Computer-mediated environment as a new technological real virtuality triggering virtual identity development

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Abstract

In contemporary higher education, it has become a commonplace to emphasize that our globalized world is undergoing an identity crisis. The signs of this crisis particularly in social and cultural spheres are abundantly increasing as we go through the global, postmodern and information era in which the concept of identity turns out to be more complex than ever before.

This paper explores significant trends in contemporary higher citizenship education including a specific focus on the role of ITs and communication technologies, as well as new emerging technologies on the development of new emerging identities, particularly, virtual identity.

The purpose of this paper is to bring together various elements that represent the complex conceptuality of virtual identity within technological society. It engages into a research of what awareness young people are now getting of new information and communication technologies and how global media may possess the potential to transform their identity and in what way educational institutions should understand and respond to this evolving virtual reality.

In this paper, we address these issues both from a quantitative and qualitative standpoint. The key issues under research include the Systemic approach to identity formation as a synergy of information and communication technology (ICT) and virtual reality in citizenship education at Riga Technical University, Faculty of Mechanical engineering, Transport and Aeronautics (Riga, Latvia). The Sociometry method and Optimization theory are the factors that integrate all the elements.

The research results have demonstrated that the Tree-model of identity development offers a methodology for identity construction by evaluating virtual reality as the potential for the development of a creative personality. Implementation of the obtained research results can contribute to the working out of a scientifically grounded concept providing recommendations for the efficient strategy of identity formation in a computer-mediated global environment.

Keywords: identity crisis virtual reality virtual identity synergy of information and communication technology (ICT) and virtual reality new emerging identities global media

1 Identity: static and sustainable or developing and transforming?

Within the historical evolution of humans, history can be divided into three segments: pre-literacy, modern and post-modern societies. The movement between segments is characterized by transitions that our sensibilities undergo as technological advancements are made and as the tools are incorporated into everyday life. The printing press divided the pre-literacy and modern societies; the computer divides the modern and the post-modern societies. In the move from pre-literate to modern society, there were few technological advances and the speed of mechanical devices entering people's life was slow, which insured that individual and societal reactions to innovation were absorbed over a considerable amount of time. People were able to develop new competencies as changes in life occurred gradually.

This is not the case in the move from modern to post-modern society. New advanced technologies demand that we extend our capabilities in a flash within the global network. Action and reaction times occur simultaneously and there are many more 'smart' tools available.

Undoubtedly, the concept of identity has undergone its evolutionary path as well. Still, there is a paradoxical dichotomy when it comes to the concept of identity, where there are two common, but opposite, approaches to the questions of what identity means and how it is constructed ranging from a prevalent and traditional approach when identity is defined as a constitution based on the recognition of familiar and shared derivations including but not limited to ethnic, linguistic, religious, historical, territorial, cultural and political attributes with other people, groups or ideals (Hall, 1994, 1996**)** to philosophically specific conceptualizations.

The concepts of *familiarity* and *share* in the traditional approach are closely associated with the meanings of *sameness*, *belongingness* and *unity*. From this perspective, identity is a 'one, common, shared culture', a kind of collective 'one real self,' which people with a shared ancestry and history hold in common. According to Grossberg (1996), the problematic factor in this analysis is that there is some intrinsic and essential content to any identity which is characterized by either a common origin or a common structure of experience or both. One can be

deemed to be born along with his or her identity that appears to act as the sign of an identical biology. In this regard, identity is determined more likely as a naturalistic and static formation that could always be sustained. This conventional view sees individual as a unique, stable and whole entity.

On the other hand, nowadays, a number of scholars point out that human self-conceptions have a history and are constantly changing. Weinreich [1] gives the definition of a person's identity 'as the totality of one's self-construal in which how one construes oneself in the present expresses the continuity between how one construes oneself as one was in the past and how one construes oneself as one aspires to be in the future' [1]. Ideas of human nature and, ultimately, identity have always been shaped by the integrated concepts of education, science, philosophy, and technology as a never completed process, logged in contingency. It is always in the process of *becoming* rather than *being*, therefore, it is constantly changing and transforming within the historical, social and cultural developments and practices such as globalization, mobility, and new innovations in technology. It is not something to have or to be, yet a resource to use and an action to do.

Furthermore, the entity of the process, the unity of education and a person's identity development constitutes the main methodological principle of citizenship education, which is especially topical at present. A person's identity relates to self-image, self-esteem, and individuality. According to this constructionists and discursive view, an individual is a socio-historical and socio-cultural product and identity is not biologically pre-determined, instead, a person develops and constructs it, and more importantly, this construction may include various and multiple identities at different points of time and contexts.

In social and cultural studies, this debate refers to a tension between essentialists (Descartes, Karl and Husserl) and constructionists/anti-essentialists (Hume, Nietzsche and Sartre) or in recent discussions, a transformation from the conception of modern identity to postmodern identity. This is how Bauman (2006) explains this transformation: 'If the *modern* problem of identity was how to construct an identity and keep it solid and stable, the *postmodern* problem of identity is primarily how to avoid fixation and keep the options open. In the case of identity, as in other cases, the catchword of modernity was creation; the catchword of postmodernity is recycling'.

2 Technological advancements and their consequences altering identity

Throughout human existence, changes in technology have significantly affected human life. Modern identity has been strongly influenced and shaped by new emerging technologies firmly entering the life of every citizen of the global community. In their turn, new technologies have shaped new theories enabling a deeper insight into the concept of identity and its construction. How a person communicates who he/she is to others is given multiple possibilities with the advent of the Internet and computer-mediated environments. Technological advancements dissolve national boundaries and open cultures to a wide and diverse unity, enabling globalization to occur. It can interconnect the world, provide information availability and assist in developing a global communication network, thus, providing a means for information sharing, self-representation in the global context supporting multiple identity through socialization and, ultimately, triggering off the development of virtual identity.

People in different parts of the world can now get together and experience the same things at the same time. They can choose any community to interact with and not obligatory the territory they are physically bound up with. What is being created – is a new electronic cultural space – a 'placeless' geography – a world in which space and time horizons have become collapsed. The concept of 'shrinking world' inherent to the process of 'time-space compression'.

Accordingly, there seems to be a fundamental transition from the values of family, community, nation, culture and country to those of global media, technological networks and virtuality.

Assuming that personal identity is a complexity of identities compiled of multiple identities, it seems no longer possible to just report the technological advancements of our society and remain neutral to their consequences. Social, technological and cultural changes are arising from a rapidly advancing technology, altering at the same time our perception of identity. Whether or not these changes are crucial, the question still focuses on how best we can come to understanding of our globalized, technologized world, ourselves, and our place in it under rapidly transforming technological conditions.

In fact, contemporary identity being greatly facilitated and shaped by ICTs and new advanced technologies that have been moving us as 'homosapiens' along the evolutionary path to an interactive and reciprocating relationship with the computer has brought about a new 'derivative' – 'composapiens'. Computer seems to have become an integral part of our life, our indispensable 'right hand' and a major personal consultant.

Therefore, identity theory today must take into consideration computer-mediated communication theory and research indicating the four major ways in which identity is affected by technology. First, there is a difference between a person's true identity and his/her virtual identity represented to the online world. Second, there are two reciprocating ways of interaction with the Internet - it can provide both protective anonymity to those who seek it and publicity to those who need it. Third, there is a mutually reverse impact that virtual identity has on the practice of communication and the impact that communication has on the practice of representing one's self. Fourth, there are varuious ways in which a user pursues both reflective virtual life and role-play with multiple identities.

Thus, once restricted to face-to-face communication, human interaction in the technologized world can be initiated, cultivated and sustained totally through computer-mediated communication, contending that identity in a modern electronic world is rooted in communication and virtual reality.

3 Virtual reality and virtual identity

Modern information and communications technology can affect changes in identities in a way that has not been experienced before in the history of humankind. Techno-

logy convinces us in being 'superhuman' since it allows us to fly, to manipulate huge and heavy objects in space and in the ocean depths, to perform surgery on the nucleus of a cell, to write by handling individual atoms, to see planets orbiting distant stars, to quickly access a vast amount of information and to communicate not only aurally but also visually in a global scale.

Social changes and identities are determined by technological innovations that can expeditiously convey information and embody social and cultural dimensions decisively shaping culture through a new communication system. Thereby, a new culture is emerging – the *culture of real virtuality* in which reality itself is fully immersed in a virtual context on the screen through which communication occurs becoming a real experience promoting the emergence of virtual identity.

There are numerous definitions given to the notions of virtual reality and virtual identity. We have adopted those given by Webster's Third New International Dictionary [2]. The notion of virtual reality comes, naturally, from the definitions for both 'virtual' and 'reality'. The definition of 'virtual' is near and reality is what we experience as human beings. So the term 'virtual reality' basically means 'near-reality'. It usually refers to a specific type of reality imitation.

Virtual reality (VR) – is the computer mediated simulation of a three-dimensional electronic environment (objects and subjects) that can be interacted, communicated with and visualized by means of computers and highly advanced technologies (such as a helmet with a screen inside or gloves fitted with sensors).

Virtual identity (VI) – is a social identity, the manifestation of one's 'self' in the computer-mediated globalized world of online communities, social networks, websites, and virtual worlds.

According to Myers (2007), the self is the most researched topic in psychology. 'Our sense of self organizes our thoughts, feelings and actions' (Myers, 2007, p. 25). When you complete the sentence, 'I am _____'you are essentially defining or describing your *identity*, how you see yourself. You could fill in the blank to describe an element of your personal identity, for example, 'I am cheerful' or 'I am athletic' or you could use terms to describe your social identity, such as, 'I am Latvian' or 'I am nationalistic'. Junglas, Johnson, Steel, Abraham, and Loughlin (2007) suggest that identity formation includes two processes: exploration and commitment. Exploration is the time period where someone questions or searches for their beliefs and goals, while commitment is when a person decides and invests in the beliefs and goals (Junglas et. al, 2007). More understanding of how and where individuals explore their identities is beginning to emerge, with the focus turning from real world to virtual worlds.

Cabiria (2008), in his research compared participants' real world experiences to their virtual world experiences. Part of his findings suggest that the structure and design of virtual worlds allow its users to freely explore many facets of their personalities in ways that are not easily available to them in real life. 'One reason for this freedom of exploration can be attributed to the anonymity that virtual worlds provide. It gives the individual the ability to be free from social norms, family pressures or expectations they may face in their personal real world lives' (Junglas et. al, 2007).

The Internet helps us to be where we want to be, to see what we want to see, hear what we want to hear, read what we want to read, feel what we want to feel and of course to be who we want to be in the freedom of anonymity.

However, with this anonymity, other consequences come into play when we look at the commitment aspect of identity formation. For example, if an individual creates a virtual identity that is different from their real identity, it can take a lot of psychological effort to maintain the false identity. In addition, one of the two options might occur: the identities may converge into one, making the virtual and real identities more true; or the individual may simply toss out the virtual identity, and start over with a new one (Junglas et. al, 2007).

The element of anonymity within virtual worlds, may provide individuals with a safe and private arena to explore their identity. However, anonymity also presents a problem for others who engage in virtual worlds, and that problem is trust. Anonymity can leave you scratching your head wondering how much, if any, of an individual's virtual identity, is really - real.

'In regards to the formation of an individual's identity in virtual worlds, we have inferred that exploration, which motivates such formation, may play a more dominant role than it does in the real world. (Junglas et. al, 2007. p. 94)

These days it seems hard to tell which is the real 'you', your real identity or your *virtual identity*, but when you have the opportunity to be who you want to be you do not really care. Some people are fine with their reality but there are also those who prefer their virtual identity, which is easier to have control over.

4 Latvian social media landscape in the European environment

Latvia is one of the Baltic states along with Lithuania and Estonia. It is an Eastern European country with a population of about 2 million [3]. About 62% of inhabitants are Latvians, and Russian-speaking population makes up the second largest multicultural group (38%) (Veģis, 2012). Because of the existence of the two ethnic-linguistic groups, the Latvian media landscape is also divided into parts - Latvian- and Russian-language editions.

Latvian media are pluralistic in terms of opinions expressed, which also includes some hostility toward the officially recognized basic principles of the state (Skudra, Šulmane, & Dreijere, 2014). Social media platforms have become very popular online venues where individuals communicate and collaborate while creating, discussing, and sharing media content. The spread of information through social media enables an emergent practice of information consumption, where users get information in their online social networks rather than actively seeking it out by regularly visiting a handful of external information and entertainment sources (Newman, Levy, & Nielsen 2015).

The use of the Internet has risen steadily over the last decades. In 2014, 76% of the Latvian population used the

Internet, and 61% used it every day. This is a bit lower than the average among the European Union countries, which was 78% and 66%, respectively (Seybert & Reinecke, 2014), but higher than the average among Eastern and Central European countries - 71% and 57%, respectively.

In line with global trends (Alexa, 2015), the most popular online services are Web search, e-mail, social networking, video, and news sites (TNS, 2014a). At the same time, traditional media retain relatively large audiences (Eurobarometer, 2013).

Similar trends can be observed in social media use. For example, in 2012, 51% of Latvians used the Internet for social networking, and by 2013, the number of social media users reached 53% (TNS, 2014). On average, social networking sites are used by 52% of Europeans (Eurobarometer, 2013), which correlates very well with the Latvian figures.

Regardless of their popularity on the Internet, many traditional media entities still have considerably large audiences. According to Eurobarometer (2013), around 92% of the Latvian population watch television and 78% listen to the radio at least once a week. These results are similar to European averages, which are 95% and 74%, respectively. While the circulation of print media, especially newspapers, has fallen dramatically in many markets (Meyer, 2009), 65% of the Latvian population still read print media at least once a week. The European average also is 65% (Eurobarometer, 2013).

5 How Latvian students' interests in social networking correlate with those of Europeans

The increasing popularity of social networking services can best be demonstrated by the growing number of their users. Facebook, the most popular social networking site in the world, has about 890 million daily active users (Facebook, 2015). The Latvian social networking site - Draugiem.lv - is one of the few among Facebook's local rivals that still dominates its home market (Aptauja.lv, 2014; Linsell, 2011). It has about 382,000 daily users (TNS, 2014b), but the number of monthly users is above 700,000 (Aptauja.lv, 2014), which is around half of all Internet users in Latvia (see Figure 1).

FIGURE 1 Screenshot of the Latvian social networking site - Draugiem.lv

Social media are increasingly employed not only to follow current events and find relevant information but to establish interpersonal contacts (see Table 1).

The most popular websites in Latvia (TNS, 2014) are the Google search engine (average daily audience is 43.2% of all users), Inbox.lv e-mail and entertainment service (28.6%), social networking site Draugiem.lv (25.3%), video site YouTube (25.1%), and news site Delfi (22.7%).

TABLE 1 The most popular websites in Latvia

Website	Average daily audience (thousands)	Average daily audience (%)
Google	886	43.2
Inbox.lv (e-mail and entertainment service; Latvian- and Russian-language versions)	586	28.6
Draugiem.lv (social networking service)	520	25.3
YouTube	516	25.1
Delfi (news site; Latvian- and Russian-language versions)	467	22.7
TVNET (news site; Latvian- and Russian-language versions)	353	17.2
Facebook	315	15.3

To get a deeper insight into the phenomenon of identity construction in times of computer-mediated global environment, we launched a pilot research to explore identity formation as a synergy of information and communication technology (ICT) and virtual reality in citizenship education at Riga Technical University, Faculty of Mechanical Engineering, Transport and Aeronautics (Riga, Latvia). Our research confirms that today's Latvian students are using a wide range of media technologies, with usage patterns growing steadily over the last few years.

We asked the 1-st and 3-rd year students (N=48; N=44 respectively) about five specific types of media use and compared these with the European tendencies:

- Watching television
- Listening to the radio
- Reading the written press
- Going on the Internet
- Use online social networks

The survey respondents were asked a series of questions regarding their use of the particular social networking site, their media consumption, what activities they use the Internet for, and how often. Descriptive statistics demonstrated the frequency of each answer, and correlation analysis was used to determine the participants' preferences for media they use.

First, the participants in the survey were asked to state how often they used any of the kinds of media on the list—every day, several times a week, once a week, several times a month, less often, or never (see Table 2).

TABLE 2 Survey results: To what extent do you watch television via the Internet?

Education	Every/Almost every day	2-3 times a week	2-3 times a month	Never	No access to this medium
Average in Europe	17%	23%	21%	36%	0%
Latvian students aged 18-20	14%	26%	34%	25%	1%
aged 21-25 +	15%	16%	21%	48%	0%
		Men – 27%	Women – 21%		

Television is the preferred medium of Europeans: 86% watch it every day or almost every day. Although Europeans are far less likely to watch television over the Internet, this practice continues to gain ground: 20% of Europeans watch television online at least once a week (Eurobarometer, 2013).

When it comes to watching television via the Internet at least once a week, the differences between categories of Latvian students are slightly more pronounced:

- This practice is more widespread among boys (27%) than among girls (21%);
- Students in the 18-20 age group are the most likely to watch television via the Internet: 34% do so at least once a week. We note that the proportion of respondent who watch television via the Internet decreases gradually with age: 21% of 21-25 year-olds watch television via the Internet at least once a week.

Radio - is the second most widely used medium by Europeans (76% use it almost every day). But there are significant differences in listening habits between Member States (see Table 3).

Two-thirds or more of the population listen to it every day or almost every day in Germany (69%). In contrast, this practice is far less widespread in Bulgaria (29%) – which is the country where respondents are the most likely to watch television. (Romania (34%) and Portugal (34%) (Eurobarometer, 2013).

TABLE 3 Radio listening: to what extent do you listen to the radio?

Education	Every/Almost every day	2-3 times a week	2-3 times a month	Never	No access to this medium
Average in Europe	37%	30%	18%	15%	0%
Latvian students aged 18-20	49%	27%	13%	9%	2%
aged 21-25 +	56%	28%	11%	5%	0%

About half of the Latvian participants listen to the radio every day or almost every day. In our talk after the survey the students admitted that they listened to the radio in the car while going to university in the morning or going home in the evening from work.

The written press is read by a third of Europeans at least once a week (see Table 4). In reading the written press, a national analysis reveals significant differences between countries: in Finland (94%) and Sweden (93%), more than nine out of ten people read the written press at least once a week. In contrast, this practice is less widespread in Greece (34%) and Romania (38%).

TABLE 4 Written press: To what extent do you read the written press?

Education	Every/Almost every day	2-3 times a week	2-3 times a month	Never	No access to this medium
Average in Europe	30%	32%	24%	13%	1%
Latvian students aged 18-20	24%	27%	31%	18%	0%
aged 21-25 +	34%	31%	24%	11%	0%

TABLE 5 Internet using: To what extent do you use the Internet?

Education	Every/Almost every day	2-3 times a week	2-3 times a month	Never	No access to this medium
Average in Europe	93%	5%	2%	0%	0%
Latvian students aged 18-20	92%	7%	1%	0%	0%
aged 21-25 +	97%	3%	0%	0%	0%

Men are more likely than women to read the written press at least once a week (69% versus 62%). Our next purpose was to find out how often our students surf the Internet (see Table 5).

More than nine out of ten young Latvian students now use the Internet on a daily or near daily basis. It is dependent on the educational attainment and age. In the age group of 18-25 it is used by 95% on a regular basis as well as 100% of all pupils and students. The use of the Internet on a daily or near-daily basis is more widespread among men (59%) than among women (41%).

The participants were also asked to report how many hours a day they spend on the Internet and on the social networking site (see Table 6). They chose from a set of answers that included various time intervals – for example, one hour or less, two to four hours, five to eight hours.

TABLE 6 Intensity of Internet use

Internet use	N=92
Amount of time in a 'typical day'	
More than 5 hours	39%
More than 4 hours –3 hours	26%
More than 3 hours –2 hours	27%
30 minutes – 1 hour	6%
≥30 minutes	2%
0 minutes	0%

The analysis has shown that the average time the students spend online daily is about 6 hours (*SD* = 2.75), and the average time they spend on a particular social networking site is about 2 hours (SD=2.25).

If to add the time needed for sleep – 7-8 hours and the time spent at university/work – 8 hours and the picture appears dramatic!

Notable differences in how boys and girls used the Internet emerged: girls were more likely to endorse social networking sites, emailing, instant messaging, and listening to music whereas boys were more likely to endorse playing games, surfing the web, and buying or looking at price on websites as their most common online activities.

It is the use of online social networks that has increased the most perceptibly in recent years: more than a third of Europeans use social networks every day or almost every day and 47% of Europeans now use them at least once a week (see Table 7).

TABLE 7 Social networks using: To what extent do you use online social networks?

Education	Every/Almost every day	2-3 times a week	2-3 times a month	Never	No access to this medium
Average in Europe	75%	16%	4%	5%	0%
Latvian students aged 18-20	78%	14%	3%	5%	0%
aged 21-25 +	59%	15%	11%	15%	0%

There are over 1 million active users of social media networks in Latvia and the growth rate is high. The use of social media among Latvian students is high, placing the country in the second place among European countries after the Netherlands.

The data on time spent on the Internet were correlated with students' answers to how regularly they consume different types of social networking site. FaceBook and Google continue their dominant position among students surveyed, with 76 of 92 students having a membership in FaceBook. At present, FaceBook remains the social media place to be and to connect with students. Twelve students listed Google+ membership. Four students noted that they were not members of any social media web site. No student listed Instagram, SnapChat, or other 'new social media' options that are seeing strong growth in other markets (see Table 8).

TABLE 8 Comparative analysis: To what extent different types of media are used (except 'never' users)

Education	TV via the Internet	Radio	The written press	Internet	Social networks
Average in Europe	68%	85%	87%	100%	95%
Latvian students aged 18-20	75%	91%	82%	100%	95%
aged 21-25 +	52%	95%	89%	100%	85%

The comparative analysis shows that both in Europe and in Latvia the situation is very similar – with the Internet occupying the leading position and very closely followed by social networks.

6 The reasons for escaping from reality and their consequences

The question arises: why do young people start spending more and more time in virtual worlds trying to escape from reality? The major problem the students reported is just that they feel bored when staying alone.

One of the reasons why they feel bored when staying in silence, away from everyone, may be 'existential emptiness'. This emptiness is formed when a person has no interests, hobbies, small pleasures, reflections, dreams, desires and conscious will.

The negative consequences of being addicted to social networks result in:

- alienation,
- reduced intelligence,
- fast fatigue and stress,
- boredom – one of the main causes of many human problems leading to:
  - frequent nervous tension,
  - alcohol / drug dependency (because of boredom many people cannot stop drinking / smoking, and even if they do it, it is only for a while, then come back to bad habits again),
  - inability to withstand long trips, meetings,

even the rest,
- inability to concentrate,
- inability to relax, chronic fatigue,
- painful desire for purchases, shopping,
- congestion of the brain by lots of problems, 'information garbage',
- the feeling of anxiety,
- apathy, depression.

As a result, the wrong choices in life, loss of opportunities, false goals and aspirations, misery and inability to get the full enjoyment of life.

How to get rid of boredom? Many psychologists advise to spend more time with your 'self'. Think about something positive. Do not think about work, about current affairs, but make plans, think about yourself and your future, about how to achieve your own happiness, and what should be done to get it.

The question becomes even more complicated by the problem of trust in social networks, which might leave you scratching your head wondering how much, if any, of an individual's virtual identity is really – real?

We asked the participants to keep a daily diary and jot down who they spoke to, what they said and whether they were telling the truth or lying, even during the most casual interactions.

The results turned out discouraging: people dropped an average of two-three lies every day. An ugly truth revealed: everyone fibs left and right.

We asked the students to consider two factors in assessing online honesty: (1) the communication venue, and (2) the topics people lie about. When it comes to the venue, research suggests that we are *most* honest on social networking sites and *least* honest on dating sites. When it comes to *what* we lie about, we are most honest about our personality, and *least* honest about our physical appearance. ('Despite the fact that the Internet makes it easy to fabricate major lies, most of the online lies are minor').

"Most people believe that given the opportunity, everything else equal, people will lie more online than they would face-to-face", said Jeff Hancock, an associate professor of communications at Cornell University who specializes in information technology and deception.

"Deception online and face to face is motivated by the same human needs", said Catalina Toma an assistant professor of communication at the University of Wisconsin-Madison who has studied online deception. "Technology simply interferes in some ways that might decrease or facilitate the opportunity to lie."

Technology is not the gateway to rampant deception; instead, Toma and Hancock both suspect that our distrust of communication technology is more likely rooted in our fear of it.

7 Virtual reality and virtual identity development based on the Theory of Graphs

With the advent of the Internet and computer-mediated environment occupying so much time in our lives, the understanding of how and where individuals explore and construct their identities is beginning to surface, with the focus turning from the real world to virtual worlds and from real identity to virtual identity.

However, individual's personal identity is not inherent or static, on the contrary, it is a story that a person keeps writing throughout his life. But our life and our behaviour is strongly influenced and shaped by social, technological and cultural changes arising from a rapidly advancing ICTs that are shaping a new emerging culture – the culture of real virtuality facilitating the development of virtual identities.

The developed model of identity construction in the computer-mediated global environment based on the Theory of Graphs [4] reflects an Identity System *(IS)* of an individul that develops and self-organizes within a bigger organized global information-communication system never available before (see Figure 2). An individual, as a social being, enhances, constructs, and develops his complex identities through interaction and communication as an information-based developing system [5-7].

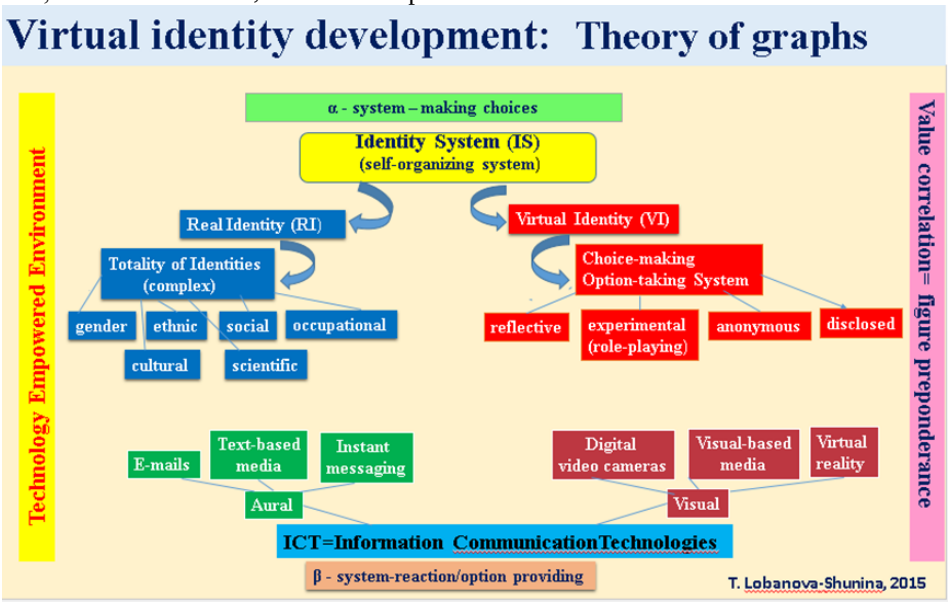


FIGURE 2 Virtual identity development

The model is presented in the form of the so-called graphs, each of which consists of vertices connected by ribs. Each vertex carries a certain meaning. Each rib indicates a certain relationship between a pair of connected vertices. Some ribs are considered in two directions.

Weuse a special type of graph which is called a 'tree', where α-vertex is the IS which makes choices, while β-vertex is the ICT-reaction system providing options. Identity System functioning is based on the investigation of the proposed options – the so-called 'tree of viewing options'.

The root vertices of such a tree present a current state/configuration, while IS - is option-taking and choice-making [5-7]. Usually there is quite a big choice of variants. As a result of their choice-making, Virtual Identity expands very fast.

8 Sociometric matrices for calculating the Virtual Identity Quality Index (VIQI)

If education professionals are to prepare for the new challenges presented by emerging media, we need to have a basic understanding of what a typical media diet looks like for today's students. We were interested in how our students use the Internet. Specifically, we wanted to know the things youth spent most of their time doing when they were online and, particularly, how the amount of time students spend on the Internet correlates with their interests. They were asked to evaluate the purposes for which they use the Internet – for studies and work, entertainment, communication, searching information and reading news, visiting blogs, etc (see Table 9).

TABLE 9 Students virtual activities

Most common Internet activities	N=92
1 Doing schoolwork +	31%
2 Social networking websites -	38%
3 Playing games -	24%
4 Listening to music -	28%
5 Instant messaging -	19%
6 Surfing the web -	17%
7 Emailing +	15%
8 Something else -	18%

Assuming that the virtual identity quality depends on the time spent in the electronic virtual space and the type of specific activities, we consider, from the educational point of view, the useful time spent on the Internet activities (i.e. that serving educational purposes) as positive (+) and the rest of the time spent on surfing the Internet - as negative (-)(see, e.g. Figure 10).The applied sociometric methods allow us to analyse partial contributions of a computer user activities and to introduce a *Virtual Identity Quality Index (VIQI).*

The method helps to identify either positive or negative virtual identity quality index (VIQI) of every person – i.e. how efficiently a person consumes his time from the point of view of educational perspective and self-development.

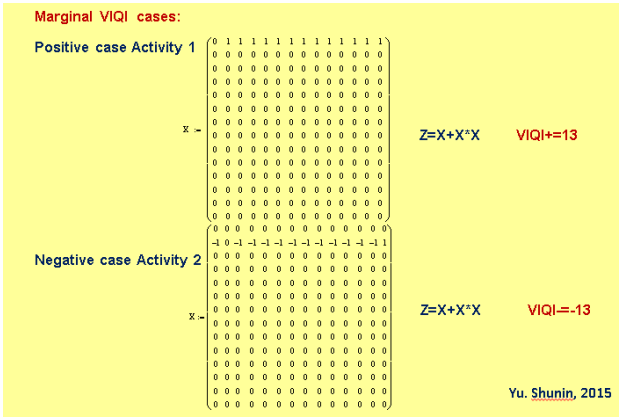


FIGURE 10 Evaluation of marginal virtual activities: pure 'plus' and pure 'minus'

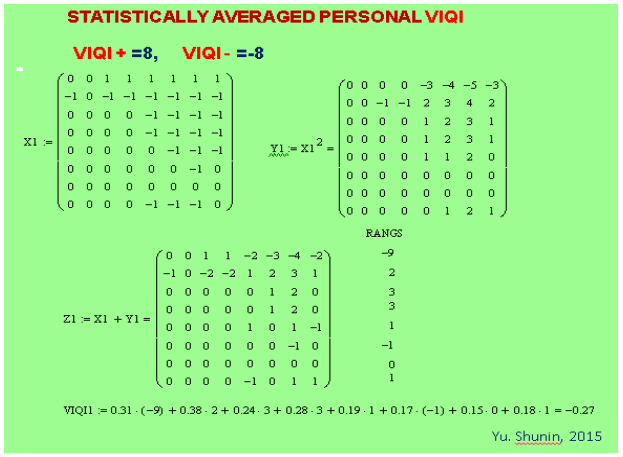


FIGURE 11 Evaluations of realistic VIQI

Based on these data, we can provide recommendations on how to most efficiently use contact computer time and how to help students to arrange their activities (both online and offline) with the maximum positive result for self-development.

9 Implications for education

Media plays a monumental role in the lives of young people today. The online world and interactive communication tools, such as text messaging, are transforming the experiences and relationships in education. The possibilities of VR and education are endless and bring many advantages to students of all ages. Technology has made the process of accessing multiple perspectives and highlighting different points of view cheaper and easier than ever before. Teachers can use the advances of ICTs and new emerging technologies to help students learn how to seek out multiple perspectives, how to synthesize various viewpoints, and how to make informed choices. Globalized society needs an educated citizenry. This requires a revision of many existing curricula and the development of objectives and content themes, and teaching, learning and assessment processes that emphasize moral values, ethical motivation and ability to work with others to help build a sustainable future. Viewing education for sustainability as a contribution to a technologically literate society is central to the reformulation of education and calls for a 'new generation' of theory and practice in education and a rethinking of many familiar approaches (Alexandersson (2012).

Wiszniewski and Coyne state 'Education can be seen as the change process by which identity is realized, how one finds one's place [8]. Education implicates the transformation of identity. Education, among other things, is a process of building up a sense of identity, generalized as a process of edification.' Students interacting in an online community must reveal something about themselves and have others respond to this contribution. In this manner, their identity is gradually formulated in dialogue with others and thereby students will gain a richer and deeper sense of who they are. There will be a process of edification that will help students come to understand their strengths and weaknesses.

Online identity in classrooms forces people to re-evaluate their concepts of classroom environments. With the invention of online classes, classrooms have changed and no longer have the traditional face-to-face communications. These communications have been replaced by computer screen. Students are no longer defined by visual characteristics unless they make them known. There are pros and cons to each side. In a traditional classroom, students are able to visually connect with a teacher who was standing in the same room. During the class, if questions arise, clarification can be provided immediately. Students can create face-to-face connections with other students, and these connections can easily be extended beyond the classroom. For timid or socially awkward students, this ability to form and extend relationships through personal contact may hold little appeal. For these students, the appeal may reside in online courses, where computer communications allow them a greater degree of separation and anonymity.

Online learning situations also cause a shift in perception of the professor. Whereas anonymity may help some students achieve a greater level of comfort, professors must maintain an active identity with which students may interact. The students should feel that their professor is ready to help whenever they may need it.

Online identity can offer potential social benefits to those with physical and sensory disabilities. The flexibility of online media provides control over their disclosure of impairment, an opportunity not typically available in real world social interactions.

10 Conclusions

We are interacting in a new environment where with the facilitation of information and computer technologies, individuals may go beyond their physical community and interface, and form virtual identities by means of interactions with diverse cultural beliefs and behaviours on a global scale.

The virtual interactive spaces mediated through the synchronous and asynchronous communication tools transform traditional notions of identity and a new cultural 'hybrid' identity emerges – the offspring of real and virtual identities.

Advances in technology have created a global communication network providing humans a new and diverse habitat – computer-mediated and online virtual world. The Internet provides virtual worlds that, in turn, provide individuals an outlet for their virtual identity.

No one can deny that the rapid developments in ICT catalysing and accelerating the dissemination of information, values, beliefs, and the spread of global culture have far-reaching effects on the development of identities and communities.

Some of them may be positive whereas others may be negative. The reduction of time and energy for the information, and the increased communication between cultures of different geographical areas and ethnic backgrounds may be deemed positive and therefore desirable.

However, the disruptive and disintegrative effects of global culture on the changing patterns of socio-cultural identities and institutions, such as youth, families, languages, educational settings and religions, may be considered negative and undesirable.

With students consuming the greatest number of hours watching television and playing video games, students between the ages of 18-22 spend an equivalent of six hours each day or 40 hours a week using media. Such amount of time devoted to media exacerbates a growing concern that media sources like television and video games have the potential to distort worldviews. This is an important concern for educators because most of the time the Internet, video film, and computer video graphics are incorporated into the curriculum. When such media are associated with youth culture, they construct representations of the world and serve as socializing agents, providing young people with beliefs about the behaviours of the world.

Schools and universities need to promote a balance way of technology diffusion that youths can properly fit to their own way of life, traditions, customs and cultural heritage at the same time they can adapt themselves to the challenges and realities of the twenty-first century in order to find their own place in the real world of globalization.

References

[1] Weinreich P 2011 Incorporating emics within etic parameters *International Journal of Intercultural Relations* **34** 124-39

[2] *Webster's Third New International Dictionary 2013 Unabridged*

[3] Bridaka D 2015 *Statistical Yearbook of Latvia 2014*

[4] Lobanova-Shunina T, Shunin Y 2014 Innovation management in higher education: Nano sciences and technologies for scientific citizenship Innovative Practice and Research Trends in Identity 56 – 66

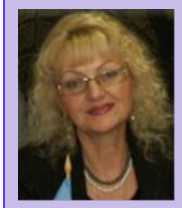
[5] Lobanova-Shunina T, Shunin Y 2014 *Computer Modelling & New Technologies* **18**(1) 13-24

[6] Lobanova-Shunina T, Shunin Y 2013 Nanotechnologies: challenges and controversy on the way to scientific citizenship, new emerging identities and intellectual consumption Identities and Citizenship Education: Controversy, crisis and challenges 182 – 93

[7] Lobanova-Shunina T, Shunin Y 2011 *Computer Modelling and New Technologies* **15**(1) 58-68

[8] Wiszniewski D, Coyne R 2009 Building Virtual Communities Cambridge: University Press 191–214

Authors



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