, 1997). Users of Community Place are able to communicate by way of text messaging (electronic chat) when the two avatars are in close enough proximity within the 3D space. The Community Place program used in this experiment was customized for elementary and junior high school students as like other educational virtual environments (for example; Wolf, 2000) A unique feature was incorporated into the design of our program to allow the users to convey their emotions by manipulating the facial expressions and gestures of their avatars. These two non-verbal channels are representative of the ones used to convey emotions in face to face communication (Ekman & Friesen, 1969;1971). Although the avatar's facial expressions and gestures are merely rough simulations they still have the potential to convey the emotions or feelings of users. In this way, our customized version of Community Place could carry two channels of communication: one to convey ideas by way of text messaging (so-called verbal channel) and the other to convey facial expressions and gestures (user emotions). The latter will be referred to as the 'emotion-related channel' in this paper.

There have been several communication environments where, as with Community Place, users are able to express their emotions as the avatar's facial expressions or gestures (Kurlander, et al, 1996; Fabri, et al, 1998; 2005; Salem, et al, 2000). There are several studies which have concerned themselves with the effects of the avatar's emotional expressions. Nijholt, A. (2002) reported that gaze behavior of embodied agents affected the impression of users. Fabri and Moore (2004) reported that creating avatar representations using only a limited number of facial features allowed emotions to be effectively conveyed.

In this study, the effect of emotion-related channel on communication performance in CVEs was investigated. An experiment was carried out in two elementary schools with

fifty-five student participants to compare the communication performances with and without the emotion-related channel in the 3D virtual communication environment.

2. Method

2.1 System Description

Community Place is a server-client system. The client personal computer uses Windows. Users can move their avatars around a 3D virtual space with a mouse and can input text messages and their emotions. A typical 3D virtual space used in this experiment is shown in Fig. 1.

Fig. 1: A typical 3D virtual-space.

Users can input the emotion they feel by using the mouse to click on the window shown in Figure 2. The avatar changes its facial expression and gesture in line with the inputted information. So, by looking at the avatar, the person being communicated with can recognize changes in the emotions of the sender. Users were given five emotional states to choose from: 'joyful', 'delighted', 'sad', 'tired', and 'angry'. Each emotional state has three degrees: 'somewhat', 'so so', and 'very', thus there is a total of 15 buttons (5 x 3) arranged along the axes of the three pentagons, which share a common center, as shown in Fig. 2. The three sizes of pentagons correspond to the three emotional degrees. Facial expressions and emotional adjectives corresponding to the five emotional states are located at the apexes of the outer pentagon.
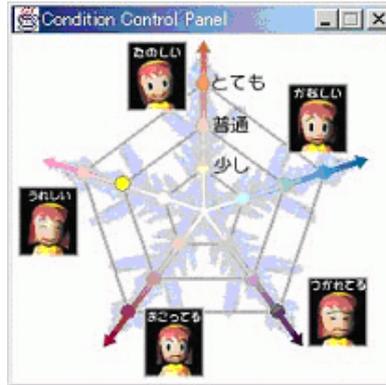
Fig. 2: The emotion input window.

Figure 3 and 4 shows the faces and gestures of the avatars corresponding to five emotional states.

Fig. 3: The faces of the avatars corresponding to five emotional states.
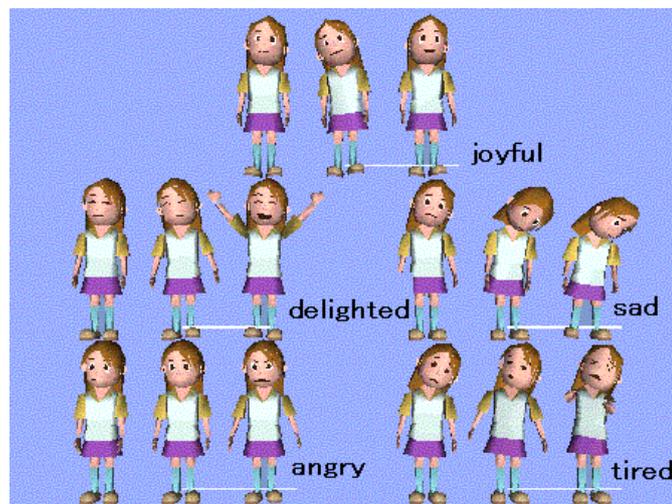

Fig. 4: The gestures of the avatars corresponding to five emotional states.

Figure 5 shows a typical example of the entire operational window. The window consists of a 3D virtual space window (top left) and an emotion input window (bottom left), the text window for electronic chat (top right), and the soft keyboard (bottom right). The soft keyboard was designed to be user-friendly for children, however, almost all the participants in this experiment used conventional keyboards.

Fig. 5: The operational window.

2.2 Experimental Conditions

This experiment was performed at the Kita 9 Jou and Kaisei Elementary Schools in Sapporo, Japan. These two schools are about three kilometres apart, and the students at both schools had no close acquaintance with those at the other. Twenty-eight sixth graders, aged from 11 to 12 years old and consisting of 14 males and 14 females, at Kita 9 Jou and twenty-eight fifth graders aged from 10 to 11 years old and consisting of 9 males and 19 females, at Kaisei participated in this experiment. Groups consisting of 4 or 5 students were organized. Each group used one PC in which Community Place software had been installed and connected to the Community Place server. There were a total of twelve groups, 6 at each school. Each group at the first school communicated to only one group at the other school. To communicate with the remote school students using the system, group members first discussed and decided on the intended text message and emotion to be communicated, then one participant inputted that message and emotion into the system using a keyboard and a mouse. Although the ability to move the avatar around the 3D space is a key feature of this system, it was removed for this experiment because we wanted to keep things simple for evaluating the effect of the emotion-related channel. Figure 1 shows a typical window where one user's avatar stands in front while the other's avatar stands in back. The two avatars appear to be engaged in conversation.

There were two experimental conditions:

> *Condition 1: participants used the emotion-related channel to communicate

*Condition 2: participants did not use the emotion-related channel to
  communicate

Under Condition 2, the emotion input window was closed. The emotion state was the most neutral, 'somewhat delighted.' The initial state of Condition 1 was the same.

Participants communicated under both conditions for twenty minutes each time. To eliminate the order effect, half of the groups started communicating under Condition 1 and the other half started under Condition 2. The topics of the conversations were not specified, so the teachers suggested that students ask about the other students or the other school in order to facilitate smoother exchanges in the beginning.

2.3 Evaluation Methods

Date, time, group, ID number, group nickname, emotion state, and text messages were recorded in the server. The voices and pictures of each group were recorded using video cameras, which were located on PC desks and shot activities of whole group members, to enable later study of how they felt when receiving messages and how they decided on what messages to send.

The checked points in video-observation were as follows.

- Response to the message appeared on PC display from the partner.
- Communication about the message.
- Discussion about the reply to the message.
- The process to determine their reply.

The following characteristics for each 20-min. communication period were evaluated:

   (1) The number of times the emotion-related channel was used
   (2) The number of letters typed
   (3) The number of lines typed
   (4) The number of turns taken
   (5) The number of letters per line (letters / typed lines)

After a group finished communicating, its members were given a questionnaire consisting of four questions. Questions #1, #2, and #3 used a ranking method followed by a free description space for their reasons. They were asked about each experimental period. Ranks: 'Yes, very much','Yes','So so','Not very much','Not at all'. These were numbered 5, 4, 3, 2, 1 respectively, for analysis. Question #4 asked the

students to describe the difference between communicating with and communicating without the emotion-related channel. Questionnaire sheet is shown in ANNEX.

3. Results

3.1 Overview of participants' attitude and communication

We observed the participants' activities in each group using the recorded video. The following is a brief summary of this observation. Each group eagerly communicated with its partner group, and participants excitedly discussed what to write as a reply. The participants in a group first discussed the meaning of the message sent to them. Typically, when a group received a message, one of the participants in the group would read the message aloud, then its meaning would be discussed. They then would discuss possible replies. After they reached an agreement, one participant in front of the PC input the message.

Table 1 shows the averages of the Questionnaire answers under both experimental conditions. The relatively high average values indicate that most participants felt satisfied about their communication.

Question	averaged values
#1 Did you enjoy communicating with your partner?	4.09
#2 Did you have a lively exchange with your partner?	3.85
#3 Could you convey your feelings to your partner?	3.45

Table 1: The averages of the Questionnaire answers
('Yes, very much'(5),'Yes'(4),'So so'(3),'Not very much'(2),'Not at all'(1))

3.2 Use of the Emotion-related Channel

The emotion-related channel was used 38 times in this experiment. Before using the channel, most groups discussed which emotional state and degree to send. Clear reactions to receiving an emotion-related channel message were observed in 12 of the 38 cases.

Whenever an emotion-related channel message was received, participants would point to the remote partner's avatar and discuss it within the group. Two issues were usually discussed:

> 1st: The avatar's expression and gestures
> 2nd: The reason their partner sent the message

Some groups replied using the emotion-related channel while others preferred sending a text message. An example of the use of the emotion-related channel is shown in Fig. 6. The upper part corresponds to a group in school 1, and the bottom part corresponds to a group in school 2. The length of the bars indicates the number of characters in the message.
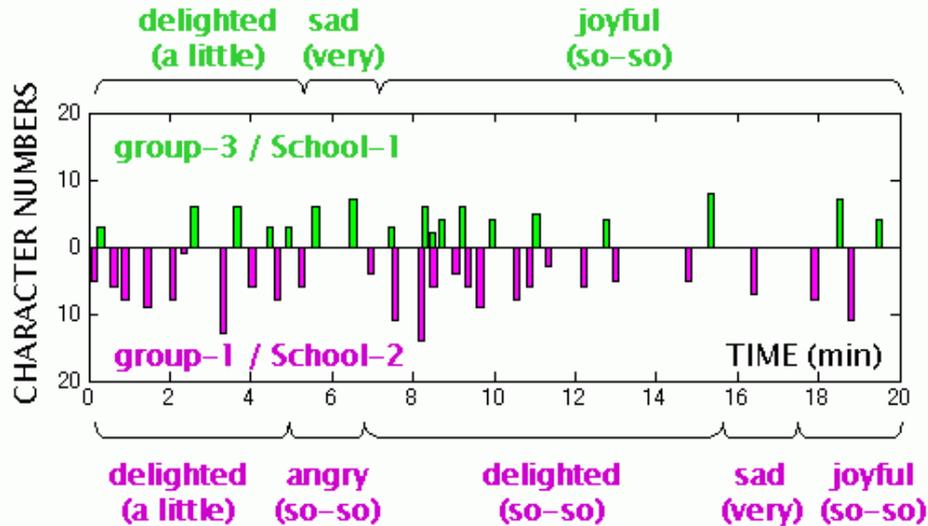
Fig. 6: Emotion-related channel use in one session
(group-3 in school-1 and group-1 in school-2)

3.3 Effect of the Emotion-related Channel [Communication Characteristics]

The average values of the communication characteristics defined in section 2.3 were calculated. Table 2 details the data of the three characteristics that had large changes. It also shows the level of significance calculated by the pair-T test. One of the communication characteristics (turn taken) significantly increases under Condition 1 (with the emotion-related channel). The other two characteristics showed no significance. These indicate that the channel serves to stimulate text communication.

Characteristics	With		Without		Difference	Level of Significance
	average	SD	average	SD		
typed letters	212.7	54.8	157.7	90.0	55.0	0.084
typed lines	23.6	5.0	17.3	10.3	6.3	0.063
turn taken	34.1	7.4	24.4	12.2	9.7	0.022

Table. 2: The average values and standard deviations (SD) of the communication characteristics for conditions with / without the emotion-related channel.

3.4 Effect of the Emotion-related Channel [Answers to Questionnaire]

The average values of all Questionnaire answers for both conditions are given in Table 3.

Question	With		Without		Difference	Level of Significance
	average	SD	average	SD		
#1	4.16	1.01	4.00	1.15	0.16	0.32
#2	3.88	1.11	3.82	1.23	0.06	0.77
#3	3.63	1.13	3.22	1.17	0.41	0.02

Table. 3: The average values and standard deviations (SD) of all Questionnaire answers for conditions with / without the emotion-related channel:
#1 Did you enjoy communicating with your partner?
#2 Did you have a lively exchange with your partner?
#3 Could you convey your feelings to your partner?

Comparing the two conditions, the average values of the answers to Question #3 are significantly higher when the emotion-related channel was used. The average values of the answers to the other two questions showed no significant difference.

The answers to Question #4 are free responses. Forty-two out of 55 participants answered the question. The answers mentioning the effectiveness of the emotion-related channel are outlined in Table 4. The emotion-related channel received a positive evaluation by the participants, as is shown in the table.

Question #4 answers	Number of Respondents
Better to have it	32
Does not matter	10
Better not to have it	0

Table. 4: A breakdown of the answers to Question #4.

Among the 32 answers "better to have it", eight stated reasons for the effectiveness of the emotion-related channel. The answers, listed below, can be categorized as: "expressing feelings"; "recognizing feelings"; and "effect on text messaging".

< expressing feelings >

(i) "It was fun to express my feelings."
(ii) "With the emotion-related channel, it was easier to ask the remote partner to stop making unpleasant statements."
(iii) "Without the emotion-related channel, I could not make the partner understand well what I wanted to say."

< recognizing feelings >

    (iv) "It was good to see my partner's feelings on his avatar's face."

    (v) "I could recognize my partner's feelings by the channel."

    (vi) "Without the channel, I could not recognize what my partner felt."

    (vii) "It was good to know whether or not my partner was angry by using the emotion-related channel."

< effect on text messaging >

(viii) "The emotion-related channel helped me think of the words I wanted to write."

These descriptions suggest that the entire communication environment became a favorable place for participants because they could convey their feelings through the channel. It is suggested that this improvement of the environment made participants feel more at ease about communicating but not necessarily only through the emotion-related channel. Statement (viii) shows one direct effect the emotion-related channel had on text communication.

4. Discussion

The environment discussed in this paper has two communication channels: a text or verbal channel and an emotion-related channel. The answers to Question #3 indicate that participants conveyed their feelings more easily through the latter channel with a level of significance of 2.2%. This question, however, asked only about the sender's ability to express feelings through the channel, whereas a considerable number of statements contained in the free responses to Question #4 pointed out the effectiveness of receiving feelings as well.

There were 27 statements concerning the effectiveness of the emotion-related channel, and among them, 16 were about sending feelings and 11 were about receiving them. Nearly the same results were obtained in the free responses to Question #3, which contain 3 statements about sending feelings and 4 about receiving them.

Although the effect on the users' sending and receiving feelings is confirmed, the emotion-related channel has negligible effects on the answers for Questions #1 and #2. To make clear the origin of this difference, descriptive answers followed by each score answers were analyzed. These descriptive answers were transformed into a number of simplified statements each containing a single idea. Totally, 153 statements regarding

both conditions were obtained. Next, the statements were classified into four categories according to the topic:

(A) Personal Statements

For example: "I could / could not chat a lot"; "I could / could not type a lot during communication"; "I laughed a lot"; and "I could use the soft keyboard".

(B) Statements about the remote-partner

For example: "Our remote-partner seemed to enjoy the communication"; "Our remote-partner seemed to be an interesting person"; "My partner was anonymous to me"; and "My partner had / did not have the same interest as me".

(C) Statements about the communication

For example: "We could talk about a lot of topics"; "We could introduce our schools"; "We could develop our communication"; and "We had difficulty understanding what we said to each other".

(D) Statements about the emotion-related channel / conveying feelings

For example: "I used the emotion-related channel"; "Our partner responded to our choice of emotion by the emotion-related channel"; "We could convey our feelings to each other"; and "We talked so much by chat that we did not use the emotion-related channel".

Table 5 shows the number of statements for each of the four categories and has some remarkable features. This topical profile relates to the respondents' thoughts as they answered the questions.

(a) The number of personal statements is relatively small when compared to the number of those about the communication or the number those about the partner.

(b) Almost all the statements for Question #1 concern either the communication or the partner.

(c) Almost all the statements for Question #2 concern the communication.

(d) The number of statements for Question #3 concerning conveying feelings is high, and the number of statements concerning the

communication or that concerning the partner are relatively low compared to the cases of Questions #1 and #2.

original question	Topic of the Statement				
	Personal	Partner	Communication	Channel	Total sum
#1	5	26	31	4	66
#2	7	38	5	2	52
#3	9	13	0	13	35

Table. 5: The number of statements of each category classified according to topic
#1 Did you enjoy communicating with your partner?
#2 Did you have a lively exchange with your partner?
#3 Could you convey your feelings to your partner?

One possible reason why the effect of the emotion-related channel is clear for Question #3 but not for Questions #1 and #2 is the difference in topical profile of each question shown in Table 5. Question #3 is relatively definite asking about the conveying of feelings. It might be easier for respondents to answer this question as opposed to Questions #1 and #2 which relate to more general ideas, i.e. the communication and the partner. The other possible reason is that the period of communication, 20 min., is not enough for participants to fully enjoy communication and/or enter into a lively exchange. In fact, almost all of the participants seemed to be unaware of this enhancement, even the turn taking increased 40% on average. Only one response, (viii) for Question #4, was related to the enhancement. It might be difficult for participants to notice the positive factors attributable to the emotion-related channel in such a short period.

5. Conclusion

The effect of the emotion-related channel in the 3D virtual chat communication environment was investigated. An experiment comparing the use and non-use of an emotion-related channel which enables users to convey their feelings through an avatar's facial expressions and gestures was performed in two elementary schools with 55 participants.

Two effects of the emotion-related channel were substantiated:

(1) Conveying users' feelings in communication

   (by the questionnaire survey shown in Table. 3);

(2) Stimulating chat communication

(by an analysis of text messages recorded in the server shown in Table. 2).

The answers given in the free response section suggests the origin of the stimulation to be a positive change in the participants' impression of the environment due to the influence of the emotion-related channel.

In daily life, people express their feelings in both intentional and unintentional ways.

People use intentional means to communicate more freely. For the experiment, the participants had to operate a mouse to choose buttons on the emotion-input chart in order to express their feelings. This is a complicated process compared to face-to-face interaction. It is therefore noteworthy that the emotion-related channel in this system can convey feelings and stimulate text communication though the process is cumbersome. This study indicates that text-based media communication environments could be greatly enhanced with an emotion-related channel realized by a simple but not so sophisticated system, as was suggested by the observed effects of emoticons in text messaging. It is also suggested that developing an emotion-related channel interface (for example; Rieger, 2003) would enhance the effects substantiated by this study.

Acknowledgments

6. References

Benford, S. & Greenhalgh, C. (1995). MASSIVE: A Collaborative Virtual Environment for Teleconferencing. *ACM Transactions on CHI*, 2(3): 239-261.

Ekman, P. & Friesen, WV. (1971). Constants across cultures in the face and emotion. *Journal of Personality and Social Psychology*, 17: 124-129.

Ekman, P. & Friesen, WV. (1969). The repertoire of nonverbal behavior: Categories, origins, usage, and coding. *Semiotica*, 1: 49- 98.

Fabli, M. & Hobbs, D.J. (1998). What You See Is What I Mean: Virtual Encounters In Distance Learning Systems. Paper presented at *the 4th EATA International Conference on Network Entities*, October, Leeds, UK.

Fabri, M. & Moore, D. (2004). Mediating the Expression of Emotion in Educational Collaborative Virtual Environments: An Experimental Study. *Virtual Reality*, 7(2): 66-81.

Fabri, M. & Moore, D.J. (2005). The use of emotionally expressive avatars in Collaborative Virtual Environments. Proceedings of the *AISB Symposium on Virtual Social Agents*, April, University of Hertfordshire, UK.

Kurlander, D., Skelly, T., & Salesin, D. (1996). Comic Chat, Proceedings of the *23rd Annual Conference on Computer graphics and Interactive Techniques* (pp. 225-235). New York, ACM Press.

Lea, R., Honda, Y., Matsuda, K., & Matsuda, S. (1997). Community Place: Architecture and Performance. *Proceedings of the Second Symposium on Virtual Reality Modeling Language* (pp. 41-49), New York, ACM Press.

Mak, W.K. & Palia, A.P. (2005). Educational perspective of collaborative virtual communication and multi-user virtual environments for business simulations. *Developments in Business Simulations and Experiential Learning*, Volume 32.

Mehrabian, A. & Ferris, S.R. (1967). Inference of attitudes from Nonverbal Communication in two channels. *Journal of Consulting Psychology*, 31(3): 248-252.

Mehrabian, A. & Wiener, W. (1967). Decoding of inconsistent communications. *Journal of Personality and Social Psychology,* 6: 109-114.

Mikropoulos, T.A. & Strouboulis, V. (2004). Factors That Influence Presence in Educational Virtual Environments. *CyberPsychology & Behavior.* 7(5): 582-591.

Nijholt, A., (2002). Issues in multimodal nonverbal communication and emotion in embodied (conversational) agents. Proceedings of the 6th *World Multiconference on Systemics, Cybernetics and Informatics. Volume II: Concepts and Applications of Systemics Cybernetics and Informatics* (pp. 8150-8151).

Rieger, T. (2003). Avatar Gestures. *Paper presented at WSCG 2003*, February 3-7, Plzen, Czech. Republic.

Rivera, K., Cooke, N.J., & Bauhs, J.A. (1996). The Effects Of Emotional Icons On Remote Communication. *Proceedings of CHI 06* (pp. 99-100). New York: ACM Press.

Salem, B. & Earle, N. (2000). Designing a Non-verbal Language for Expressive Avatars. *Proceedings of the third international conference on Collaborative virtual environment* (pp. 93-101). New York: ACM Press.

Walthier, B.J. & D'Addario, P.K. (2001). The impacts of emoticons on message interpretation in computer-mediated communication. *Social Science Computer Review*, 19(3): 324-347.

Wolf, A. (2000). Alecia, Emotional expression online: Gender differences in emoticon use. *CyberPsychology & Behavior*, 3(5): 827-833.

ANNEX. Questionnaire sheet (English version)

Grade:	
Male / Female:	
Group Name:	

#1 Did you enjoy communicating with your partner?

First Time	Second Time
( )Yes, very much.	( )Yes, very much.
( )Yes.	( )Yes.
( ) So so.	( ) So so.
( ) Not very much.	( ) Not very much.
( ) Not at all.	( ) Not at all.

Please explain your answers.

#2 Did you have a lively exchange with your partner?

First Time	Second Time
( )Yes, very much.	( )Yes, very much.
( )Yes.	( )Yes.
( ) So so.	( ) So so.
( ) Not very much.	( ) Not very much.
( ) Not at all.	( ) Not at all.

Please explain your answers.

#3 Could you convey your feelings to your partner?

First Time	Second Time
( )Yes, very much.	( )Yes, very much.
( )Yes.	( )Yes.
( ) So so.	( ) So so.
( ) Not very much.	( ) Not very much.
( ) Not at all.	( ) Not at all.

Please explain your answers.

#4 Please describe the difference between communicating with and communicating without the emotion-related channel.