THE USE OF MODERN TECHNOLOGIES IN HIGHER SCHOOLS AS ONE OF THE ELEMENTS OF VALUE INNOVATION

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Abstract:
In the knowledge economy it is appropriate to revise the approach to teaching and learning in complex and unpredictable environment in which wider numbers of societies function. The traditional approach to learning and teaching cannot be sufficient, precisely because of turbulent conditions in which the gaining knowledge comes to use. In the era of globalization and digitization of social and economic life it has become a very important need of skilful and flexible use of ever more sophisticated tools and technologies. Simultaneously, thanks to modern technologies, acquisition of knowledge, skills and qualifications has become faster, easier and more efficient. In this paper it has been made an attempt to approximate the use of modern technologies, in particular internet, such as: augmented reality, videoconferences on-line in real time, strategic games, social networking sites or books on-line, enabling the efficient acquisition and creation of knowledge and skills, which may be an element of value innovation in higher schools. There were made the comparisons of use of new technologies in higher schools, and it was shown their benefits, both from the perspective of the recipients of educational services, and from the point of view of the universities in Poland and other countries. There were analyzed the student's opinions about the benefits and the major problems associated with the use of modern technologies described in this paper.

Keywords: modern technologies, higher schools, value innovation.

1. INTRODUCTION

In the era of globalization and digitalization of social and economic life a need of skilful and flexible use of ever more sophisticated tools and technologies has become very important. Simultaneously, thanks to modern technologies, acquisition of knowledge, skills and qualifications has become faster, easier and more efficient.

In this paper it has been made an attempt to approximate the use of modern technologies, in particular internet, such as: augmented reality, videoconferences on-line in real time, strategic games, social networking sites and books on-line, enabling the efficient acquisition and creation of knowledge and skills, which may be an element of value innovation in higher schools.

The comparisons of use of new technologies in higher schools were made, and their benefits, both from the perspective of the recipients of educational services, and from the point of view of the universities in Poland were shown. The students' opinions on the benefits and the major problems associated with the use of modern technologies described in this paper were analyzed

2. BASIC CONCEPTS

The requirements of knowledge-based society are forcing higher schools to continual adaptation to new circumstances. In this context, the following issues should be considered (Ratajczyk & Sojkin, 2004, p. 160):
- the information society, and knowledge and access to information,
- knowledge as public, but not universal good,
- a higher school - an incubator of information or meta information,
- teaching or learning - in search for equilibrium,
- globalization of education,
- changing role of the medium of instruction (lectures and reading role in education, as a result of the dissemination of technology, in a short period of time will probably be far-reaching changes),
- a student - a result of the learning process or a participant of the training.

The basic concepts which should be defined for the purpose of this paper are: value, innovation, value innovation and new internet technologies.
In the context of created and offered by the university value, which strives to ensure the meet expectations and needs, both reported by the students themselves and their 'advisers', the following determinants of the competitive position of higher schools should be indicated (Ratajczyk & Sojkin, 2004, pp. 161–166):
- the universal and individual value (relationship: a need - an educational product),
- the market value of graduate (both in their own eyes, as well as in the eyes of the employers and the university),
- the value of R & D,
- the value of scientific and technical base,
- the earned value - market image (university image).

The universal value are primarily programs and employees as the necessary elements of a learning process. Both these elements are the dual dimensions of educational services quality, in terms of both mandatory and voluntary.

For individual value, considered from the perspective of an integral operator of providing an educational service, it means a student – as a participant of the process, it should be taken into account the layout, the number, structure of classes, individual commitment of the school and leaders. Not without significance is the nature of classes: lectures, optional lectures, seminars, laboratories, simulations, workshops, practices, practical work, field work. It becomes necessary to perceive a student as a customer and co-founder of the final outcome of the educational process, with his knowledge, awareness and skills.

Market value of graduate is created through individual student's personality characteristics (knowledge and skills, the possibilities of perception, independence, creativity, responsibility, etc.), teaching and educational process to which he is subjected, perception of the university (rankings, evaluations, reviews, accreditation), and the requirements of the job market.

Observable variables in this area could provide:
- employers activity at the university (practice, training, competitions, case studies, job fairs, recruitment, internships, recruitment for work),
- percentage of people at work,
- adaptation the profiles of graduates for the job candidates' profiles (knowledge and skills in practical terms),
- occupied positions,
- career course (range, dynamics, actors, income),
- word of mouth.

The research activity of higher schools plays the leading role in the educational and the science development process, which create a kind of value for the individual creator – a scientist and educator, and for the beneficiary, it means for a student. This component attracts both academic employees (academic teaching profession is not only prestige, but also a source of personal and professional development), and potential students, students and graduates.

Speaking about the research and education, a proper base for university research and teaching should not be forgotten. Determining the value of scientific and educational base, such issues as infrastructure (scope, quantity, quality, location, condition, accessibility, standards, modernity), equipment, linking the learning process, whether the database can attract and maintain not only students but also employees, whether it sets a base standard and educational opportunities, and individual development, should be taken into consideration.

As a part of an intangible asset base, is earned value, including: pension of location, time of operation, traditions, the image of the university, its employees, students and alumni, and market value of the portfolio of the educational services.

All discussed generators are determinants of earned value, which is reflected in the image of higher school. It should be remembered that the image is a dynamic category and only recognized in this way is a part of designating the university's competitive position.

Second issue, which is innovation, can be defined and classified in many different ways. The interpretation of innovation is dominated by two approaches, namely the recognition of innovation as an outcome or process. In terms of the first understanding of innovation it is a change in the sphere of production, which consequently leads to new products. In terms of other meaning innovations are all aimed at creative thinking processes to apply and use the improvements in technology, organization and social life (Pomykalski, 2001, p. 17; Brzeziński, 2011, pp.17–25).

In management theory, there are many different criteria for the distribution of innovation. The most commonly used by businesses include (Jasińska, 2005, pp. 37–38):
- − product innovation - related to the core business, being understood as a new or substantially modified products and services,
- − process innovation - linked to technological processes for ways to manufacture products or provide services from a technical point of view,
- − organizational innovation - for all business processes relating to its operation as a whole,
- − value innovation[1] - making the new philosophy of the company; are considered at a strategic level and relate to both creation new market opportunities and use existing ones by the organizations; rely on providing the customer a completely new value for him, not necessarily with the use of new technologies.

Innovations can also be divided into: supporting and groundbreaking (disruptive) (Christensen, Anthony & Roth, 2010, pp.18–19).

Supporting innovations rely on improving existing products in terms of highly valued by customers. However disruptive innovations bring new values. Both are creating new markets and transform previously existing. There are two types of disruptive innovation - in the low segments and in the new market. Groundbreaking innovation in the low segment occurs when existing products or services are 'too good', and thus too expensive in relation to the value expected by customers. (...) Groundbreaking innovations for the new market occur when an existing product features to limit the number of potential recipients, or impose inconvenient usage.

Information technology is defined as the acquisition, processing, storing and distributing voice, picture, text and numeric information, through a combination of microelectronic devices and telecommunications computing (Pomykalski, 2001, p. 194).

New internet technologies, which can be used in higher schools as an element of value innovation, in this paper are as following: Internet, augmented reality, videoconferences on-line in real time, strategic games, social networking (especially Facebook) and on-line books.

3. ACCESS TO THE COMPUTERS AND TO THE INTERNET IN POLAND

According to data enclosed on the website of the Central Statistical Office, since 2007 the rate of enterprises with Internet access throughout the country increased in 2010, reaching a level of 96 %. Among large companies continued almost to the same level (almost 100 % in 2009) in the last four years. The greatest progress has been made for small enterprises, which were

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[1] More in: W. Chan Kim, R. Mauborgne, 2005.

the least equipped with the access to the global network. Since 2007, the rate of Internet access among small enterprises increased by 5 percentage points, reaching 91 % in 2008. In 2009 there was a slight decrease of 3 percentage points, and then in 2010 increased to 95 %.[2]

In Poland, the proportion of employees using computers at work in 2009, depending on the region, showed a fairly large variation. This is due to varying degrees of regional development. In Mazowieckie, which excels, more than half of the employees and 47 % of computers have got an access to the Internet. This represents a huge contrast to the Warmia and Mazury, where these rates are lowest and are respectively 25 % and 20 %. In 2010 there was a slight increase in these indicators. It ranged from 3–5 percentage points. The exception is, in the case of employees using computers, Mazowieckie, Opolskie and Małopolskie, in the case of using a computer with Internet access: Opole, Lublin, which reported a decline. In case of the voivodeships, the percentage of people using computers has decreased slightly and amounted to 51 %. Despite this, in 2010, Mazowieckie Province still led and Warmińsko-Mazurskie Province took the last position.[3]

According to data contained in the CSO report the highest percentage of the Internet users by age are people with age range 16–44 years (people from the age group 16–24 years - more than 90 % of people related this age used the Internet in 2010, nearly 80 % of people aged 25–34, and about 65 % of those in the range 35–44 years).[4]

Tables and figures must be placed within the text of the paper. Generally, graphics should be in Times New Roman 12 pt with table column headings underscored (as seen below). Graphics should be clearly rendered in order to form attractive, readable black-and-white copies. All tables and figures must be included in the paper (no appendices are allowed).

Table 1: Percentage of households with the Internet access at home

Description	2006	2007	2008	2009	2010
Total	35,9	41,0	47,6	58,6	63,4
Household type					
Households with children	47,3	53,2	61,4	75,3	82,9
Households without children	30,7	35,4	40,9	50,1	53,7
Place of residence					
Large cities	45,6	49,9	56,0	65,1	68,8
Smaller towns	36,5	43,7	50,3	59,8	65,1
Rural areas	25,1	28,9	36,1	50,5	56,2

Source: www.stat.gov.pl/cps/rde/xbcr/gus/PUBL_nts_spolecz_inform_w_polsce_2006-2010.pdf.

The most common activity when using the Internet for communication purposes in 2009 was the use of instant messaging - 33 % of the population have used such programs. Traditionally, the highest percentage of such people can be seen in the group aged 16–24 (80 %) and among students (85 %). It was noted that reading on-line diaries (called blogs) reached the lowest

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[2] Webpage: www.stat.gov.pl/cps/rde/xbcr/gus/PUBL_nts_spolecz_inform_w_polsce_2006-2010.pdf (15.04.2012).
[3] Webpage: www.stat.gov.pl/cps/rde/xbcr/gus/PUBL_nts_spolecz_inform_w_polsce_2006-2010.pdf (15.04.2012).
[4] Webpage: www.stat.gov.pl/cps/rde/xbcr/gus/PUBL_nts_spolecz_inform_w_polsce_2006-2010.pdf (15.04.2012).

popularity (8 % of the population). It should be also noted that each of these activities is performed to the greatest extent by those aged 16–24 years and by students.[5]

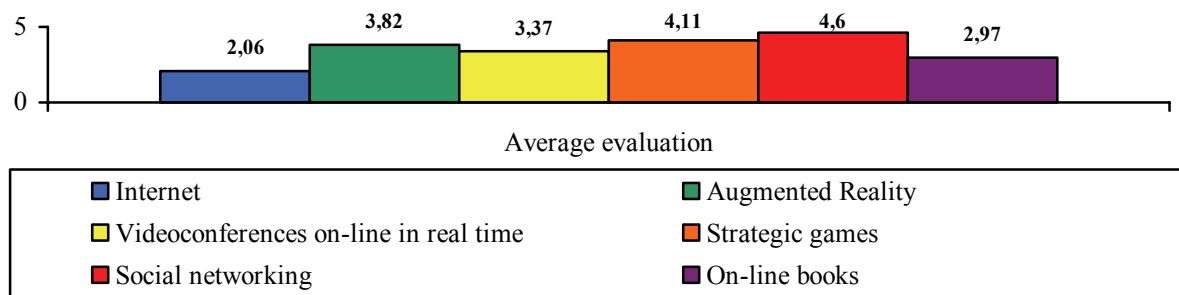# 4. THE USE OF MODERN INTERNET TECHNOLOGIES IN HIGHER SCHOOLS

For the purposes of this paper, pilot research of public higher school students in Poland were carried out. Questions about the modern Internet technologies in the educational activities of universities were asked. The questionnaire consisted of substantive questions and questions about respondents. As part of substantive questions there was one in which respondents assessed the usefulness of modern technology in the educational activities of universities. Also they were asked about the use of new technologies by higher education. It was an open question. Further questions concerned the benefits and problems associated with the use of various modern internet technologies in the educational activities of higher schools from the perspective of students. The last question was about the benefits from the perspective of the university.

Respondents were students of the last year of part-time master degree studies. Women accounted for 67,69 % of all respondents, 93 % of respondents were at age between 21–34 years, 56,92 % of them declared that were in a relationship - marriage or other type, 58,46 % of respondents with total number of people in the household between 3–4. 43,08 % of all respondents were employed in private enterprises and 23,08 % were unemployed, with work experience between 4–6 years (50,77 %) and work experience on the current occupied position between 1–3 years (30,77 %).

Respondents were asked to evaluate the use of the modern internet technologies in higher school educational activity. The evaluation was conducted by a rating scale from 1 – the most relevant for the student, to 6 – the least useful. Results are shown on the Picture 1.

Taking into account data contained in Picture 1. it can be concluded that in students' opinion the most useful modern internet technologies are the Internet and on-line books. The less relevant is social networking. It is not surprising, therefore, that social networks are not seen (yet) as a way of more wide communication, but not invented until something else than a social reception of this method of communication. But both companies and individuals use the portals to the activities such as marketing.

Picture 1: Average evaluation of use the modern internet technologies in higher school educational activity

Legend:
- Internet
- Videoconferences on-line in real time
- Social networking
- Augmented Reality
- Strategic games
- On-line books

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[5] Webpage: www.stat.gov.pl/cps/rde/xbcr/gus/PUBL_nts_spolecz_inform_w_polsce_2006-2010.pdf (15.04.2012).

Taking into account the opinions of students about the ways of use the modern technologies by higher schools, it was found that most respondents considered that most of them can be used for promotional and communication goals. In students' opinions Internet can be used for sending e-mails, as website, for promotion of university, communication between students, distribution of knowledge, scientific programs and posting information for students, and dates of lectures and materials.

Augmented reality (AR) might be useful for educational goals, practices (for example, distribution of knowledge, fun, hobbies, communication of students with tutors and conducting experiments. It should be noted that most students did not know AR before the researches. Only after some explanations they were able to answer questions on this subject. It explains their answers connected with this new internet technology.

Videoconferences on-line in real time were better known and respondents considered that they are useful for such purposes as: university open days, teaching objectives, communication, promotion, distribution of knowledge, lectures, information, opportunity to conduct discussions with eminent lecturers from other higher schools all over the world, more flexible learning process. Strategic games which were considered rather as games for children or young people, were seen not only as a kind of fun but as technology which helps gaining additional skills, learning teamwork and foresight activities. It can also fulfill educational goals, practices, knowledge distribution, information for high school students, or the simulation of reality. There were also opinions that strategic games can be used as a kind of examination – after achieving needed level it could be an entrance exam to higher school. Going further in this direction, strategic games could be used as a tool for lecturers as a kind of test instead of traditional examinations.

Next modern internet technology, social networking was observed rather as a tool of advertising, personally addressed information, promotion, communication, information, integration of academic community, feedback for universities (the place where students can share their opinions about school).

Last internet technology - on-line books – in students' opinions can be used for promotion of university, what is understood rather as promotion by fact that higher school has such opportunity, than by on-line books themselves. Next ways of use are for educational purposes and distribution of knowledge.

Apart from the opinions on the ways of using analyzed modern technologies, respondents were asked to assess the benefits of their usage. In scale from 1 (lowest rating) – to 3 (highest rating), they evaluated each of given benefits. Results of this evaluation are shown in table 2.

Table 2. The benefits of using modern Internet technologies from the viewpoint of customers – students

Description	Internet	Augmented Reality	Videoconference on-line	Strategic games	Social networking	On-line books
Faster flow of information	2,72	1,97	2,38	1,60	1,95	1,92
Easier access to information	2,65	2,09	2,02	1,57	1,89	2,23
Easier contact with lecturers	2,45	1,88	2,35	1,55	1,88	1,18
Opportunity to improve practical skills	1,91	2,23	2,00	2,28	1,51	1,58

Lower costs of studying	2,34	2,11	2,31	1,72	1,65	2,12
Saving time	2,66	2,11	2,29	1,58	1,66	1,98
Easy access to studies	2,48	1,97	2,29	1,72	1,66	1,85
Opportunity to work in a group	2,23	1,97	2,14	2,14	2,18	1,35
Possibility of contact with other students	2,54	1,94	2,11	2,00	2,49	1,20
Possibility of establishing friendships with people from other universities	2,48	2,03	2,35	1,86	2,20	1,25
Opportunity to learn foreign languages	2,32	2,05	2,25	1,60	1,74	1,66
The possibility of establishing friendship with people from other countries	2,17	1,80	1,88	1,43	1,75	1,12
More attractive courses	1,91	1,69	1,75	1,43	1,32	1,06

Taking into consideration data from table 2. it can be observed that for students the most valued benefits connected with using modern internet technologies were faster flow of information (specially thanks to the Internet), easier access to information (Internet), easier contact with lecturers (Internet, videoconferences on-line) opportunity to improve practical skills (Augmented Reality and strategic games), lower cost of studying (Internet and videoconferences on-line), saving time (Internet, and videoconferences on-line), easy access to studies (Internet and videoconferences on-line), possibility of contact with other students (Internet and social networking), possibility of establishing friendship with people from other universities (Internet and videoconferences on-line), opportunity to learn foreign languages (Internet).

As it can be observed Internet itself is most useful for students. It can be concluded that such perception of the Internet is a confirmation of the characteristics described in the theory of this technology.[6]

Respondents were asked to evaluate the problems which can be observed in connection with the usage of new technologies (table 3).

From data included in table 3. it can be noticed that, in general, respondents do not see modern technologies as problematic ones, because average assess shows that any of given problems were not evaluated at the highest rating (3). Majority had the rating below 2. For respondents the main problems connected with using modern technologies were: lack of contact face-to-face (especially with using Internet, strategic games, social networking and on-line books), difficult access to lecturers (Augmented Reality, strategic games, on-line books), high costs of using (Augmented Reality, videoconferences on-line), lack of appropriate equipment (Augmented Reality and videoconferences on-line) and unreliability of information (Internet, social networking).

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[6] See: K. Obłój, 2007, pp. 52–53.

Table 3: The problems connected with the use of modern technologies from the viewpoint of customers – students

Description	Internet	Augmented Reality	Videoconference on-line	Strategic games	Social networking	On-line books
Lack of contact face-to-face	1,77	1,78	1,77	1,78	1,72	1,88
Difficult access to lecturers	1,72	1,95	1,75	1,80	1,66	1,95
Social isolation	1,80	1,94	1,74	1,77	1,57	1,60
High costs of using	1,54	2,03	1,94	1,75	1,42	1,65
Psychological barriers	1,40	1,68	1,78	1,69	1,60	1,32
Lack of appropriate equipment	1,66	2,20	2,18	1,77	1,54	1,62
Incompetence of use	1,66	2,03	1,88	1,78	1,45	1,54
Lack of knowledge of foreign languages	1,80	1,86	2,02	1,89	1,78	1,78
Unreliability of information	1,97	1,75	1,72	1,62	1,82	1,37
Lack of access	1,66	1,91	1,75	1,60	1,48	1,65

The most significant benefits of using modern internet technologies from the perspective of higher schools are shown in table 4. It should be mentioned that it was a viewpoint of students.

Table 4: The benefits of using modern Internet technologies from the perspective of university

Description	Internet	Augmented Reality	Videoconference on-line	Strategic games	Social networking	On-line books
Faster flow of information	2,53	1,97	2,31	1,80	2,00	1,88
Easier contact with students	2,55	2,02	2,22	1,86	2,14	1,55
Opportunity to improve practical skills	1,88	2,06	1,91	2,23	1,58	1,55
Lower costs of conducting classes	2,38	2,05	2,25	2,00	1,95	1,97
More attractive courses	2,30	2,46	2,43	2,22	1,77	1,65
Possibility of contact with lecturers / researchers from other universities	2,48	1,97	2,28	1,77	1,94	1,25
Possibility of cooperation with other universities	2,44	2,05	2,25	1,80	1,97	1,32
Reduction in operational costs of universities	2,36	1,98	2,00	1,66	1,71	1,88
Space saving	2,22	1,71	2,03	1,58	1,66	1,78
Possibility of quick and cheap university promotion	2,34	1,66	1,89	1,37	1,83	1,29

Taking into consideration data from table 4 it may be observed that average assesses are, in general, close to 2,5. The most important are faster flow of information (Internet and videoconferences on-line), easier contact with students (Internet and videoconferences on-line), lower costs of conducting classes (Internet and videoconferences on-line), more

attractive courses (Internet, Augmented Reality, videoconferences on-line, strategic games), possibility of contact with lecturers / researchers from other universities (Internet), possibility of cooperation with other universities (Internet, videoconferences on-line), reduction in operational costs of universities, space saving, possibility of quick and cheap university promotion (Internet).

5. CONCLUSION

The main purpose of this paper was approximating benefits and main problems connected with use of modern technologies, in particular internet, such as: augmented reality, videoconferences on-line in real time, strategic games, social networking sites and on-line books, from viewpoint of students in context of their use as an element of value innovation in higher schools.

The pilot researches show that from students' viewpoint most benefits of the use of modern internet technologies are connected with the use of the Internet itself. Other technologies are perceived as a novelty which use is not still associated with more substantial benefits. This is probably due to the fact that they are not still commonly used in higher education, especially in smaller and less prestigious higher schools in Poland.

The major problems which were pointed out by respondents were lack of contact face-to-face, difficult access to lecturers, high costs of using, lack of appropriate equipment and unreliability of information.

From students' point of view the most important advantages of new technologies for higher schools are more attractive courses, faster flow of information and easier contact with students.

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