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Prof. Dr. Mustafa Şahin Dündar - TOJSAT, Editor Sakarya-Turkey

Hello from TOJSAT

TOJSAT welcomes you.
I am very pleased to publish v5i4, 2015 issue. As an editor-in-chief of The Online Journal of Science & Technology, this issue is the success of the reviewers, editorial board and the researchers. In this respect, I would like to thank to all reviewers, researchers and the editorial board.

The v5i4, 2015 issue covers different research scopes, approaches which subjects about new developments in science and technology by valuable researchers. The editorial team will be pleased to share various researches with this issue as it is the miracle of our journal.

TOJSAT, TASET, Governor State University, Sakarya University and Vienna University of Technology will organize ISTEC-2016 (International Science & Technology Conference) (www.iste-c.net) between July, 13-15, 2016 in Vienna, Austria.

Call for Papers

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The articles should be original, unpublished, and not in consideration for publication elsewhere at the time of submission to TOJSAT.

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October 01, 2015

Editor-in-Chief
Prof. Dr. Aytekin İŞMAN
Sakarya University

Dear Tojsat Readers,

Today, we have reached to the end of fifth volume of our journal. With the fifth volume five years past from the journals' first issue published on-line. Our goal is to rewiev and accept mulyi diciplinary research papers, rewiev articles, etc. for the journal from scientific World such as *"E-Consumer Behaviour as a New Trend of Consumption in Poland", Is IBL (Inquiry based learning) helping Zayed University students acquire scientific skills in a general science course?"* in this issue of journal.

I will thank to the readers all around the World for supports by sending their valuable scientific studies to publish in Tojsat journal.

Prof.Dr. Mustafa S. DUNDAR

Editor, TOJSAT

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Abstract The paper widely discusses not only threats and barriers, which are associated with the new model of cloud computing. It covers the benefits and prospects for the development of enterprises and all kinds of services inherent in using the cloud computing model. The results of a survey conducted among Polish entrepreneurs operating in the province of Silesia on the knowledge of the concept of cloud computing, the potential of the business model have been analyzed, discussed and compared with published results of previous studies. It has been noted that the use of cloud computing, also in the area of accounting reduces overall IT management costs, and allows large-scale consolidation and optimization of the use of hardware and software resources. It can level the competitive field, by making a large-scale computational resources available to small businesses and other organizations, which would not be able to afford adequate infrastructure otherwise. This trend represents also the ability to equal opportunities in the macro-scale, which means emerging economies, at least for those regions that have created a sufficiently reliable and fast broadband infrastructure.

Key words: Cloud computing, accounting, SME business.

Introduction

Cloud computing is a new model of computation that can bring significant benefits to consumers, businesses and government, creating new threats and challenges. "In the cloud" data processing came to be called a model of the IT systems in which the server installation location does not matter. "Cloud computing" model can be simply defined as the storage, processing and use of data to be accessed over the Internet, on a different location computers. This means that users can request to have almost unlimited computing power that do not require significant capital investment in order to meet their needs and that they can access their data from any location where they are connected to the Internet

This is the Internet which was one of the major factors influencing the fact that globalization of economic processes leading to the integration but also interdependence of countries, societies, economies, characterized by, inter alia, the flow of goods, capital and labor on a global scale is an irreversible process. Also, the internationalization of economic processes and internationalization of enterprises are already a fact. Globalization covers all areas of economic life, but the most advanced is in the area of financial markets. Along with widening of globalization and internationalization the range of users of financial information and their information needs. Taking this into account, knowledge of accounting systems existing in different countries, in particular the differences and similarities between these systems and the directions of their development gains significance. Globalization of the economy and the development of civilization undoubtedly contributed to the processes of harmonization and standardization of accounting. The advantages and tangible benefits from the use of international standards, meant that they enjoy more and more recognition around the world, which is reflected in their direct implementation in national accounting, in such countries as China, Russia, Ukraine and African countries, or the use of selected standards under the modified national regulations, such as in Poland, the Czech Republic or so-called old EU countries. Convergence of national solutions and IFRS took place in South Africa, Japan, Israel, Malaysia, Latin America, especially in Mexico and Brazil. This progressive internationalization of business, integration within the European Union and the creation of international financial organizations forced somehow need to create a uniform system of accounting standards, which would be based on clear and explicit rules that ensured comparability of used solutions and comparability of financial statements prepared in accordance with them at the national and transnational level.

Accounting "in the cloud" is a relatively new phenomenon. Accounting is a field rather conservative and one of the last subjected to modern IT and technological. With the introduction of new solutions in recent years, it turned out that the concept of building own data center is not always effective. Moreover, in the era of globalization and performance of transnational availability of current financial information from anywhere in the world and at any time becomes a necessity. Processing of data on costs, revenues, sales, corporate finance in the cloud enables access to such data limited only by access privileges independently of place and time.

In the recent years, both in Europe and in the world a number of studies such as the effects and extent of implementation of the cloud computing model in enterprises, areas in which it is used, the protection of consumers in the EU and the use of digital services in the EU to ensure a single market have been prepared.

Model of data processing in the cloud - risks and benefits

The World Wide Web provides access to information for all and everywhere, and thanks to cloud computing, computing power is available for everyone and everywhere. Cloud computing, as the Internet network, is the result of an ongoing for some time technological development, which will continue to proceed. In contrast to the Internet, cloud computing is still in a relatively early stage of development. Bearing in mind the rapid implementation of cloud computing in the European Union, it becomes extremely important to adopt new legal framework for data protection and develop uniform standards governing their processing, which is necessary to increase the safety of the provision of this service.

Cloud computing can be seen as a form of reproduction of power and the flexibility to use various forms of outsourcing by companies or organizations. Data processing service in the "cloud" can handle all types of business applications and services, including a full range of business needs. In addition, this service allows businesses to introduce quickly new products to the market, through more effective cooperation, including international partners, as well as the availability of advanced, low-cost computing resources. Business processes run in the cloud allow for close cooperation between many different providers and increase the possibility of cooperation and access to information between different companies within the same organization, which promotes the internationalization of economic activity.

Cloud computing can produce savings and facilitate innovative web services. However, it turns out that the implementation of a wide range of use of cloud computing faces a variety of barriers. The basic condition for exploiting benefits of cloud computing activities, not only for the single market of the European Union, is to fill the gaps in the legal provisions related to the cloud. Main points are to improve conditions for users, solving security-related problems of stakeholders, to encourage the public sector to benefit from the cloud and to support further research and development in cloud computing (Directorate-General for International Policies, 2012).

One of the barriers is the fear of users whether stored and transmitted data in the cloud will not be used or disclosed in unexpected ways. This aspect is one of the fundamental considerations by business owners who want to take advantage of new solutions. Data transmission within a LAN (Local Area Network) gave business owners confidence that their interception by unauthorized persons is minimal and depends only on the level of security on its own network. When moving data across virtual servers, we have to rely on adequate collateral public network and server units service provider. Enterprises and consumers need to be confident and reassured by service providers with complete security of their data. There must be an appropriate high level of confidence on the supplier - recipient line in the field of risk management skills, backed up by the use of cutting-edge solutions in the field of cybersecurity.

Considering the technical point of storing data in the computing cloud, it is worth saying that they are accessible from any computer connected to the network. In addition, in the case of public cloud, are stored together with the data of other clients. Although each user has individual access channels to prevent its data being spied by other recipients, but the fact itself of storing data in the same infrastructure can be worrying. Concern may also result from the fact that we entrust our resources to an unfamiliar company, which admittedly provides the maximum level of security, but against external users. The provider, if he wants, can easily browse our data.[1] National systems of protection of privacy should be predictable, transparent and avoid unnecessary burdensome registration requirements for data and cross-border data transfers for service providers, such as the cloud. Cloud Providers should be encouraged to establish a privacy policy, appropriate for this type of service and the business model they use. Another barrier to wide popularization of cloud computing is the fight against cybercrime, which usually manifests itself in the form of theft of money, goods, programs, data. Computers are also used in the so-called technological or economic espionage. There must be clear and precise legal provisions allowing the fight against criminals in the network, as in the real world. Effective enforcement mechanisms in this field should be ensured.

[1] The Business Software Alliance (BSA) Global Cloud Computing Scorecard ranks 24 countries based on seven policy categories that measure the countries' preparedness to support the growth of cloud computing. Together, these countries account for 80 percent of the global ICT market According to this study, rules introduced in Korea provide the best data protection and the worst – in South Africa. Also, in this regard, there is no relevant data protection legislation in China, India, Indonesia and Singapore.

The problem is the lack of appropriate legislation in individual countries, which are the seats of companies providing cloud computing services, or are transit countries for data transmission. This creates conditions for the development of cybercrime[2].

Area for better regulation in connection with the implementation of a wide range of CC is the protection of intellectual property. The pace of development of services, applications available in the cloud, will depend on providing legal protection to owners and authors of these solutions. Among the countries surveyed by the BSA, the worst results are noted in Brazil and the best in Australia.

A separate issue is the free transfer of data and adaptation of international regulations in this regard. It should be possible for users to move data between different cloud providers, which require both the suppliers and governments to cooperate between each other in the field of data transmission. There is a need to develop standards, such as those already existing in transmission of image and sound.

Implementation of cloud computing in companies requires access to broadband Internet. The exchange of data is so large that the usual links operating in asynchronous ADSL (Asymmetric Digital Subscriber Line) can cause delays in the transmission of packets, which in turn will adversely affect the functioning of the company, which depends on information stored hundreds or thousands of kilometers from the place of running a business. Therefore, successful implementation of cloud computing depends essentially on building the necessary infrastructure networks and eliminate unstable work of network connections (Kobis, 2013).

Software solutions used by companies often come from different suppliers. During the migration to the Cloud Computing model it may well be that particular application is not available in the cloud, or is available in the cloud of another service provider. There may be a need to provide mechanisms for ensuring cooperation between programs or between clouds. These solutions can be very costly, and in some cases impossible to achieve. Although companies offering clouds are doing everything to ensure maximum usability, but it is remembered that, this method of supplying solutions is still in the development phase.

By their nature, cloud computing works across the countries' borders, and the success of its services depends on access to regional and global markets. It should promote trade in computer network, allowing for the sale and purchase of products regardless of the physical location of production and distribution. The promotion of "free trade".

As one can see, there are several problems that must be solved in order to use the model of cloud computing, which, however, has many advantages. By using this solution, users can request to have almost unlimited computing power, they do not require significant capital investment (computer equipment, servers) in order to achieve their needs and can access their data from any location where they are connected to the Internet. With cloud computing costs for users of information technology (IT) can be reduced and the development of many new services is possible. The use of cloud computing means that even the smallest businesses can reach out to larger markets and governments can increase the attractiveness and effectiveness of their services while reducing expenses.

Kobis (2013) among the opportunities and benefits for companies in the Cloud Computing implementation lists:

No need to invest in their own IT infrastructure - this advantage relates primarily to companies that only build their infrastructure. For companies that already have their own IT infrastructure, moral aging of infrastructure is a motivation to transfer resources in the cloud. Cloud computing provides always the latest available solutions.

Scalability and Performance solutions - is related to the daily operation of the company. Software manufacturers argue that traditional infrastructure companies is used to a small extent - between 15 and 20 percent. In contrast, cloud is a solution that maximizes the use of resources, increasing it up to 90 percent. In the case of clouds, the customer decides what computing power he needs in a given period, paying only for the actual utilization.

Independence from the physical device and place of residence - in traditional solutions, where applications are installed on workstations, work is closely connected with certain physical computer. In the case of cloud computing there is a possibility of employing the so-called mobile workers.

Resistance to hazards (safety and reliability) - Cloud Computing uses redundant servers and backup all your data to enable continuous availability and reliability. The system has the ability to automatically and immediately switch back up your data as primary and start the service on the other, efficient servers.

Savings staff - having your own IT infrastructure combined with the employment of highly qualified specialists managing and monitoring the work of individual departments. When you move to a cloud computing infrastructure, the responsibility for ensuring access to services is on the supply side. This enables a significant reduction in IT staff.

[2] Research conducted by BSA shows that a model system to combat cyber crime can be found in such countries as Japan, Germany, France and South Africa not included in the chart, which achieved 9.8 points. Poland in the statement is in an overall sixth place. Also in this category, Brazil occupies the last place among the 24 countries surveyed-1.6 out of 10

The adoption of cloud computing in all sectors of the economy may help to reduce the costs associated with information and communication technologies and, in conjunction with the new digital practices within the business, can improve the productivity, growth and employment (Kretschmer, 2012). The European Union has taken actions to encourage all interested parties to participate in the implementation of these actions. This could mean additional, direct expenditure of € 45 billion for the model of cloud computing in the EU in 2020, as well as the overall total impact on GDP of EUR 957 billion and the creation of 3.8 million jobs by 2020 (International Data Corporation, 2012).

The solution of specific problems associated with cloud computing would mean faster and better harmonized adoption of this technology by enterprises, as well as organizations and public authorities in Europe. This will lead to contributing to the demand for accelerated productivity growth and increased competitiveness of the economy and, on the supply side, the broader market in which Europe becomes a key partner in the international dimension. Thus, the European ICT sector can benefit from the introduction of important new features. Under appropriate conditions, the traditional strengths of Europe in the field of telecommunications equipment, networks and services can be a very effective use of the cloud infrastructure. In addition, the large and small European application developers could benefit from the growing demand (European Economic and Social Committee and the Committee of the Regions. 2012).

Kovachev, Cao, and Klamm (2011) point out in their research on cloud computing in mobile applications. In order to better understand how to facilitate the building of mobile applications based on the cloud, they pursue work in the field of mobile computing through the prism of principles of cloud computing, which can help to build a more advanced mobile applications.

Cloud computing market is growing rapidly in Poland. According to the International Data Corporation (IDC) report "Poland's Cloud Services Market 2011-2015 Forecast and 2010 Competitive Analysis" in 2010, the value of the cloud computing market in Poland, covering both private cloud and public accounted for nearly 7% of the total IT outsourcing market is estimated at more than $ 520 million. At the same time processing in the cloud computing is the fastest growing part of the Information and Communications Technology (ICT) market. Projected average annual growth rate for 2015 is at 33 %. It turned out, however, that these predictions were too optimistic. Although the cloud is extensively promoted and the offer in this regards is growing fast, Polish companies are not as enthusiastic towards the clouds as expected. Therefore, a lower growth rate of the cloud computing market has to be accepted. In the current year among IT spending in Poland, the traditional model of purchasing will still dominate, while spending on cloud model will account for only a fraction of expenditures (International Data Corporation 2011).

Poland has one of the most comprehensive systems of intellectual property protection. However, there are minor deficiencies in the process of enforcement. The legal system in Poland has provisions governing the protection of privacy, electronic signature, electronic commerce and cybercrime. Poland promotes innovation and interoperability. The Achilles heel of the exchange of digital services in Poland is still poor access to broadband network. A functioning, comprehensive strategy would ensure the improvement of the availability of high-speed Internet. The best situation in this area can be observed in urban areas, where thanks to a large extent to the acquisition of EU funds, the rate is at a good level. The situation in most rural areas is far below the European average. Cloud computing has significant economic potential. Enterprises benefiting from this form of services can reduce overall costs of operating systems, and also derive substantial profits from innovation adoption of new organizational processes that increase productivity. A survey conducted in 2011 on behalf of the European Commission by IDC among companies that use cloud computing shows that the savings associated with this amounted to an average of 10-20 % of the cost of IT. Among 36 % of the surveyed companies use of cloud computing has generated savings of 20% or higher in IT spending (European Economic and Social Committee and the Committee of the Regions, 2012)
http://pl.wikipedia.org/wiki/Chmura_obliczeniowa - cite_note-5.

Adoption of developed in the European Union strategy "Unleashing the Potential of Cloud Computing in Europe" is designed to create in effect of 2.5 million new jobs in European countries and impact of € 160 billion to EU GDP annual (about 1%) in 2020 (European Economic and Social Committee and the Committee of the Regions, 2012).

Internet and globalization

It is known that the Internet is a challenge for traditional theories of regulatory and governmental practices. This is mainly due to blurring of concepts such as territory or sectors. Nevertheless, when we consider the future of the Internet, we see even greater challenges ahead, with many questions about privacy, security and Internet governance. It is also the moment to initiate a global discussion on the better, more efficient and more commonly used in business Internet. All these issues concerning the future of the Internet are crucial for Europe

and the rest of the world. The European Union has every right to be a key player involved in deciding the future of the Internet.

The Internet is the basis for the whole economy in a growing part of the world. ICT contributed to 40% of overall productivity growth in the economy in 1994-2004. The network effect enables acceleration and global diffusion of innovation. Subsequent changes in the economy, as well as in the lives of the citizens were remarkable. The variety and multitude of applications and business models supported by the Internet also largely affects its nature and structure (Internet traffic increases by 60% per year). You could say that the Internet infrastructure has become mature and exhausted its innovation and growth potential. We are at the beginning of a new phase of the Internet, which will drive innovation and growth. However, you have to think about what to do to unleash this potential, which is even more necessary in times of economic downturn. To get out of the economic crisis, we need to encourage stable and sustainable growth of business in the goods and services that respond to the real needs of the market with high value. Europe needs to make full use of the economic potential of a single market, which is still locked in fragmented national markets. Internet-based services should be used primarily, because their nature has a cross-border dimension (Reding, 2009).

The global nature of today's marketplace requires active participants in the internationalized business. Historically, companies compete with each other on the plane up to two performance goals, such as price and quality. However, competition in existing markets is not limited only to control of demand through price and quality but also the flexibility and speed of response. Therefore, today's organizations must compete against all the competing goals.

Economic globalization and internationalization are key factors for integrating suppliers, partners and customers within and outside the country, and the goal is to achieve integrated supply chains. This can help in the implementation of technology and information systems such as enterprise resource planning (ERP). Yusuf, Gunasekaran and Abthorpe (2004) studied the cases of successful and unsuccessful implementations of technology and information systems in order to achieve a coordinated and integrated supply chain. They found that the causes of failures are often associated with poor management of the implementation process. The emergence of various information technologies such as the Internet, electronic data interchange (EDI) and Web facilitate achievement of an integrated supply chain, which allows for flexibility and rapid response to changing market requirements.

Business processes in the cloud allow to combine a number of different suppliers and increasing cooperation between different departments of the same organization. Lack of adequate infrastructure in place is irrelevant (including emerging economies in macro scale, at least for those regions that are sufficiently reliable and have fast broadband infrastructure).

Accounting in the cloud

Accounting for many centuries has been considered a discipline that did not give up fashions, and changes were introduced very carefully and in an evolutionary way. Prudent approach to changes contributed to ensure the stability of the accounting system and the ability to perform the basic function of which is to provide information to help the settlement of the ongoing management of their activities. In recent years, the pace of development accelerated accounting. Harmonization processes tend to be replaced by processes of standardization on a global scale. The current changes in accounting represent a rapidly advancing standardization processes rather than harmonization. Critics of the current processes of standardization propose a different solution, involving the harmonious co-existence of many (few) sets of standards and allowing the market to decide when and what standards should be used to prepare the financial statements. In the process of harmonization in the sense one can not talk about the process of approaching a single, universally accepted set of standards (Dobija, 2009).

The milestones of technological progress were virtual solutions such as the development of the Internet. An important element is to increase awareness among entrepreneurs' advantages of outsourcing, or outsourcing of certain services to external partners also in the field of accounting. Accounting will also be aimed in the direction of the "in the cloud" data. Systems available on the network will enable it - the world is excited about a system xero.com service that provides on-line accounting, and in Poland virtual mKsiegowa.pl. The factors reinforcing this trend will be publicly available service on the Internet and the integration of accounting systems with those services. One of the more advanced services system of this type is eDeklaracje. Submission of tax returns via the Internet will not only be more and more popular, but also will become easier. Instead of manually filling out a PDF form, accounting software will be equipped with the module sending it online.

An important issue is the integration in the area of payments. It is about not only downloading bank statements, but also direct integration with online payment systems. There are no obstacles to record electronic

payments automatically. Associating payments taken from the on-line system with the sales document is usually much easier than recording a bank statement taken from traditional banking.

The attention also should be paid to the aspect of telecommuting. On-line accounting no longer requires regular coming to the office in order to perform their duties. One can easily reconcile the private sphere of work. Organization of the accounting department, where for example every employee has the right to a one day work from home, is not difficult, with a program running "in the cloud". In large cities, it could mean saving 1-2 hours a week that you have to spend on commuting. Ease of integration of "in the cloud" systems lead to a cheaper solutions and are now available to small businesses.

Results and discussion – analysis of cloud computing in polish SME businesses

To examine the extent of the interest of small and medium-sized enterprises in the region of Silesia a survey among entrepreneurs mainly from the area of Czestochowa has been conducted. The questionnaire was sent electronically to over 1,000 entrepreneurs, but responses were provided by less than 10%. 134 responses were received, which were given mainly by women (62%) aged 26-40 years (65%). 26% of respondents were in the age range 41-60 years. Most of the responders had a degree in economics - 62%, and the remainder (32%) technical education. Respondents most often pointed to the use of the Internet in business in the form of e-mail and having its own website. Communication with the public administration via the Internet becomes increasingly common.

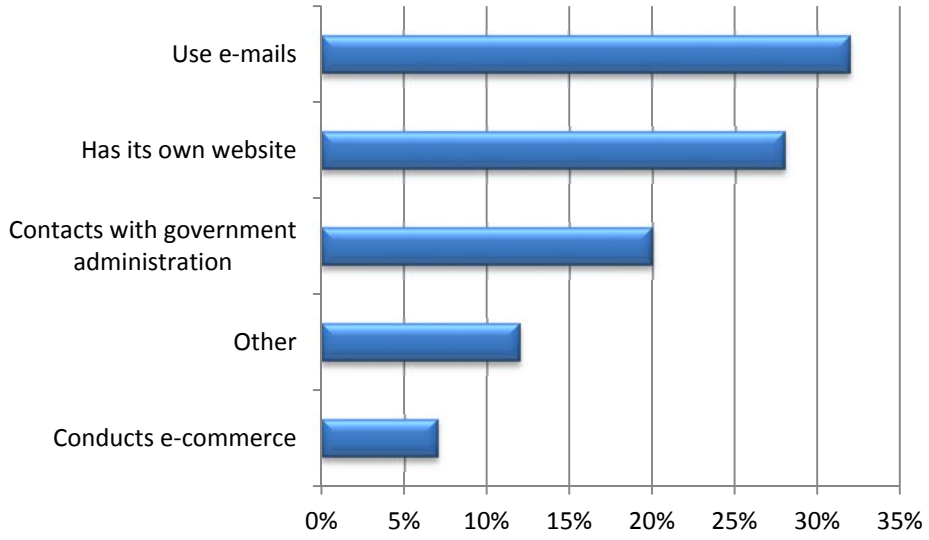

Figure 1: The use of the Internet in business

Most of respondents indicated accounting books (62%) and the income and expenses tax book (30%) as a kind of accounting records kept at the company. Among the surveyed companies, accounting is carried out by the internal financial and accounting services for 42%, by a specialist certified accountant at 28%, and by an owner at 20%. Only 8% of respondents outsourced the maintenance of accounting records to an external accounting office. Almost all respondents (96%) use computer programs for financial-accounting and payroll (80%) of their companies.

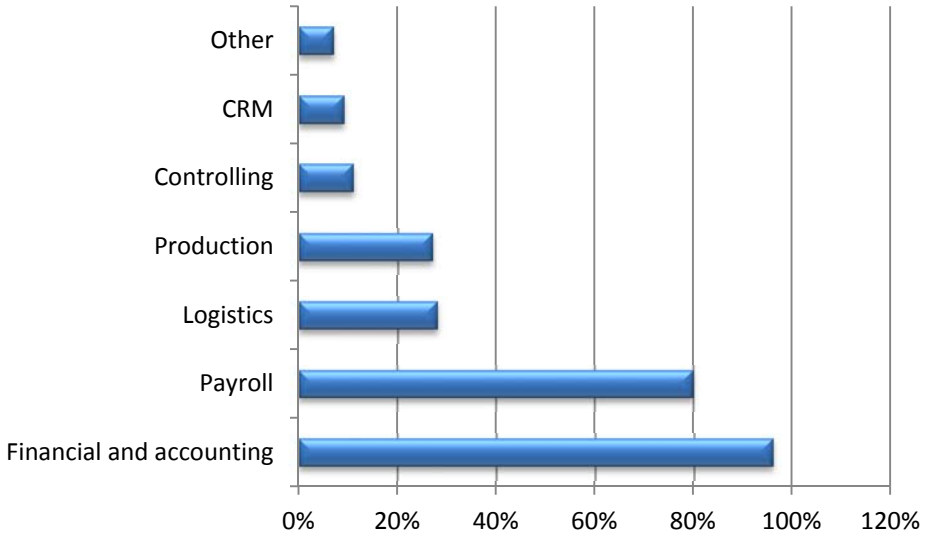

Figure 2: Area of business supported by computer programs

Perhaps because of the difficult economic situation at the macro level and because of the uncertainty, companies do not plan to change or purchase a new computer system in the next two years (62%). Only 16% of respondents expressed an interest in the subject. The remaining 22% of respondents were not decisive. In addition, when it comes to planning implementation in the Cloud Computing model 43% of the respondents answered that they do not plan any such actions, and only 3% of companies participating in the survey currently uses this form. The majority (53%) had no opinion on the subject, which may be due to the small knowledge of the essence of the model, its benefits and risks associated with it. Most companies interested in Cloud Computing model expects that it could be used in the area of finance and accounting. It is significant that the question of what might constitute a barrier to the implementation of Cloud Computing more than half of the entrepreneurs indicated a lack of knowledge of issues related to this model. In the second place, they pointed concern for the safety of the stored data

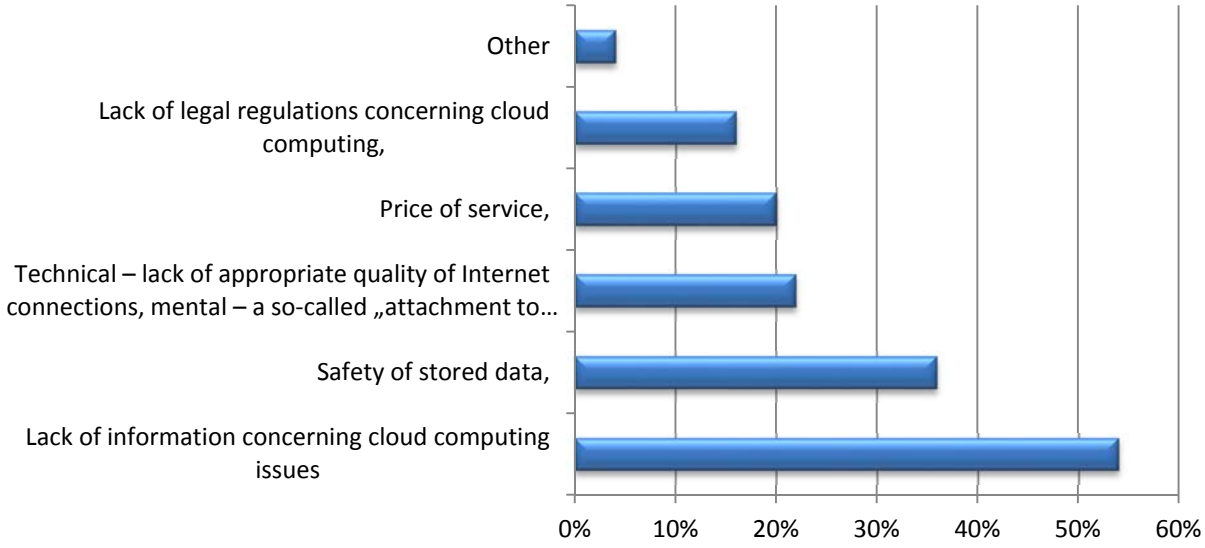

Figure 3: Barriers to the implementation of Cloud Computing

Among the benefits of using Cloud Computing primarily saving time, space and money associated with the construction, organization and maintaining their own server, storage devices, power and air conditioning, as well as the purchase of software licenses were indicated. 31% of respondents pointed at benefits of cloud computing in their availability and tie with the comfort of mobility. Resources that are leased by client are available almost anywhere, there is a possibility to perform the tasks by employees who are outside the company at the time.

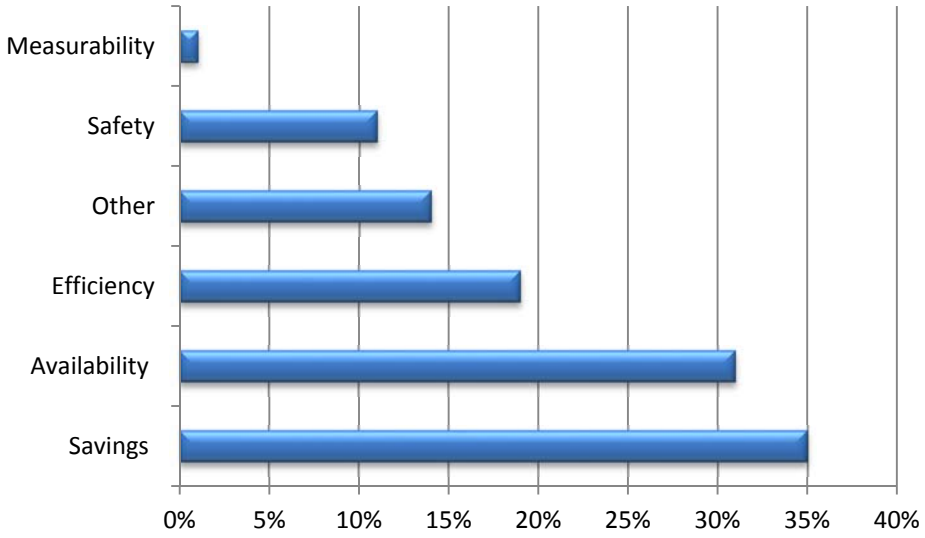

Figure 4: The benefits of using Cloud Computing

Interpretation of obtained results of the survey will be undoubtedly easier if one takes into account the information about the size of investigated companies measured by the number of employees. Among the respondents 58% of these were small businesses employing up to 50 employees.

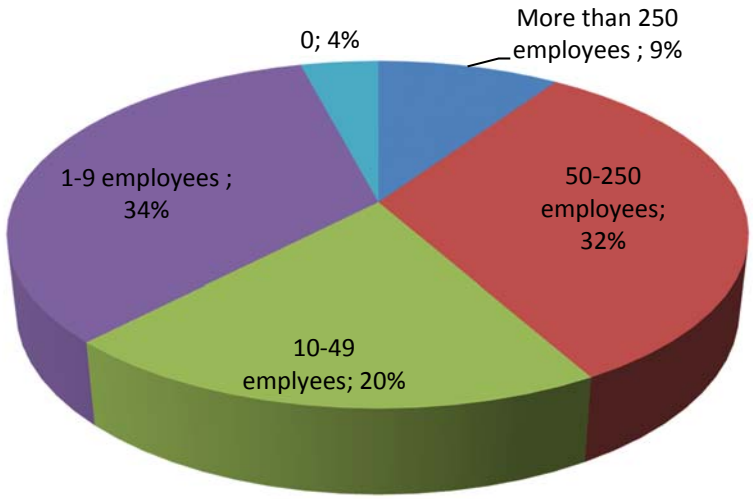

Figure 4: The size of investigated companies measured by the number of employees

Results of the survey conducted by the Cloud Industry Forum (CIF) in the UK in 2012 look completely different. They show that even then, organizations in the UK were more satisfied with the services based on cloud computing. Of the 250 organizations surveyed in the UK 61% claimed that they currently use the cloud (compared with 34% in January 2011). The private and public sectors use the cloud in the same way. However, only 52% of small firms employing less than 20 employees have adopted cloud services, compared with 68% in

larger organizations. It turned out that one in four companies, which do not benefit yet from the cloud is not going to use it within the next 12 months. 34% of organizations in the public sector and 30% of small and medium-sized companies said they intend to take action in the cloud in the coming year. Studies have shown much greater enthusiasm among large enterprises, though one would think that small businesses would benefit from the chance to save money by using Internet solutions. Another study conducted by VMware showed that 59% of IT workers said they are hesitant to purchase in the cloud. As reasons for their hesitation, respondents mentioned the issue of security in the cloud, restrictions in previously signed agreements, as well as a lack of understanding of cloud technology.

The average company in Latin America uses cloud computing in 39% of all applications. The companies of the Asia- Pacific 28% of applications process in the cloud, but in Europe and the U.S., the percentage of companies using the cloud is even lower (12% and 19%) ("Asia Pacific and Latin America firms", 2012).

Within a few years, online accounting – accounting in the cloud - will cover 50% of the total accounting software market. Research of IDC firm confirms such conclusion. In the 2011, online accounting covered 11%, but IDC believes that this percentage will increase to 50% in 2016 among enterprises employing up to 100 employees. According to IDC, the rapid development of online accounting market forces accountants to include these changes in their businesses. There are new apps for integration of accounting systems with Microsoft Outlook. They allow for example the integration of the accounting system based on the cloud with Microsoft Outlook e-mail, so that products and services can be invoiced directly in Outlook ("New app to integrate E-conomic with Microsoft Outlook", 2011). What began as cloud-based applications, such as CRM and HR software now includes office automation, marketing automation software and financial accounting. In addition, supply chain management and solutions industry-specific/vertical soon will have their applications.

Conclusions

Today's buyers expect software solutions that work with the modern workforce and mobile workers. Cloud solutions meet this requirement. CFOs often decide to adopt financial and accounting applications in the cloud. Financial and accounting software in the cloud may in future completely replace the use of software at the headquarters.

The benefits of cloud computing are too large to ignore. First, facilitation of geographical expansion, the applicability of mobile solutions and ease of integration are the basic benefits referred to. The possibility to constantly update products, which are available in the cloud (which do not require a large commitment of IT), and security of data recovery and low capital costs (such as servers) are beneficial as well ("How I Learned To Stop Worrying & Love Cloud Financial Software", 2013).

In terms of policy instruments, the main problems and risks of cloud computing can be divided into three basic categories. First of all, the legal framework that must cover the solution is the issue. The main problem is the large number of rules, often contradictory and in different ways, dependent on the country, which protect the interests of customers in terms of compliance and accountability; enforcement and pursuing claims. It is also important that other model contracts (terms and conditions) associated with Cloud computing service (Service Level Agreements; End User Agreements; privacy terms and conditions; clarity and transparency) and contracts with end-users ensure transfer of interoperability (vendor lock-in).

Small business does not need expensive software to lead the general ledger and perform basic accounting tasks. Simple accounting applications in the cloud are created to help small business owners to organize and manage their IT operations. Since this is an online accounting service, one can access business data anywhere on a mobile phone or a desktop PC and his data is safe because there are backups. Anxiety and concerns rises in terms of possible access of third parties to data of entrepreneurs (owners of servers and personnel operating them).

One of the uses of Cloud Computing in accounting for small and medium-sized enterprises are emerging recently "in the clouds" accounting offices, which are modern accounting solutions available anywhere. These are accounting offices, which do not need to be personally visited. It does not matter where physically clients and offices operate, and on what basis companies run accounting.

Although the appropriate action to promote and encourage the further development of cloud computing are already included in the program for Europe, in Poland use of services of accounting firms is still negligible. It is necessary to remove loopholes in the legislation, to ensure, inter alia, full harmonization of data protection rules across the EU, full transparency of contracts for the provision of cloud computing services, unified system of border protection of intellectual property rights, etc. It is appropriate to conduct comparative empirical research across the EU 27 on the user experience of cloud computing, their behaviors and perceptions risk as also noted earlier.

References

Asia Pacific and Latin America firms love the cloud; why don't we? 05 April 2012 - http://andersbjornsbo.wordpress.com/

Directorate-General for International Policies. Policy Department Economic and Scientific Policy (2012). *Cloud Computing. Study.* Retrieved from http://www.europarl.europa.eu/RegData/etudes/etudes/join/2012/475104/IPOL-IMCO_ET%282012%29475104_EN.pdf

Dobija, D. (2009). O procesach standaryzacyjnych w rachunkowości, MBA 3

European Economic and Social Committee and the Committee of the Regions. (2012). *Unleashing the Potential of Cloud Computing in Europe*, Brussels. Retrieved from http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri= COM:2012:0529:FIN:PL:PDF

European Economic and Social Committee and the Committee of the Regions (2012). *Unleashing the Potential of Cloud Computing in Europe.* Retrieved from http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SWD:2012: 0271:FIN:EN:PDF

How I Learned To Stop Worrying & Love Cloud Financial Software. Top executives share insights on their journeys in the cloud, (2013) http://online-accounting.financialforce.com/Cloud_Financials_Journey.html

International Data Corporation (2011). *Poland's Cloud Services Market 2011-2015 Forecast and 2010 Competitive Analysis.* Retrieved from http://idcpoland.pl/eng/research/published-reports

International Data Corporation (2012). *Quantitative Estimates of the Demand for Cloud Computing in Europe and the Likely Barriers to Take-up.* Retrieved from http://cordis.europa.eu/fp7/ict/ssai/docs/study45-d2-interim-report.pdf

International Data Corporation (2013). *Poland Cloud Services Market 2012 Analysis and 2013–2017 Forecast.* Retrieved from http://idcpoland.pl/eng/research/published-reports/52486-poland-cloud-services-market-2012-analysis-and-2013-2017-forecast/2-abstract

Kobis P. (2013). Istota cloud computing oraz szanse i zagrożenia związane z wykorzystaniem chmury obliczeniowej. In L. Kiełtyka (Ed) *Technologie informacyjne w funkcjonowaniu organizacji. Zarządzanie z wykorzystaniem multimediów* (pp.213-222). Towarzystwo Naukowe Organizacji i Kierownictwa - Stowarzyszenie Wyższej Użyteczności "Dom Organizatora", Toruń.

Kobis, P. (2013) Czynniki warunkujące bezpieczne i efektywne wykorzystywanie cloud computingu w przedsiębiorstwach, In H. Howaniec, I. Szewczyk, W. Waszkielewicz (Ed.), *Information and Marketing in Activities of Organization* (pp.93-105). Wydaw. Nauk. Akademii Techniczno-Humanistycznej w Bielsku-Białej, Bielsko Biała.

Kovachev, D., Cao, Y., Klamma, R. (2011), Mobile Cloud Computing: A Comparison of Application Models. Retrieved from arXiv:1107.4940

Kretschmer, T. (2012), Information and Communication Technologies and Productivity Growth: A Survey of the Literature, OECD Digital Economy Papers, Nr 195, OECD Publishing. Retrieved from http://dx.doi.org/10.1787/5k9bh3jllgs7-en

http://andersbjornsbo.wordpress.com/2011/11/14/new-app-to-integrate-e-conomic-with-microsoft-outlook/New app to integrate E-conomic with Microsoft Outlook, 14 November 2011, http://andersbjornsbo.wordpress.com/

Reding, V. (2009), Member of the European Commission responsible for Information Society and Media Internet of the future: Europe must be a key player, Brussels, 2 February 2009, http://www.esinternet.imasdtic.es/CLI_AETIC/ftpportalweb/documentos/discurso_reading_020209.pdf

Yusuf, Y., Gunasekaran, A., Abthorpe, M. S. (2004). Enterprise information systems project implementation: A case study of ERP in Rolls-Royce*, International Journal of Production Economics*, Volume 87, Issue 3, 251-266

Categorial Participant of Slovak Semantic Sentence Structure. Sentences of Existence

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Abstract: We focus on semantic participants of Slovak Language. These participants are known also as thematic roles, semantic roles or theta roles. In every sentence there are some participants needed for correct syntactic meaning. Our hypothesis is based on premise that one of these participants is categorial and this participant opens the position or positions for other participants. In our opinion categorial participant is fundamental semantic element within specific language micro-situations (existence, possession, information transfer, moving etc.) and every micro-situation has only one such participant. Non-categorial (general) participants can occur within more micro-situations. The paper describes methods for specifying categorial participants. As a model structure we describe elementary sentence structure of existence.

Key words: linguistics, syntax, semantic structure, thematic role, participant, existence

Introduction

Our premise is that sentence as a basic unit of communication is a realization of conventional semantic and syntactic scheme. This scheme is correlative to units, or participants, of specified language micro-situation. For example, micro-situation when *somebody informs someone about something* needs these participants: somebody who informs (agent); somebody who receives information (recipient); and information. Of course, language is not able to describe the whole micro-situation based on extra-linguistic context. It describes it selectively. The central position by creating any sentence within a micro-situation has a predicator. It is a mediator which correlates particular participants of specific micro-situation. The ability of predicator to open functional positions we call intentional ability, and the configuration of participants - the aggregate of functional positions of a predicator – we call intention field. We use this terms as Grepl and Karlík have it (1998). In our conception participant is a functional position of predicator. As Grepl and Karlík (1998) say participants of semantic sentence structure may be characterized as a specific positions that correspond to "members" or relevant "circumstances" of standardized situations. The roles of participants are for example agent, patient, recipient, initiator, possessor, locus, direction etc. The number of these roles vary from one linguist to another. Ch. Fillmore (1969) has eight "deep cases": agent, counter-agent, object, result, instrument, source, goal and experiencer. W. L. Chafe (1970) has only two roles: agent a patient. E. Tibenská (1996) has these subject participants: processor, actor, initiator, causator and realisator. She writes also about object participants (1998): patient, result, recipient, relant, sociative and inherent. Grepl and Karlík (1998) divide participants into two groups: 1. substantial – that are divided into physical objects (agent, causator, processor, carrier, possessor, expirient, recipient, beneficient, patient, stimulus, instrument and vehicle), and locus participants (locus, directiv and origative); and 2. situational participants (information, instruction, impulse and purpose). J. Nižníková (2001) writes about 64 semantic participants.

This brief survey into problematics of semantic roles shows that there are different approaches and methods used for describing them. Our conception is based on needs and requirements of specific language micro-situations in which we assume some standardized syntactic and semantic participants. The most important is semantic function of them, e.g. the semantic role they have within elementary sentence structures. The conception of Czech linguists P. Karlík and M. Grepl (1998) is the methodological base for our research. We modify this conception in the way that of used methods. We use methods of verb specific description and method of semantic (or thematic) roles. The first one is used for defining of basic situational scheme within a particular language micro-situation. For example we use it for abstracting of general extra-linguistic meanings in the sentences with verba dicendi and we got structures like *somebody says something* or *somebody speaks with someone*. In the next step we abstract semantic roles *source, theme, information* or *sociativ.*

On one hand the language is a complicated phenomenon but on the other hand no special skill is needed for using it. Language – in its systemic complexity – changes into easy tool of communication. Interconnection between extra-linguistic complexity and linguistic abstraction is the base for analyses of semantic structure of Slovak sentences.

In the past structure of Slovak sentences was described mostly as a formal structure based on morphological attributes of words. For example typical Slovak sentence structure with subject in nominative case, verbum finitum as a predicate and object in accusative case has the formalized structure (N means noun):

$$\mathbf{N_N - VF - N_A}$$

There are many examples for this type: *Otec číta noviny. Peter spozoroval včely. Žofia zbožňuje palacinky. Voda obsahuje kyslík. On nenávidí mňa. (Father reads a newspaper. Peter beholds bees. Žofia likes pancakes. Water contains oxygen. He hates me.*) In all of these sentences the grammar structure is the same but their semantic structure is clearly different – there is an action, a perception, a description, an emotion. We think that only a description of grammar structure of sentence is not enough for typology of sentences. The same grammar structure may correspond to different semantic structures. On the other different grammar structures may have the same semantic structure. As an example there is a passivization of sentences. By this process object from active sentence becomes subject in passive sentence, and subject from active sentence is not present in passive sentence or it changes into an adverbial:

Active sentence: *Zahraniční robotníci stavajú dom. (Foreign workers build this house.)*

Passive sentence where subject from active sentence changes into adverbial*: Dom je stavaný robotníkmi zo zahraničia. (The house is built by foreign workers.)*

Passive sentence where subject from active sentence is not present: *Dom sa stavia. (The house is built.).*

In these sentences there is a change in grammar positions of its parts but these parts keep its semantic positions – *house* is still generated substance and *workers* are still the agent of the action. Of course, sometimes it is not necessary to express the agent in the surface structure of the sentence and it can be omitted. Grammar position and semantic positions are two independent structures. As Grepl and Karlík (1998) have it: syntactic (grammar) positions and their forms in grammar structure do not uniquely correspond to any semantic roles (functions).

In this paper we used semantic sentence structure as the basis for sentence description. Language micro-situations are the base for our semantic-role model. In our conception language micro-situations are abstractions based on defining basic semantic participants within elementary sentence structures. Grepl and Karlík (1998) have nine elementary sentence structures: identity, existence, possession, location, quantity, correlation and process. J. Nižníková (2001) has eleven model groups based on the lexical meaning of corresponding verbs. We define elementary sentence structures as the most general categories that are transferred for extra-linguistic reality into language. They can be imagined as topics abstracted from common language use. Within elementary sentence structures we define particular language micro-situations that are less general and within one elementary sentence structure there can be more language micro-situations. Micro-situations can be identified by specific configuration of semantic roles. Within one elementary sentence structure there is always one or more categorial participant(s) that cannot occur within other elementary sentence structure. We can say that language micro-situations are modifications of the same basic elementary sentence structure. This modifications are made by non-categorial participants that can occur in more elementary sentence structures. Within particular language micro-situations we define their semantic and grammatical structure, and its lexical or stylistic varieties. We allocated eight basic elementary sentence structures: existence, state, characteristic, location, possession, attitude, information and action. In this paper we describe elementary sentence structure ***existence***.

Process of communication is bordered within non-linguistic reality. Elementary sentence structures and language micro-situation as their specifications are only segments of this reality. Of course, this segment is always simplified and reduced – language is no table to describe all details and relations of depicted reality. For that reason it is necessary to abstract semantic and grammatical elements when describing sentence structures.

If we want to define elementary sentence structure ***information transfer***, it is necessary to asbtract which semantic elements can occur within this structure and which must occur. Elements that must occur are categorial, other participants are non-categorial. In this elementary sentence structure the participant ***information*** must be always present, even if there is not subject as in this Slovak single-element sentence:

Hovorí sa, že každý raz nájde svoje šťastie. (It is said that once everyone will find his happiness.)

Other participants that can occur are non-cathegorial; e. g. ***agens***:

Ľudia *hovoria, že každý raz nájde svoje šťastie. (****People*** *say that once everyone will find his happiness.)*

Sentence can be completed also with non-categorial participant ***recipient***:

Peter hovorí ***Pavlovi****, že každý raz nájde svoje šťastie. (Peter talks to* ***Pavol*** *that once everyone will find his happiness.)*

Also non-categorial participant ***aspect*** can occur in some sentences:

*Peter hovorí Pavlovi **o ich spoločnej kamarátke Katke**, že si raz určite nájde svoje šťastie. (Peter talks to Pavol **about their friend Katka** that once she will find his happiness.)*

Complex semantic structure has the form:

agens – predicator – information – recipient – theme

Not only semantic structures but also their grammatical realization are important. For language praxis it is important to know which grammar forms are used for realizations of particular semantic participant. For example, agent in this kind of structures can be realized by morphologically different but semantic equal forms: ***Vrátnik** nás informoval/**na vrátnici** nás informovali/**od vrátnika** sme dostali informáciu. (**The gate-keeper** informed us/**at the gate** we were informed/we got information **from the gate-keeper**).*

Elementary sentence structure *existence*

The meaning of the word existence is probably intuitively clear to everyone but i tis not so easy to define it. In the most general meaning we can say that existence is being, presence within some time and space dimension. Existence refers not only to human beings, animals or things but also to abstract nouns. For expression of existence there is relatively only small group of predicators because it is specific type of language micro-situation with quite a stabile structure. As the predicator the most frequent is the verb *byť* (to be). Other verbs are for example *existovať (to exist), jestvovať (to exist), uskutočniť sa (to take place), prebehnúť (to take place), vyskytnúť sa (to appear)*. The intention field of these predicators is also limited. They need one categorial participant – nositeľ existencie (existence experiencer) which can be completed by one non-categorial participant.
The basic scheme of this elementary sentence structure is:
somebody/something – exist/does not exist/arises/vanishes

Semantic structure has the form:
$\text{Experiencer}_{\text{existence}}$ – existence – (benefactor/tempus/locus/aspect/causation)

Grammatical structure has the form:

$N_{N/A/G}$ – VF – (N_D/pre N_A /$ADV_{loc/temp/asp/cauz}$/prepN

Characteristics of particular participants:
a) $\text{Experiencer}_{\text{existence}}$ (Exp_{exi}) is the categorical participant of this elementary structure. It is not an active participant. It is expressed by non-fiction and fiction persons, animals, material things but also abstract terms. They have in common that in sentence is shown that they exist/do not exist/arise/vanishes. Formally they can be expressed by:
- nominative case: ***Yeti** je a **Lochneská príšera** nie je? Musia byť aj iné **svety** podobné Zemi.(Yeti exists and Loch Ness monster does not exist. There must be also other worlds like Earth.)*
- partitive genitive case: *Veľa **nádeje** už nám nezostalo. **Ľudí** je ako maku. (There is not much hope left. There are so many people.)*
- accusative case: *Máš **známky**, ktoré si nikdy nekúpiš. Máte **otázky**, na ktoré nikdy nenájdete odpoveď. (There are stamps that you will never buy. There are questions that you will never answer.)*
b) **$\text{Experiencer}_{\text{existence/change}}$ (Exp_{exi})** is a participant that occurs in sentence that express arising or vanishing of something. Like **$\text{Experiencer}_{\text{existence}}$** it is semantic passive participant but there is a difference. There is a mutative change by **$\text{Experiencer}_{\text{existence/change}}$**. It starts or discontinues existing. Formally it can be expressed by:
- **nominative case**: *Susedovi vykapali všetky **sliepky**. **Zem** vznikla približne pred 4,5 miliardou rokov. Vzplanul spravodlivý **hnev** utláčaných. (All neighbour´s **chickens** have died. **Earth** arose approximately 4.5 billion years ago. Righteous **anger** of oppressed people has arisen.)*
- **partitive genitive**: *Rodí sa viac **dievčat** ako chlapcov. Postupne sa vytvorilo niekoľko **koncepcií**. (More **girls** than boys are being born. Several **conceptions** were created progressively.*
c) Benefactor (be) is, in Eva Tibenska´s terminology (2012), third-plan participant. As she says, benefactor can occur in sentence to make its meaning complex, and to change sentence perspective from objective to subjective. Its use is not a stylistic device. Benefactor expresses the aspect, e.g. in regard of who/what the expressed existence applies. It can be expressed by:
- dative case: *Veľa nádeje už **Ivanovi** nezostalo. Možností **vám** existuje habadej. (There is not much hope left for **Ivan**. There exist a lot of possibilities **for you**.)*
- nominative case: ***Ivan** nemá veľa nádeje na úspech. (**Vy**) Máte habadej možností. (**Ivan** has not many chances to success. **You** have a lot of possibilities.*

- accusative case + preposition *pre (for)*: *Veľa nádeje už **pre nás** neexistuje*. *Jestvuje **pre Vás** habadej možností. (There is not much hope **for us**. there exist a lot of possibilities **for you**.)*

In intention field grammar form $\mathbf{N_N}$ corresponds to **Experiencer**$_{\textbf{existence}}$. Predicator is mostly expressed by the verb byť (to be) in its existence meaning. The verb byť can have several meanings in Slovak language and can be found in three different language micro-situation:
(1) Existence: *Strašidlá **sú**. (Monsters **exist.**)*
(2) Location: *Strašidlá **sú** v sklade.(Monsters **are** in the deposit.)*
(3) Characteristics or state: *Strašidlá **sú** hrôzostrašné, deti **sú** vystrašené. (Monsters **are** creepy, and children **are** scared.)*
In the third meaning there is not the autosemantic form of the verb byť. It is only a copula verb. Predicator with this verb consists of the form of the verb byť and autosemantic form of a noun, adjective, pronoun or numeral.
(1) Verb byť (to be) in the meaning: to exist from ontological point of view. In this function the verb byť expresses existence regardless of any external circumstances. It can be identified as something or someone that simply exist or does not exist. From the lexical point of view i tis an autosemantic verb that can be replaced by synonymic verbs like existovať, jestvovať (both mean to exist). From syntactic point of view it is autosyntagmatic word that fulfills role typical for autosyntagmatic verbs in the sentence – the role of predicate.
Examples: *Mimozemšťania **nie sú**. Musia **byť'** i iné svety. Myslím, teda **som**. Niečo **je** a niečo **nie je**. (Extra-terrestrials **does not exist**. There must **be** also other worlds. I think, therefore I **am**. Something **exists** and something **does not**.)*
(2) Verb byť expressing location: to occur in or to have origin in. In this function there is nota n ontological aspect. The necessary component of this meaning is adverbial of place. Of course there is no rection between the verb and adverbial, despite of this adverbial is obligatory component of sentence. From lexical point of view i tis an autosemantic word that can be replaced by synonymous verbs like nachádzať sa (to occur), žiť (to live somewhere), vyskytovať sa (to occur)... From syntactic point of view it is an autosyntagmatic word. Predicator byť (to be) together with adverbial of time (tempus) expresses existence – but not ontological but located somewhere.
*Syn **je/žije** už dvadsať rokov **v USA**. Mama **je/nachádza** sa **v záhrade**. Komáre **sú/sa vyskytujú** najmä **pri vode**. Kniha **je/nachádza sa na stole**. Štefan **je/pochádza z Novohradu**. (My son **has been/lived in USA** for twenty years. Mother **is in the garden**. Mosquitoes **occur** mostly **by the water**. The book **is on the table**. Štefan **comes from Novohrad**.)*
(3) The verb to be as synsemantic word. It is a copula that serves only as a carrier of grammatical categories. Its meaning must be completed be autosemantic word – noun, adjective, pronoun, numeral, participle or adverb. From lexical point of view i tis a synsemantic word without any lexical meaning. From syntactic point of view i tis a synsyntagmatic word that is never an independent constituent of sentence but always occurs together with autosemantic constituent.
Examples: *Žofia **je učiteľka**. Peter **bol nervózny**. Starí ľudia **sú** už **takí**. Alonso **bude prvý**. (Žofia **is a teacher**. Peter **was nervous**. Old people **are like that**. Alonso **will be the first.**)*

We take existence similar to M. Grepl and P. Karlík (1998) who distinguish three possible states of existence: something/someone exists/does not exists, something/someone arises, and something/someone causes that something/someone arises/vanishes. In our conception their third state of existence belongs to other elementary sentence structure because it is an action that causes something. J. Nižníková (2001) divides sentence models with verbs of existence into three groups: verbs of existence, verbs of arising, and verbs of vanishing.

1. Language microsituation "somebody/something exists/does not exists"

From semantic point of view there are two components in this microsituation: ***Exp**$_{exi}$* and predicator of existence. ***Exp**$_{exi}$* can be expressed by anything that exists in factual or abstract meaning, in fiction or non-fiction world. As the participant there can be human beings, animals, things or abstract terms.

Existence can be expressed in two ways:
a) as **absolute existence**, i. e. generally without reference to any circumstances:
Vlkolaci nie sú. Duša je. Veľký tresk možno prebehol. (Werewolves does not exist. Soul exists. Big Bang maybe really was.)
In this way it is only a statement without an adverbial. It expresses only existence or non-existence of some entity. For this reason there is only one participant $Exp_{exi,}$ and this participant is categorical. Predicator does not open any other obligatory position for more semantic participants.

Semantic structure has the form: **$Exp_{exi,}$ - existence**
J. Nižníková (2001) more closely specifies the participant as processual existence experiencer. We think that our term existence experiencer is appropriate enough. In our opinion the existence from ontological point of view does not express any process.

Grammar structure has the form: **N_N – VF**

Within type a) we distinguish two groups of existence:
a1) existence that refers to the whole class of entities:
Mimozemšťania sú, ale škriatkovia nie sú. Hlupáci boli, sú a budú. Spravodlivosť neexistuje. (Extra-terrestrials exist but dwarfs do not. The dumbs existed, exist and will exist. Justice does not exist.)
Often there are experiencers whose/which existence is doubtful. It can be beings, places or events of supernatural origin. Experiencer can be in both plural and singular form but when it is abstract word, it is mostly in singular form.
a2) existence that refers to specific entity:
Myslím, teda som. Boh je. Peklo nie je. Veľký tresk sa uskutočnil. Existujú dva druhy iónov – anióny a katióny. (I think, therefore I am. God exists. Hell does not exist. Big Bang occured. There are two groups of ions – anions and kations.)
Within this group there is always concretized reference to experiencer of existence, not to the whole class. Mostly it is one specific person, place or event so it has singular form. Predicator has plural form only if there are more kinds of experiencer (as in the last example.)
There is a specific subgroup with sentences in which existence associates with occurrence of an attribute of experiencer. Attribute can have the form of subordinate clause or it can be simple concordant or non-concordant attribute. In these sentences there is mostly existence based on real world and within it their validity is closely specified:
Sú ľudia, ktorým nikdy nevyhovieš. Boli aj nevysvetlené prípady. Existuje aj svet bez závisti. Neexistuje nápoj, ktorý by nevedel namiešať. (There are people who you cannot satisfy. There were also unsolved cases. Also world without an envy exist. There is not a kind of drink that he cannot mix.)
Semantic structure of such sentences is modified with attribute: **(Exp_{exi} + attribute) – existence**

Verb byť can be often replaced by the verb mať (to have) in this kind of sentences. This replacement is accompanied with change in grammar structure. To the subject position there goes formal construction sentence constituent ty, vy (you) or there is an object as a formal sentence constituent in dative case.
Formal subject*: Máš ľudí, s ktorými sa nikdy nedohodneš. Máte prípady, keď sa nedá nič robiť. (You have people with whom you cannot make a deal. You have cases when you are no table to do anything.)*
Formal object*: Existujú ti ľudia, s ktorými sa nikdy nedohodneš. Sú vám prípady, keď sa nedá nič robiť. (There exist people (in regard of you) with whom you cannot make a deal. There are cases (in regard of you) when you are no table to do anything.)*

Similar examples occurs when there is non-obligatory dative object in sentences like *Sú **ti** krajiny, kde zjedia nechutné potvory. (There are countries (in regard of you) where they would eat tasteless beast.)* Formally it looks like sentence constituent but it has no semantic function and it is used only to emphasize the content of sentence. We can say that it has a function similar to particula. This non-obligatory object does not occur only within existence sentences but also in other types of elementary sentence structures; for example by expression of state: *Ten **Vám** bol hladný. (He was so (in regard of you) hungry),* or action *Ani **ti** mi nenavarila*. (*She (in regard of you) did not cook for me.*) In all of such sentences it has only expressive function and this kind of sentence is limited to colloquial style. Considering functional sentence perspective the experiencer is rheme of the sentence and for that reason it is always positioned behind the non-obligator dative object which functions as a theme. According to Slovak word-order rules in neutral sentences theme is always at the beginning of the sentence and rheme follows it.

b) Existence in relative meaning. By this meaning we understand an existence that is obligatory related to some circumstance. It can be time, place or aspect. In this sentence existence is always limited and is not valid generally but only partially.
Examples of existence sentences with particular circumstances:
- **Tempus (temp)**: *Jery ešte **v 10. storočí** boli. Prvá svetová vojna zúrila **v rokoch 1914 – 1918**. Ničivý mor sa vyskytol **medzi rokmi 1348 a 1350**. Vojny sú už **odpradávna**. (Jers still existed **in 10th century**. WW1 raged **in 1914-1948**. Terrible plague occurred **between 1348 and 1350**. Wars have existed **since the oldest time**.)*

- **Locus (loc)**: *Život **niekde vo vesmíre** musí existovať. Taký zákon je len **v Číne**. (Life must exist **somewhere in the space**. Such a low exists only **in China**.)*
- **Aspect (asp)**: *Pravda existuje len **v rozprávkach.** Plány jestvujú zatiaľ len **v jeho hlave**. Taká fonéma **v slovenčine** nie je. (The truth exists only **in fairy tales**. The plans exist only **in his head** yet. There is not such a phoneme **in Slovak language**.)*

Validity/non-validity is expressed only in regard of mentioned circumstances in these sentences. J. Nižníková (2001) uses term statuál nositeľ existencie (statual existence experiencer) for **Exp$_{exi}$**. We think that it is not necessary to distinguish processual and statual existence experiencer. I tis always passive, non-processual element that is obligatory related with circumstance in some sentences.
Semantic structure has the form: **Exp$_{exi}$ - existence – tempus/locus/aspect**

Grammar structure has the form: **N$_{N/G}$ – VF –N$_D$/pre N$_A$ /ADV$_{loc/temp/asp}$/prepN**

The most typical grammar form for **Exp$_{exi}$** is nominative case, but also genitive, as a partitive case, can occur. Partitive genitive is limited to quantitative or negative usage. For his usage in existence sentences stylistically marked negation form niet/nieto is typical:
*Na svete **niet pravdy**. **Niet** iného **východiska**. Ďalšej **šance** už **nieto**. (There is **no truth** in the world. There is **no** other **solution**. There is **no** more **chance.**)*
Genitive case could be replaced by nominative in these sentences:
*Na svete **nie je pravda**. **Nie je** iné **východisko**. Ďalšia **šanca** už **nie je**. (There is **no truth** in the world. There is **no** other **solution**. There is **no** more **chance.**)*
Sentences like ***Peter tu už nie je**. Odišiel domov. (**Peter is not present here**. He went home.)* are not existence sentences. They are sentences of location because they refer to position of entity and not to its existence in ontological meaning.
Specific type of sentences are sentences like: *Nie je **čo** čítať. Je na **čo** sa pozerať. Nebolo **koho** voliť. Niet **komu** veriť. Niet **s kým** chatovať. (There is nothing to read. There was nobody to get our vote. There is nobody to trust. There is nobody to chat.)*
Their particularity is in the fact that existence is related to experiencer that is expressed by a form of personal or relative pronoun (čo, koho, komu, s kým...) The infinitive of the verb expresses the circumstance in regard of which the existence is valid or not.
In some sentences infinitive can be replaced by verbal noun: *Niet nič/ničoho na čítanie. Nie je nikto/nikoho na chatovanie. (There is nothing to read/for reading. There is nobody to chat/for chatting.)*

2. Language micro-situation „someone/something arises/vanishes“
In the previous language micro-situation the existence of something/someone was expressed, i. e. pure existence in ontological meaning. In this micro-situation is expressed the fact, that someone or something starts/continues/discontinue the existence. It is important to distinguish between existence meaning and action meaning. In sentences like *Výrobok vznikol v továrni. Pytliaci vybili chránené druhy zvierat.* (The product was made in factory. Jack lighters killed off protected animals.) There is depicted that something started to be and discontinue to be but it was caused by conscious planning – it was an action. In the existence sentences the agent is not present. The first example (Výrobok vznikol v továrni.) is deagentive sentence but in its deep structure agent is present - somebody had to make it. In the second sentence (*Pytliaci vybili chránené druhy zvierat.)* there is an active substance that operates the action. This participant is called agent and is never present in existence sentences.
Predicators that express arising or vanishing of existence have mutational character, i. e. in their meaning shift from one phase of existence into other phase is present. It does not mean that they have processual character. Process needs some active background.
Verbs like *vznikať, narodiť sa, zanikať, zomrieť, stratiť sa, vytrácať sa* etc. *(to arise, to be born, to die, to vanish, to get lost)* serve as predicators in this meaning.
Examples for arising of existence: *Ja sa nikdy nenarodilo a nerodí, rodí sa iba telo. Vznikla celá spleť komplikovaných problémov. V ostatnom čase vzplanul záujem o vyhotovovanie rodinných erbov. Presne v tej chvíli prišiel na svet nový človiečik. Na prelome storočí sa zrodil nový literárny smer – romantizmus. (Ego is never born, only body is born. A net of complicated problems has arisen. In recent time interest in family crests has flamed out. Just in that moment a next little human being was born. At the turn of the century new literary movement arose – romanticism.)*
Examples for vanishing of existence: *Mnohé rastlinné a živočíšne druhy sa postupne vytrácajú. Absolútna viera v pozitivizmus sa v tej dobe vytratila. Bohužiaľ, zomrel a už ho niet. Mamuty vyhynuli v období pred 13 000 a 11 500 rokmi – okrem reliktného stavu mamutov srstnatých. Hokejová eufória rýchlo utichla. (Many kinds of*

plants and animals die out gradually. The absolute believe in positivism vanished in that times. Unfortunately, he died and he lives never more. Mammoths died out 13 000 – 11 500 years ago – except wooly mammoth. Ice-hockey euphoria calmed down very quickly.)

Within this micro-situation we distinguish two subtypes. It is similar to previous micro-situation:
a) absolute change,
b) relative change.

a) Absolute change of existence express that there are no surrounding circumstances needed for arising or vanishing of existence: *Neustále vznikajú nové choroby. Čo sa zrodí, musí zaniknúť. Niektoré druhy už vyhynuli, iné sa podarilo zachrániť. Celá násada pstruhov vykapala. Rímska ríša zanikla. (New illnesses arise every day. What was born, must also die. Some kind died out already but some were saved. The whole stock of trout conked out. The Roman Empire vanished.)*
Semantic structure has the form: **Exp_{exi} – change of existence**
Grammar structure has the form: **N_N – VF**

b) Realtive change always needs some obligatory circumstances of place, time or cause. Here are some examples for particular circumstances:
- **time (temp)**: *Svet vznikol **pred dávnymi vekmi**. Postmoderna nastúpila **v druhej polovici 20. storočia**. Slovenský štát vznikol **v roku 1939**. Narodil som sa **v septembri**. (The world begun **billions of years ago**. Postmoderna arose **in 2nd half of 20th century**. The Slovak State came into existence **in 1939**. I was born **in September**.)*
- **place (loc)**: *Jeden náš známy sa narodil **v sanitke**. Naturalizmus vznikol **vo Francúzsku**. (One of our relatives was born **in ambulance car**. Naturalism started i**n France.)***
- **cause (caus)**: *Kultúrne spolky väčšinou zanikajú **pre nedostatok financií**. Africké deti často zomierajú **pre zlú potravu** a **nedostatočnú zdravotnú starostlivosť**. (Cultural organization vanishes **due to lack of money**. African children often die **due to bad nourishment and health care.***
Semantic structure has the form:

Exp_{exi} – change of existence – temp/loc/caus

Grammar structure has the form:

N_N – VF – N_D /$ADV_{loc/temp/caus}$/prepN

Results:

In the table there is a summary of semantic and grammatical specifications of elementary sentence structure **existence.**

Expression of existence			
1. somebody/something exist/does not exist	a) absolute meaning	- existence applies to the whole class *(Strašidlá nie sú. Hlupáci boli, sú a budú.)* - existence applies to particular entities (*Boh je. Peklo nie je?*)	**SS: Exp$_{exi}$** – existence **GS:** N_N – VF
	b) relative meaning	- time (*Jery ešte **v 10. storočí** boli.*) - place (*Taký zákon je len **v Číne**.*) - aspect (*Taká fonéma **v slovenčine** nie je.*)	**SS: Exp$_{exi}$** – existence – temp/loc/asp **GS:** N_N – VF –N_D/ pre N_A /$ADV_{loc/temp/asp}$
2. somebody/something arises/vanishes	a) absolute meaning	*Neustále vznikajú nové choroby.*	**SS: Exp$_{exi}$** – existence change **GS:** N_N – VF
	b) relative meaning	- time (*Slovenský štát vznikol **v roku 1939**.*) - place (*Naturalizmus vznikol **vo Francúzsku**..*) - cause (*Kultúrne spolky väčšinou zanikajú **pre nedostatok financií**.)*	**SS: Exp$_{exi}$** – existence change– temp/loc/caus **GŠ:** N_N – VF –N_D/ pre N_A /$ADV_{loc/temp/caus}$

List of abbreviations:

$ADV_{loc/temp/asp/caus}$ – adverbial of place/time/aspect/cause
Exp$_{exi}$ – experiencer of existence
GS – grammatical structure
N_A – noun in accusative case
N_D – noun in dative case
N_G – noun in genitive case
N_N – noun in nominative case
prepN – any preposition + noun
pre N_A – preposition pre (for) + noun in accusative case
SS – semantic structure
VF – verbum finitum

References

Chafe, W. L. (1970). Meaning and the Structure of Language. Chicago: Chicago Press.
Fillmore, Ch. (1969). Types of Lexical information. In Studies in Syntax and Semantics. Dordrecht: F. Kiefer, (pp.109-137).
Grepl, M. – Karlík, P. (1998). Skladba češtiny. Olomouc: Votobia.
Nižníková, J. (2001). Vetné modely v slovenčine. Prešov: Prešovská univerzita.
Tibenská, E. (1996).Vetné typy s aktívnym subjektom v slovenčine. In J, Mlacek (Ed.), Studia Academica Slovaca. 25. Bratislava: Stimul – Centrum informatiky a vzdelávania FF UK, (pp.226-238).
Tibenská, E. (1998).Objektový participant sémantickej štruktúry vety. In Slovenská reč. 1998 (pp. 198-209).
Tibenská, E. (2012). Sémantická štruktúra slovenskej vety. Trnava: UCM.

Co-creation of Innovation Using the Potential of Web 2.0 Tools

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Abstract: In the paper there are discussed the opportunities for using Web 2.0 tools as communication solutions and platforms of cooperation with the client in the field of co-creation of innovation. There are presented the changes of the concept in the area of innovation, from closed to open innovation, and particularly the models emphasizing the role of users in creating innovation. There is also discussed the evolution of the solutions of communication with the client with the consideration of Web 2.0. The presented results of the author's own research show the activity of young people as co-creators of on-line innovation, identify the most frequently used channels of communication and, above all, present the evaluation of the application of Web 2.0 tools in the field of cooperation with the client.

Key words: co-creation, innovation co-creation, Web 2.0,

Introduction

The concept of involving customers into the process of creating the innovation gains more and more supporters (Prahalad, Ramaswamy, 2004), (Full, 2010), (Howe, 2008). We observe deep changes in the interaction between the consumer and the company in co-creating not only the innovation but widely understood value co-creating. Prahalad (2004) distinguished four fundamental elements of the process of co-creating: dialogue, access, risk assessment and transparency defined as DART concept. The purpose of the study is to determine which Web 2.0 tools have the biggest influence on customer co-creation innovation process.

In the paper there are presented the changes in the perception of the concept of creating innovation from the model of closed innovation to the latest concepts in the framework of the model of open innovation. Subsequently, there is defined the concept of cooperation with the client and the space of the Internet as the platform of the development of these processes. The aim of the paper is to verify the following hypotheses:

H1: Young clients eagerly get involved in the process of co-creation of on-line innovation and take the role of consultants, innovators and people testing new products and services.

H2: Web 2.0 is the environment favorable for cooperation and co-creation but it is not fully utilized by companies for co-creating innovation with the client.

New paradigms, such as Open Innovation (Chesbrough, 2003) and Web 2.0 (O'Reilly, 2004) promote a more proactive role of customers in the innovation area. Companies should see customers as co-creators of products and hence value. Products should be designed in ways that allow users to design all by themselves, remix, and share.

In literature there are many concepts that shows other most crucial aspects of co-creation and a number of existing methods for involving users, such as:

- Virtual community (Rheingold 2000),
- Crowdsourcing (Howe 2006; Howe 2008; Kozinets et. al., 2008),
- User Co-Creation (Prahalad and Ramaswamy 2003),
- Collective Intelligence (Glenn 2009),
- Open Innovations (Chesbrough 2003; Jelonek 2012),
- User-Driven Innovations (Rosted 2005; De Moor et. al., 2010),
- Consumer Involvement (Muncy and Hunt 1984),
- Lead User (Von Hippel, 2005),
- User Centred Design (Von Hippel, 2005)
- User Created Content (O'Reilly, 1998)
- and others

Information about customer preferences and personalization have always been a key factor for success in any business. Electronic commerce, partially in conjunction with flexible manufacturing, now provides the opportunity to obtain the information necessary for personalization from customers all over the world at low cost and, specifically in the case of digital products, to tailor general-purpose goods or services to the specific needs

of each customer - "mass customization" (Bandulet and Morasch 2005).

The Internet is the environment which is favorable for the development of cooperation with the client. The development of the Internet refers, above all, to new communication solutions used in the relationships - business- customer (B2C), customer – business (C2B), customer – customer (C2C) and business- business (B2B).

The term Web 2.0, as proposed by T. O'Reily (2005), has been adopted in a variety of studies aimed at offering perspectives on the Web developments (Fuchs, 2010), (Song, 2010). With the development of Web 2.0, the role of prosumption and creative behaviors of customers is increasing. Ritzer and Jrgensons (2012) demonstrated that prosumption has become a significant characteristic of Web 2.0. At present, business and application developers are suggesting that there will be a new era of the Web: Web 3.0. This will be defined by a new online environment, which will integrate users' generated data to create new meaning. In contrast to Web 2.0, which is understood as being based on users' participation, Web 3.0 will be based on users' cooperation (Fuchs et al. 2010). Websites built upon Web 2.0 allow users to co-create the contents by enabling them to publish, comment on or evaluate the contents. The main characteristics of Web 2.0 (Kuszyn, 2008) are:

- network effect – joining by new users
- the long tail – increasing the sales of the product
- user contributed value – contribution of users positively influencing the value of the website
- remixability – possibility of integration of other websites and services
- co-creation – co-creating website by users
- decentralization – use of the website or its part by users with no participation of the owner
- emergent systems – administration of parts of the website by users

Co-creating innovation with the client – the organizational aspect

Consumers are considered a valuable source of innovation such as the generation, design, refinement, and testing of ideas and new product concepts. Consumers take on the role of co-creators. Prahalad and Ramaswamy (2004) describe that co-creation is about joint creation of value by the company and the customer. It is not the firm trying to please the customer (Prahalad, Ramaswamy 2004). They wrote also that, co-creation is […] creating an experience environment in which consumers can have active dialogue and co-construct personalized experiences; product may be the same […] but customers can construct different experiences (Prahalad, Ramaswamy 2004). Customer become a new sources of competence, consisting of the knowledge and skills they possess. They are ready to learn, experiment and engage in dialogue with the firm, cooperation, co-creation of innovation.

In the realization of successful co-creation it is proper to take into account two determinants which will positively influence on the process of co-creating innovations with the customer:

1. The recognition of motives of customers who are inclined to co-creating the innovation using Web 2.0 tools.
2. The consider of conceptual model designer –user collaboration

Against the background of many opportunities to maintain the relationship with clients, in the first position, more and more frequently, there are listed social media, in which more and more managers see the target groups of their clients. According to the report (From social…2011) 65% of managers participating in the research perceive social media as the promising source of profit providing that the cooperation activities undertaken by them are compliant with clients' expectations. Unfortunately, as the research showed there are significant gaps between what businesses think consumers care about and what consumers say they want from their social media interactions with companies (see Figure 1). 5 reasons in the assessment of which there occurred the largest discrepancies in both groups of respondents were market with grey color. The respondents, as the two main reasons of their activity on profiles of organizations in social media, listed an opportunity to get discounts (61% of indications) and to make purchases (55% of indications). The same reasons, in the opinion of managers, were found in the last and the second-to-last place of all the 12 specified reasons of the participation in social media.

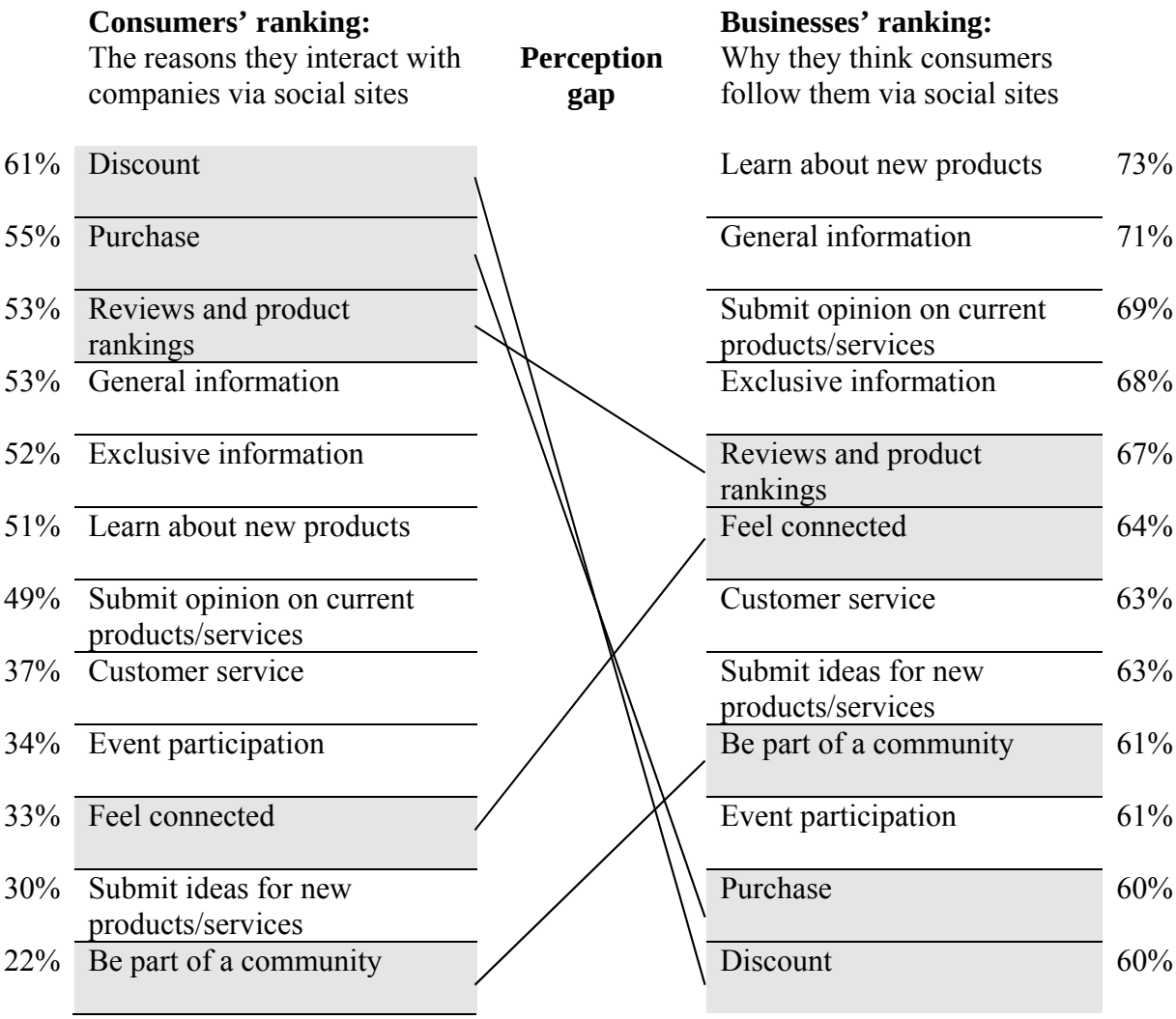

Figure 1. The reasons for which it is advisable to maintain the relationship with organizations using social media from the point of view of clients and managers.
Source: *From social media to social CRM. IBM Global Business Services Executive Report*, Copyright IBM Corporation 2011, s.11.

The effective support for managers, which will allow to minimize the detected discrepancies in the perception of clients' behavior and lack of understanding of their needs, is the information provided by the systems of Customer Relationship Management (CRM) or e-CRM network systems and the latest propositions - social CRM or CRM 2.0.

Customer - company cooperation requires new effective methods and models of collaboration. Awa and Eze (2010) reviewed methods of customer collaboration and proposed the model designer – user collaboration. Traditional approach displayed the model of "design for customer", proposed model demonstrates an extension of "design with and design by user". The conceptual model designer –user collaboration was presented in Figure 2.

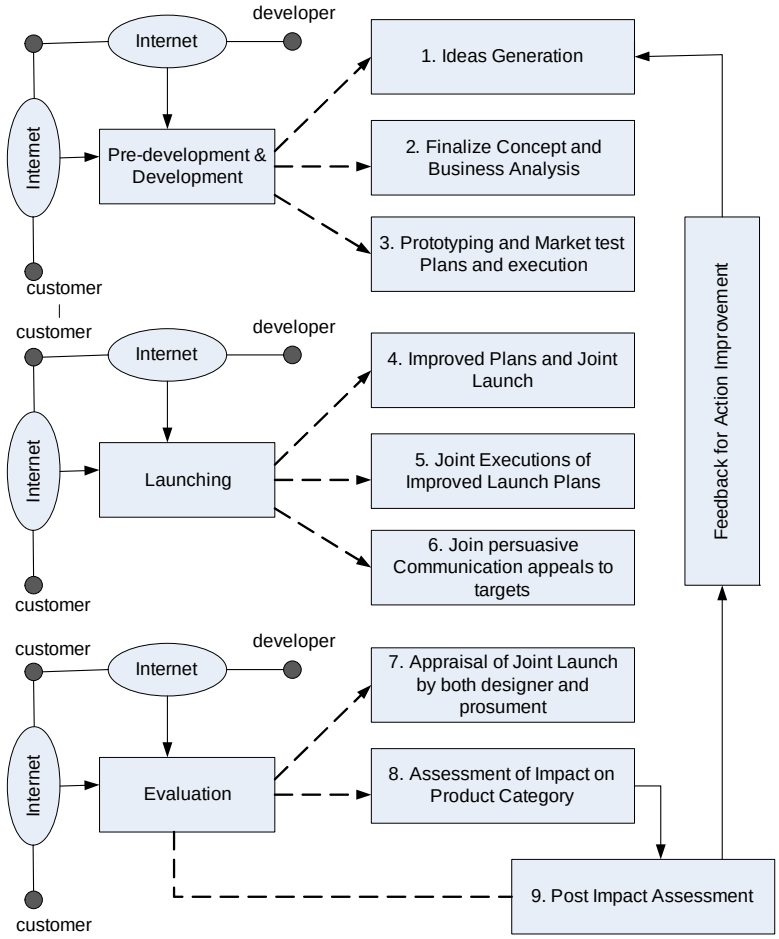

Figure 2. Conceptual model designer –user collaboration
Source: (Awa, Eze 2010)

The model shows four phases: pre-development and development, launching, evaluation, and feedback of customer collaboration. The pre-development and development exercises span such activities as idea generation, concept finalization and business analysis, prototyping and market test plans and execution. Then the generated information are evaluated. The launching phase covers such activities as improved plans and joint launch, joint execution of improved launch plans and joint development of persuasive communication appeals. The evaluation phase involves a joint objective comparison of actual results against ideal standards in order to trace impact discrepancies on product category to a source. Actions are continually reworked from the results of joint evaluation and feedback exercises in order to further the competitive balance of management decision (Awa and Eze, 2010). This model seems very useful for companies witch plan collaborate with customers.

Materials and Method

The survey was conducted in January 2014 on a group of 198 of students of the full-time studies of the Faculty of Management of Czestochowa University of Technology. The study used an electronic form on the website. The form included 18 questions directed towards the achievement of a few research objectives. The purpose of the research was, among others, to identify the behavior of the respondents as clients on the Internet. It has been established that in the group under research, the traditional clients who do not make purchases on the Internet constitute 5%, the clients who occasionally do the shopping on the Internet amount to 40%, e-clients constitute 27% and prosumers - 28% (Jelonek, 2014). On the basis of the research results, it has also been indicated that personalization is an important determinant of the success of activities directed towards cooperation with the client, performed in the space of the Internet (Jelonek 2014).

Moreover, the further research objectives referred to:
Objective 1: Identification of the respondents' activity in the area of innovative actions
Objective 2: Establishing what communication channels are used by the respondents

Objective 3: Evaluation of the extent of use of Web 2.0 tools in the customer – company cooperation
Objective 4: Evaluation of the possibilities of using Web 3.0 tools in the customer – company cooperation

The results obtained in the course of the research serving the purpose of the achievement of the above objectives are presented in the following part.

Results

In the research there participated: 124 women (63%) and 73 men (37%). The respondents were aged 23-25. It was established that in the analyzed group 93% of the respondents have free access to the Internet, 5% - the limited access, 1% - very limited access and 1% of those questioned indicated the response "no access". The respondents are characterized by "high" (34%) and "sufficient" (57%) abilities of using the Internet resources and utilizing the available Internet services. Only 6% of those questioned admitted that "they sometimes use the help of others", 2% of the students "often use the help of others" and 2% of the students "cannot use the Internet to make purchases".

The listing of the responses to the question: "Have you ever taken activities on the Internet, in which you were: a purchaser of products or services, a brand promoter, a client who reveals advantages and disadvantages of a product/service, an innovator submitting an idea, a client testing a new product/service or a consultant?" are presented in Table 1. The responses were given by 55 respondents and it was possible to indicate a few answers.

Table 1. The clients' activities in the area of innovative actions

No	Propositions of the responses to the question: "Have you ever taken activities on the Internet, in which you were:	% of indications
1.	A client submitting an idea of a new product/service, or essential improvement, modification, development of the existing products or services	9%
2.	A client testing a new product or service	52%
3.	A client – consultant	40%
	Total:	100%

Source: The author's own study based on the research results

The students cooperating with companies in the field of broadly understood innovation were asked for the answers to the further questions. Each of 55 respondents were able to indicate a few responses. The listing of the answers to the question "What channels of communication with the company were used by the respondents?" is presented in Table 2.

Table 2. Channels of communication with the company used by the respondents

No	**Propositions of the responses to the question "What channels of communication with the company did you use?":**	**% of indications**
1.	Telephone	98%
2.	Text message	86%
3.	e-mail	99%
4.	A form on a website	85%
5.	Blog on a company website	45%
6.	Chat on a website	57%
7.	Video chat and Skype	58%
8.	Social website	62%
9.	Platform of reporting ideas created on a website by the company	4%
10.	Platform of cooperation in a real mode	0%

Source: The author's own study based on the research results

The respondents' answers to the question concerning what enterprises ought to improve in contacts with clients are presented Table 3.

Table 3. What enterprises ought to improve in contacts with clients

	What requires improvement on the side of companies	%
1.	Social media	32%
2.	Skype	26%
3.	Introduction of virtual assistants, avatars	35%
4.	Better contact via text message and telephone	25%
5.	Multimedia	30%
6.	Better contact with a consultant	26%
7.	Others	3%

Source: The author's own study based on the research results

For clients contacting the company it is important that the range of available communication tools is wide, fully accessible and effective. The most popular ones are traditional channels of contact, e.g. a phone, and from among the traditional Internet communication tools - e-mail. In the first case, communication in a synchronic mode, guaranteeing fast and efficient contact is important to the client. In the other case, the client consciously decides on the choice of the channel of asynchronous communication and accepts the postponement of interaction with the company. From among Web 2.0 tools the respondents use: forms on websites, social websites, video chats and Skype, chat on a website, blog on a company website and, to a small extent, platforms of submitting ideas, created on a website by the company. In the evaluation of effectiveness of communication, relatively high assessment was given to a form on a website. A chat on a website and video chats and Skype were rated low with respect to the "speed" and in the evaluation there was taken into consideration long waiting time and often lack of activity even at the time of designated consultation. Social websites were given low rating of effectiveness and rapidity. Platforms of submitting ideas created on a website or platforms of cooperation in a real mode obtained the highest percentage of indications in the "average" rating since the respondents had their own experience of such cooperation. Thus, there is such low rating of effectiveness of platforms in the aspects – "very comfortable", "very fast" or "very effective".

The research results showed that 92% of the respondents use a lot of communication channels, which means that they utilize at least 6 out of 10 listed communication channels. There are no preferences as for the choice of the communication channel depending on the gender.

The respondents paid attention to the need for combining the contact with consultants with other communication channels when asked about the elements of the contact with the client which need to be improved by enterprises. Clients would also long for more modern methods of contact handling avatars, social media and multimedia.

Discussion

Enterprises, more and more frequently, perceive their client not only in the role of a purchaser but, by establishing cooperation with the client, strengthening the relationship with them, they want the client to appear in the following roles:

- A promoter of products, services or a brand,
- An expert, specialist or consultant,
- A person testing new products and services,
- An innovator.

The results obtained in the research allowed to positively verify the hypothesis that young clients eagerly get involved in the process of co-creation of on-line innovation and take roles of consultants, innovators and people testing new products and services.

Theoretical considerations on the possibilities of Web 2.0 and the results of the survey also confirmed the validity of the hypothesis that Web 2.0 is the environment which is favorable for cooperation and co-creation but which is not fully utilized by companies for co-creating innovation with the client. Clients will eagerly take the role of a consultant or an expert, but in the environment which is a natural and comfortable communication platform to them, which Web 2.0 is.

Summing up, companies treat Web 2.0 and social media more frequently as a tool of casual communication than a tool of long-lasting relationship. In the near future there must be an important change in the perception of social media and their use in the activity of the company since the new generation of employees and, simultaneously, clients enter the labor market. For young people Facebook or Twitter are not only another technological curiosity but a natural channel of exchange of information.

In the research it has also been confirmed that for young clients the appearance of a wide range of communication channels is important because 60% of clients asked a question or submitted a proposal while using one communication channel and in the further communication they searched for solutions utilizing other channels.

Conclusions

The recognition of the motives clients are driven by, while taking other roles than the role of the purchaser of products and services, is of the key importance in creating the basis for the effective cooperation with the client. Another step is the identification of clients' needs not only as for the offer of products and services but also their preferences as for the used tools of communication with the enterprise. While planning the designer - user cooperation, it is advisable to utilize the presented concept model (figure 2) and to develop the communication layer with tools preferred by clients of the company.

The most professional solution in communication with innovation founders are cooperation platforms created on platforms of companies or as independent portals. Well-known platforms include: "Dell Idea Storm" or " My Starbucks idea", and among Polish brands, e.g. "Bank pomysłów" (Bank of Ideas) BZ WBK. Unfortunately, only 4% of the respondents at least once logged in on the platform of submitting ideas and took an activity, e.g. submitting an idea, commenting or voting on the presented ideas.

Companies will need to be more flexible and creative in defining the way they interact with customers. Furthermore, companies will need to become more sophisticated in their open innovation approaches and in a relationship-dominated world, companies will need to focus more on the role of employee engagement in innovation. The winners will be those company who are able to link strategy, innovation, product, customer experience and employee engagement, all in a landscape of shifting sectoral boundaries, new bases of competition and Web 2.0 tools.

References

Awa, H. O., Eze, S. C., (2010). *Democracy and User Community Collaboration in Innovation*: A Value Creation Paradigm in an Extended Enterprise, International Business and Management, Vol. 1, No. 1., pp. 90-106.

Bandulet, M., Morasch, K. (2005). *Would You Like to be a Prosumer? Information Revelation, Personalization and Price Discrimination in Electronic Markets*, International Journal of the Economics of Business, July, Vol. 12, No. 2, pp. 251–271.

Chesbrought (2003). *The Era of Open Innovation*, MIT Sloan Management Review, 44/3 Spring 2003, pp. 35-41

De Moor, K., Berte, K., De Marez, L., Joseph, W., Deryckere, T., Martens, L. (2010). User-driven innovation? Challenges of user involvement in future technology analysis. - Science and Public Policy, Vol.37, No.1., p.51-61.

From social media to Social CRM. What customers want. The first in a two-part series. (2011). IBM Global Business Services. Executive Report.

Fuchs, C. (2010). *Social software and Web 2.0: Their sociological foundations and implementations.* In: Murugesan S 9ed.) Handbook of Research on Web 2.0, 3.0, and X.0: Technologies, Business, and Social Applications, vol.II. Hershey, PA: IGI-Global, pp. 764-789.

Full, J. (2010). *Refining Virtual Co-Creation from a Consumer Perspective*, California Management Review, 52/2 Winter, pp.98- 122.

Glenn, J. C. (2009*). Collective Intelligence - One of the Next Big Things***.** - Futura Vol. 4, Finnish Society for Futures Studies, Helsinki, Finland.

Howe J., (2008). *Crowdsourcing: Why the Power of the Crowd Is Driving the Future of Business*.

Howe J., *The Rise of Crowdsourcing,* Wired Magazine, Issue 14.06, June 2006.

Howe, J. (2008). *Crowdsourcing: Why the Power of the Crowd Is Driving the Future of Business,* Crown Business.

Jelonek, D., (2012). *The Role of the Internet in Open Innovations Models Development,* Business Informatics Vol. 1(23), pp. 38-47

Jelonek, D., (2013). *Prosumption in Creating Value for the Customer*, Proceedings of International Scientific Conference "Business Management – Practice and Theory in the 21st Century", 6-7, June 2013, Nitra, Slovakia.

Jelonek, D. (2014). *Personalizacja jako determinanta sukcesu współpracy z klientem w przestrzeni internetowej*, Prace Naukowe Wałbrzyskiej Wyższej Szkoły Zarządzania i Przedsiębiorczości T.27 (2), 2014, pp.267-278.

Kozinets, R., Hemetsberger, A., and Schau, H. J., (2008), *The Wisdom of Consumer Crowds*, Journal of Macromarketing, Vol. 28/4, pp. 339-354.

Kuszyn, M. (2008). Co to jest Web 2.0?, http://www.eioba.pl/a78956/co_to_jest_to_web_2_0

Muncy, J. A., Hunt, S. D., (1984). *Consumer Involvement: Definitional Issues and Research Directions,* Advances in Consumer Research Vol. 11, pp. 193-196.
Prahalad, C.K., Ramaswamy, V. (2004). *The Future of Competition: Co-Creating Unique Value with Customers,* Boston, MA: Harvard Business School Press.
Reinhold O., Alt R., 2012, *Social Customer Relationship Management: State of the Art and Learnings from Current Projects*, 25th Bled eConference eDependability: Reliable and Trustworthy eStructures, eProcesses, eOperations and eServices for the Future, 2012,Bled, Slovenia.
Ritzer G., Jurgenson N., (2012), *Production, Consumption, Prosumption. The nature of capitalism in the age of the digital prosumer'*. Journal of Consumer Culture, Vol. 10/1, pp.13 -26.
Ritzer, G., Jurgenson, N. (2012), *Production, Consumption, Prosumption. The nature of capitalism in the age of the digital prosumer'*. Journal of Consumer Culture, Vol. 10/1, pp.13 -26.
Rosted, J. (2005). *User-Driven innovation. Results and recommendations*, FORA, Copenhagen.
Song, F.W. (2010). *Theorizing Web 2.0*. Information, Communication & Socity, 13 (2), pp. 249-275.
Von Hippel, Eric A., (2005). *Democratizing Innovation*, MIT Press, Cambridge, MA,

E-Consumer Behaviour as a New Trend of Consumption in Poland

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Abstract: In the contemporary economy, one of the significant factors determining the activities of enterprises is that of change in the behaviour of consumers on the market. These changes may be the result of the impact of various circumstances. The most important of these include the impact of the environment in economic, demographic, socio-cultural, technical and technological dimensions, among others. Each of the aforesaid dimensions has an impact on the formation of new forms of consumption in both the short-term and long-term periods of time. One of the new forms is e-consumer behaviour, which involves the realization of the process of consumption on the Internet. Its development is associated with new forms of communication. Mobile equipment (cellular phones, smartphones, tablets) with connections to the Internet facilitate the acquisition and consumption of consumer goods outside of traditional shops, which in turn has an impact on the creation of new trends of consumption.The main aim of this paper is to describe the trend of e-consumer behaviour on the consumer market. The authors focus on the answer to the question of whether this trend shall dominate in the near future. With the aim of finding the answer to the aforesaid question, the authors analysed the most important economic, social and cultural factors influencing the development of e-consumer behaviour at the beginning of the 21st century. The most significant features of e-consumption have been presented. The perspectives of e-consumer behaviour in Poland has also been illustrated on the basis of quantitative and qualitative research. The practical implication of the analysis carried out is the indication of the growth in potential of consumption on the Internet. Nevertheless, the social implication of this paper is the emphasis of the significance of this new trend in consumption and its implications for producers.

Key words: e-consumer, consumer trends, consumption, consumer behaviour

Introduction

In the 21st century, the development of IT technologies is leading to numerous social and economic consequences. One of the most important of these is the development of e-commerce and new sectors of services. The sale of consumer goods by means of new forms of communication, namely, the Internet, cellular phones, interactive television is becoming more widespread. A multitude of virtual shops are emerging on the Internet that offer almost unlimited opportunities in terms of the choice of products and services, speed of purchase, as well as a multitude of aspects involving information about products. They are becoming important centres of consumption, namely places that facilitate the consumption of various goods and services (Ritzer 2001, p.21). The rapid development of e-consumer behaviour is dependent to a large extent on the technical progress associated with the new forms of communication. The appearance of smartphones and tablets with access to the Internet has expanded the possibilities of developing the new forms of communication. These include the interactive digital television, electronic advertising kiosks, electronic catalogues of mail-order houses and other firms, TV networks of home purchases, advertising broadcasts, as well as forms of online trade on the Internet.

The development of electronic forms of communication has influenced the creation of new forms of consumer behaviour. From the perspective of the sociology of consumption, we may observe the creation of the "new consumer", namely, the people who realize the process of purchasing with the aid of the Internet by means of the following: identifying the need, searching for a solution, making purchases of goods and services. The process of consumption realized by the new forms of communication has an impact on the change in the trends of consumption and lifestyles. New consumer norms are being created. As a result of availing of purchases on the Internet the expectations and customs of consumers are changing. On the one hand, the "new" consumer by way of access to numerous sources of information is becoming critical and sceptical with regard to the world of goods, while simultaneously conscious of the requirements with relation to the prices and quality of goods. On the other hand, the "new" consumer is subjected to the impact of constant advertising that appears in all forms of communication, e.g. cellular phones, the Internet, TV, radio etc., as a result of which the averaging out of tastes

and their standardization are taking place. With relation to the changes in consumption, the question arises as to whether the new form of consumer behaviour realized on the Internet is a long-term trend in Poland and in what scope. The authors formulate conclusions relating to the perspectives of the development of the trend of e-consumer behaviour in Poland on the basis of the method of critical analysis of the existing documents – books, papers, reports and other works.

E-consumer behaviour as a mega-trend

Consumer behaviour in the 21st century involves constant change and the impact on this process involves various factors. The most important ones include globalization, networking and informatization. They create the circumstances for the formation of new consumer behaviour, which may be termed as a trend. H. Veilgaard defines this trend as the process of change that may be perceived from a variety of perspectives (Veilgaard 2008, p. 9). Nevertheless, Ph. Kotler defines trend as a direction or series of events characterized by a certain drive and durability (Kotler 2005, p. 159). Hence, the consumer trend is termed as any change in consumer behaviour that has a defined period duration, as well as occurring in several areas and in the activities of a consumer, while also remaining compatible with the other important factors, both the existing ones, as well as those emerging at the same time (Celeste, 1991). From a time perspective, it is possible to discuss the short-term or long-term trends. Short-term trends are reactions to the current economic and social situation, e.g. the economic crisis has had an impact on the search for ways to adjust to the new economic reality. However, together with its conclusion, the associated trends disappear. Nevertheless, long-term trends are of a constant nature and are most frequently the result of profound social, cultural and economic changes.

In literature devoted to the field of marketing, it is possible to encounter various typologies of the contemporary consumer trends. For instance, American marketing analysts have worked out the 10 most important trends. According to the American firm JWT, it is possible to distinguish the following trends: *all the world's a game* which encompasses behaviour directed towards super-modern technologies, particularly computer games, which shape specific behaviour in the virtual world and the real world*; the urgency economy*, whose essence involves the subjection to uninhibited consumption in today's world without waiting for the future; *non-commitment culture* relates to consumer behaviour characterised by the transitory relations between the seller and the producer, as well as the lack of loyalty and allegiance to the brand*; eat, pray*, *tech* pays attention to the fact that the possession of goods of high technology has grown to the ranking of elementary needs that are essential to life*; de-teching* is associated with the bases of "digital abstinence" caused by the escape from the digitalized and completely modern technologies of the world*; retail as the third space* relates to changes in the functioning of traditional sales in the direction of transforming it into a unique consumer experience; *creative urban renewal* is associated with the situation of gradual integration of the trademark with the iconic space of a contemporary city; *worlds colliding* relates to the overlapping of the virtual world and the real world, which favours the development of modern technologies*; hyperpersonalization* is based on the search for highly individualized products and services*; outsourcing self-control* relates to the maintenance of self-discipline and moderation in terms of consumption (10 trends for 2011, pp. 1-87).

Another interesting proposition of trends in consumer behaviour was presented by B. Mróz who distinguished the following: *gender blending,* which involves the fading of differences in the division of social roles in the area of consumption between men and women*; LOHAS (Lifestyles of Health and Sustainability)* is associated with the departure from over-consumption in the direction of a lifestyle that propagates ecological consumption, sustainable development and respect for the environment*; do-it-yourself doctors* encompasses behaviour associated with care for personal health, physical and psychological condition*, trysumer* propagates behaviour associated with the search for new feelings and experiences*, sharing* economy is associated with consumer cooperation in terms of acquiring new goods*;* while the hyperpersonalization relates to the search for unique items that are adjusted to individual expectations and preferences (Mróz 2013, pp.134-165).

Each of the aforesaid typologies contains behaviour that is characteristic of e-consumption, which signifies the fact that the process of satisfying consumer needs is realized on the Internet where a consumer identifies the needs, searches for solutions, carries out purchases of products and services, while even consuming them in the virtual world. With relation to this, new trends of consumption are being formed (particularly with reference to the trends of acquiring consumer goods). The trend of e-consumer behaviour due to its strong ties with the IT society may be acknowledged to be the one which shall define the future consumer behaviour.

In characterising this trend, it is possible to distinguish a multitude of its features. One of these is the use of the modern methods of consumption for the realization of the process of consumption. The development of the Internet, as well as the means of communication (smartphones, tablets, mobile phones, laptops with functions of access to the Internet) has had an impact on the creation of new products and consumer services only available in the virtual world.

Another feature of e-consumer behaviour is the acquisition and accumulation of consumer information. The commercial Internet provides a consumer with the possibility of availing from a databank with reference to the process of creating a given product and other information about the product that is helpful in taking a decision to purchase. This enables the acquisition of information from other consumers that use the given products or avail of specific services. In the case of websites offering a wide range of consumer goods, there is the possibility of a relatively fast familiarisation of the offers of the particular shops, whereas in the case of the traditional way of acquiring goods the acquisition of information on the offers of particular shops requires a lot of effort and time.

A further feature is that of prosumption, which involves participation in the creation of an individualized product. Consumers get involved in part of the work executed by specialists in an enterprise, i.e., by means of active participation in the process of designing a given product, which in its final stage acquires individualized features adjusted to the expectations of a consumer. D. Tapsott defines this aspect of presumption as the desire to possess varied types of consumer goods in accordance with personal concepts and active participation in the creation of the given goods (Tapsott, Williams 2008, pp. 215-218). Thus, it was assumed that products are the arena for experimentation in the case of potential clients and taking account of the changes proposed by them, while simultaneously treating consumers as partners and not only clients (Tapsott, Williams 2008, pp. 215-218). Consumers are encouraged to share knowledge with producers (Ziemba, Eisenbardt 2014). Sometimes their knowledge is availed of to solve specific problems that producers are faced with. This may take on the following three forms: crowdfunding which involves the joint financing of specific projects by the Internet society, co-creation associated with the commonly executed creative work, as well as microtasting involving the execution of small tasks constituting part of the common project by the virtual society (Mróz 2013, p. 92).

The features of e-consumption are new forms of making purchases by means of the organization of consumers into virtual consumer societies in which mutual cooperation is significant which facilitates taking shrewder purchasing decisions. With this aim in mind, review platforms are created, on which consumers exchange information about products and services, or societies are also formed around brandnames. Apart from the exchange of information, virtual consumer societies undertake active operations on the market by means of various forms which include, among others, social shopping taking on the form of purchases made by groups and social offering involving purchases in which the initiating party is a group of consumers (Mazurek 2012, p. 162).

The choice of e-consumption as a type of consumer behaviour is influenced by many factors as follows: firstly, there is the possibility of making rapid purchases in virtual shops, secondly, the possibility of choice in a virtual shop depending on the needs and preferences, thirdly, a consumer may store a large amount of information about products and possibilities of purchasing that is not offered by brochures and technical descriptions, fourthly, there is the possibility of acquiring a broader range of information on a given product from a producer by means of electronic mail. Research on e-consumers indicates that the main reasons for the choice of Internet shops are as follows: the greater convenience and saving of time, ease of purchasing, saving of money, good fun, better selection of products, easier delivery and availability of information (Windham, Orton, p. 48). The benefit of Internet purchases relating to entertainment is worth mentioning. In the case of some consumers, the possibility of surfing the Internet, comparison of prices, searching for bargains and participation in auctions are elements of good fun and the feeling of pleasure.

Prerequisites for the shaping of the trend of e-consumer behaviour

The development of e-consumer behaviour is influenced by many conditions of an economic, social and technological nature. The most significant economic conditions include the differentiation of the offers of goods and services with regard to target groups, the increase in the mass spread of cheap trademark substitutes of comparable use value, the expansion of the segment of low prices of consumer goods and services, the emergence of new techniques of sales, changes in the sphere of satisfying basic needs, as well as the wide availability of consumer credit. Another equally significant factor in terms of stimulating behaviour associated with e-consumption is the possibility of availing of credit cards as a method of disbursing money. The increase in the availability of credit cards for the payment of purchases in Internet shops was enabled by the implementation of electronic methods of payment for goods and services. The infrastructure of the electronic funds transfer was created and the processes of accepting credit cards were prepared and implemented. Thanks to all this, the application of credit cards in e-commerce has become a widespread phenomenon. A further economic factor in supporting the development of e-commerce is the pursuit of acquiring products, i.e. designer goods at reduced prices. This process may be termed the "logic of cheapness" (Jäckel 2006:274), which is illustrated in the fact that consumers compare the prices of goods between themselves and search for those that are at the lowest price. Another form of the "logic of cheapness" is that of purchases made in groups. These purchases are the result of the need for simplicity, frugality, the trend towards "jumping" from one offer to another (Flatters,Wilmott 2009:106-112). Group buying or social buying involve the collection of an

appropriately large group of consumers that are interested in purchasing a specific product and its acquisition via the Internet (Bilińska-Reformat 2013:98). In the case of a consumer, this type of purchase is an opportunity to avail of the attractive offers price-wise, while in the case of firms this is a marketing tool of a broad promotional application.

A significant influence on the development of e-consumer behaviour is created by circumstances of a social nature, of which one is mass communication. The rapid development of television has evoked a multitude of consequences in society. One of these relates to the changes in the manner of spending leisure time. According to R.D. Putman, television has "privatized" or "individualized" the way in which leisure time is spent, by occupying an increasingly important position among the ways of spending free time (Putman 1995: 65-75). The unidirectional form of communication that is characteristic of television has created the feeling of anonymity and feeling of emotion in solitude. It has made viewers dependent on a unidirectional form of managing communication as a way of spending leisure time, self-education and finding activities. The creation of such attitudes among people has become the basis for the development of new forms of communication. The Internet by utilizing the customs of people in terms of spending leisure time at home offer the possibility of two-way communication. It has provided the tools, thanks to which it is possible to satisfy consumer needs without leaving the home. Over the course of a short period of time, the Internet has facilitated purchases of required products in any place where there is a possibility of connecting to the Internet.

Another circumstance is the growth in the activity of women and the associated chronic lack of time with reference to running the household. The professional activity of women has had an impact on changing the lifestyles of women, which is illustrated by the fact that the modern-day woman has less time to run the household, which in turn means that they have less time to do shopping. The Internet enables a significant saving of time and also increases the convenience of doing shopping.

A further social circumstance is the individualistic orientation associated with post-material values (Bylok 2013, p.158). In the sphere of consumption, this is witnessed by the pursuit of creating an individual style of consumption. The application of new communication techniques has had an impact on expanding the area of individualism in consumption and the possibilities of choice of individual styles of life as forms of building self-identity. Technical artefacts support this process. Thanks to the use of the "communicative" means of consumption, it is possible to create an individual style of consumption. A consumer has the possibility to choose various options. M. Prisching defines optionality as each possibility that may and should become a reality, without effort and with the feeling of great pleasure (Prisching 2006, p. 67). Optionality in consumption involves carrying out purchases and availing of the products according to one's own idea. The Internet has significantly facilitated the choice of a specific option of consumption with regard to individual preferences.

The individualistic orientation is associated with the pursuit of feeling new experiences that enable the satisfaction of the need for the feeling of pleasure. Consumers search for unknown and unique experiences not only in real life, but also in the virtual world. Electronic equipment of the latest generation that has access to the Internet facilitates the feeling of new and exciting experiences, e.g. in the form of computer games. There is an additional dependency between the value of pleasure and the attitudes towards e-purchasing, namely the feeling of pleasure on the internet has a positive impact on making purchases on the internet (Jayawardhena 2004).

A significant condition in the development of the trend of e-consumer behaviour is the ideology of technological progress associated with the propagation of technocentric attitudes among consumers, which involve the positive evaluation of everything that is modern and the result of the latest technologies (Wiswede 2000: 45-50). This is carried out by spreading the concept of the almighty power of the techniques, as well as the fact that human labour shall become restricted to servicing technical equipment. The realization of this ideology is the technologizing of everyday life associated with the widespread use of goods equipped with new IT technologies. The possession of goods created by the sector of high technologies has become not only an important need for many consumers, but also a determinant of social status, or lifetime success. Contemporary man is increasingly dependent on goods equipped with modern technologies. The possession of modern mobile products (cellular phones, smartphones, tablets), which fulfil the function of handy "digital assistants", guides and helpers in everyday life is becoming essential. This equipment is equipped with special programs and applications facilitating the realization of the process of consumption in any place and at any time.

Behaviour of e-consumers in Poland

The desk research method was applied for the analysis of the existing data on the behaviour of e-consumers in Poland, which was executed on the basis of the data published in the following: reports, papers, articles in magazines. As a result of the research carried out, the findings relating to the perspectives of the development of e-consumption in Poland were formulated.

In the first decade of the 21st century, there was rapid growth in the development of e-consumer behaviour in Poland. This is first and foremost conditioned by the range of access of consumers to the Internet. As indicated by research carried out by Głównego Urzędu Statystycznego (Central Statistical Office) in 2013, access to the Internet was registered in the case of 71% of households, including 68.8% with broadband access. If Polish people have access to the Internet, they most frequently avail of it in their homes (60.6%), while subsequently in the workplace (20.8%) and in the homes of other people (10.5%) (GUS 2013, p.9). An analysis of the socio-demographic features of the people using the Internet is interesting. The findings of research carried out by CBOS (Public Opinion Research Centre) indicates that in 2013 there was almost widespread use of the Internet by the youngest Poles of ages less than 25 years of age (93%), while the vast majority of people aged between 25 and 45 (88%). The number of users of the Internet decreases with age and the lowest percentage of internauts is aged 65 or over (11%). Polish people who usually avail of the Internet are in the majority of cases people who are relatively well-educated (higher education is held by 92% of users, while medium level education in the case of 73% of internauts). The variable differentiating users of the Internet is that of professional status. The largest group of users of the Internet consists of people employed in managerial positions (97%), while also administrative and office workers (88%). However, the smallest group of people using the Internet consists of unqualified workers (40%) (CBOS 2013). Hence, the typical user of the Internet in Poland is a young individual that is relatively well-educated and occupies a relatively high position in the workplace. The findings of research on the consumer behaviour of Polish people indicate that this group of consumers is featured by spontaneity in terms of purchases and behaviour aimed at attaining pleasure in consumption (Bylok 2005, pp. 335-360).

Availing of the Internet with the aim of realizing the process of consumption depends on the level of Internet skills, namely the use of Internet browsers, participation in chats and discussion forums, utilizing programs for exchanging film files and music files, as well as buying and selling on the Internet. Research on the IT competences reflects that 35% of Polish people possess high level and medium level Internet skills. However, 29% of Poles possess low levels, while 35% do not possess any skills (Szymanek 2013, p. 27).

The scope of e-consumption is dependent on the equipment which users are in possession of. Research by CBOS indicates that there is a systematic rise in the number of people in possession of mobile equipment such as laptops, cellular phones, notebooks, tablets and smartphones in Poland, which has a positive impact on the increase in the interest of consumption on the Internet. In comparison with 2010, when the users of this equipment amounted to 45%, in 2013 73% of Poles declared their access to wireless connections with the Internet by means of such equipment (CBOS 2013). Polish people are increasingly availing of mobile equipment to make purchases online. Currently, every sixth person buys online by means of mobile equipment. The increasingly technologically advanced equipment is becoming an alternative for desktop and laptop computers. This trend is tied with the growth in the quantity of mobile equipment in Poland as the number of mobile viewings for websites in the category of e-commerce tripled in 2012 (Gemius Report 2012: 54).

The scope of availing of e-commerce tools has had an impact on the development of e-consumption in Poland. The most significant of these includes price comparison websites, namely service websites in which consumers may compare the prices of products in various Internet shops (59%) and service websites with reviews and opinions on products on the Internet (57%). Consumers also avail of advertising portals, in which internauts may inform about products which they would like to sell/buy (40%), group buying, or in other words, service websites in which internauts who are interested in the same product may negotiate the price with the supplier or buy more cheaply (19%), as well as shopping malls, namely service websites concentrating shops of a similar assortment (16%) (Gemius Report 2012:100). Each of these tools favours the taking of consumer decisions.

Together with the increase in the access to the Internet among Polish people, there is also a rise in consumption with this method. In 2012 by comparison with 2008, the percentage of people making purchases grew from 66% to 72%. The largest group of consumers constitutes people both on auctions, as well as on online shops (58%). These are usually people aged less than 35, having a higher level education and holding a higher social position, while also living in large cities. Another group of consumers consists of people buying exclusively on online shops (24%). These are most frequently women and people aged over 35. This is the result of the growing popularity of clothing shops on the Internet which offer innovative solutions, e.g. virtual changing rooms or 360 degree photos. The final group consists of people buying exclusively on online auctions (19%) who are most often people of a lower level of education and living in the country or in small towns (Gemius Report 2012:28). Hence, the socio-demographic features have an impact on the choice of place for making purchases on the Internet.

The structure of products purchased on the Internet makes for interesting reading. The consumer goods which are most frequently purchased are clothing and footwear – bought by 32% of internauts. Furthermore, consumers willingly buy articles associated with motoring (12%), electronic equipment (10%), cosmetics,

children's toys and goods (9% each). Nevertheless, food products are relatively seldom purchased (2%) (CBOS 2013).

Apart from behaviour associated with the purchase of consumer goods on the Internet, e-services are of significant importance. M. Dąbrowska defines them as the new way of providing services with the use of the Internet from the moment of the firm contacting the client with the aim of presenting their offer by means of ordering services to their provision and contact following the execution of services (Dąbrowska 2008, p.44). The feature of e-services is their interactivity, situational personalization and possibility of regulation in real time (Rust and Lemon 2001). Depending on the type of e-services, they may be rendered on the Internet and their consumption may take place while availing of the Internet or in the real world following their purchase online. Of all the e-services, Polish people relatively often avail of banking services via the Internet (83.4%). Availing of electronic banking is favoured by people with higher education, namely the higher the level of education, the more often Polish people avail of e-banking. Further types of services which consumers search for on the Internet are e-culture (56.9%), e-learning (55.9%), e-administration (34.5%), e-insurance (28.1%) and e-health (16.7%). Research indicates that women avail of services in the sphere of e-culture, e-learning and e-health more frequently than men. In turn, men avail more of the services of e-administration and e-insurance. The most active group of consumers availing of e-services are people aged between 25 and 34, as well as between 35 and 44 (Wolny 2013, pp.256-257).

In the analysis of consumer behaviour on the Internet, a significant role is played by the motives of e-purchasing (Bourlakis et al. 2008). The most important motives that stimulate Polish people in choosing e-consumption include saving money associated with the low prices offered by Internet shops (80%), the lack of time and convenience (71%), while also free delivery (34%). The possibility of spending a pleasant time doing shopping online is also important (15%) (Gemius Report, pp.15 and 33). An equally significant motive behind consumer behaviour online is the need to feel experiences. Internauts choose playing computer games most frequently as a source of entertainment, while also downloading files with games, music, films and graphics (28%), listening to the radio, watching TV online (29%) and playing network games (8%) (Szymanek 2013, p. 43). In sum, it is possible to state that in the case of consumers, making a decision to purchase a given product is associated with financial benefits, saving time and the feeling of pleasure.

In the process of the behaviour of an e-consumer, utilizing the Internet for searching information about products is significant. In Poland, knowledge about new products is searched for by 49% of internauts, whereas in turn, reading, downloading files of newspapers and magazines which contain information about new products is important for 30% of the people availing of the Internet (Szymanek 2013, p. 42). Most frequently, e-consumers search for information on the Internet by means of search engines (Google, Bing, Yahoo) - 29%, while also on online auctions -26%. Consumers avail of online shops familiar to them to a lesser extent - 14%, while price comparison websites -13% with the aim of acquiring information about new products (Gemus Report 2012: 32).

The development of e-consumer behaviour as a trend is certified by the frequency of making purchases by mean of electronic forms of consumption. As indicated by the Gemius report, of all the internauts who declare their tendency to make purchases online, almost half of them admit that they do shopping there at least several times a year (44 proc.), whereas the virtual basket is filled by 20% of Polish people more or less once a month. However, purchases on the Internet are made several times a month by 16% of respondents. A mere 4% of Polish people buy systematically on the Internet (Gemius Report 2012). This data reflects the fact that Polish consumers do not make purchases in Internet shops very systematically.

The defined trends of consumer behaviour become a long-term trend when consumers perceive them to be important for the future. In analysing the expectations of Polish consumers with relation to e-consumption, it is worth indicating the factors which are important determinants of potential behaviour. Research shows that Polish people would more frequently make purchases on the Internet in a situation of improving their financial situation (23%), lower prices (20%), lower costs of delivery (19%) and broader assortment of available products (5%) (Gemius Report 2012, p. 42). These factors are of first and foremost an economic dimension, thus the development of e-consumption in Poland is decided by economic conditions in terms of its functioning.

Discussion

The presented findings of the research reflect the fact that there is great potential for the development of consumption in terms of the Internet in Poland. Hence, it is essential to consider the perspectives of developing the trend of e-consumer behaviour. In Poland, the development of this trend is influenced by many factors. Firstly, a consumer finds the website of the Internet shop quickly, orders the sought after item of trade and leaves it quickly. Secondly, shopping becomes convenient, a consumer may make purchases at home, in the office, in an airplane, or indeed anywhere where access to the Internet may be had without the necessity to visit crowded

retail shops. Purchases may be made at any time of the day and on any day of the week. Thirdly, it saves time that is necessary to search for products on Internet shops, in which only several minutes are necessary in order to see the offer of a shop, whereas searching for goods in traditional shops requires a lot of time. Fourthly, a consumer may store a large quantity of information about products and the possibilities of a purchase which is not facilitated by brochures and technical descriptions. Fifthly, there is the possibility of acquiring a wider scope of information about a given product from a producer by means of electronic mail. Sixthly, a consumer has the possibility of acquiring a product manufactured in another country, but which is made available on the Internet. Seventhly, an important circumstance in the choice of e-consumption is that of attaining pleasure while making purchases on the Internet. In the case of some consumers, the possibility of surfing the Net, comparing prices, finding bargains and participating in auctions are elements of good fun and the feeling of pleasure.

Apart from the factors that have a positive impact on the development of e-consumer behaviour, there are also barriers that hinder its development. These are first and foremost, the slow technical processes and difficulty with ensuring the safety of credit cards. Another barrier is the organization of Internet shops. The reality of virtual shops is divergent from theory, in that many barriers exist which hinder the development of this area of trade. There are no broad ranges of products, while there are also problems with timely deliveries to the homes of clients who have bought products, errors in communication on the Internet take place, while the sellers do not always respond to questions regarding specific features of the products sold in their shops by electronic mail (Windham and Orton 2001: 158-159). Another barrier to the development of consumption is the lack of trust with relation to Internet shops which is connected with uncertainty in terms of the quality of the goods and the execution of the transaction itself. Another barrier is the non-adherence to ethical norms on the part of e-sellers, namely the lack of a guarantee of privacy and safety of e-consumers, the lack of responsibility of e-sellers, the lack of a precise description of the products that is in accordance with the reality (Avshalom et al. 2007). In Poland, the most significant barriers to purchasing on the Internet is the fear of being cheated by the seller (66%). Another important barrier is the limited safety of the transaction (27% of those analysed refrained from a purchase as they did not want to reveal details concerning their credit cards) (CENEO 2013).

Conclusions

Deliberations on the perspectives of the development of e-consumption as a new trend of consumption in Poland lead to the formulation of several conclusions. Firstly, as a result of the constant process of change in the technological means of communication, growth exists in the potential possibilities of satisfying consumer needs by way of new forms of consumption. Secondly, new forms of consumer behaviour are emerging as a result of the development of new forms of sales in terms of goods and services on the Internet. Thirdly, individualistic attitudes are being created in consumption. This is favoured by the differentiation of the offers of consumer goods in Internet shops that facilitate the individualization of the styles of consumption. The styles of consumption are to an increasingly lesser extent dependent on the influences of social classes and levels or groups. Fourthly, the acquisition of goods with the aid of electronic means of communication enables the satisfying of the need to feel pleasure and experience adventures characteristic of consumption that is directed towards the feeling of pleasure that is the feature of a consumer society. Fifthly, there are technical and psychosocial barriers hindering the development of consumption via the electronic means of communication. This refers to on the one hand, the limitation of the safety of electronic transactions, while on the other hand, the habits, customs, patterns and trends of consumption that are characteristic of traditional consumption. Likewise, the lack of skills in the use of a personal computer and the skills to avail of the Internet are barriers to gaining access to the Internet market of consumer goods. This is particularly visible among elderly people who in the majority of cases do not possess a personal computer.

Analysis of the circumstances of the formation of the trend of e-consumption and its state of development in Poland render it possible to state that consumption by means of the electronic means of communication is becoming increasingly mass in terms of scale and shall gradually displace traditional consumption. With relation to this fact, producers and those offering consumer goods should focus greater attention on activities connected with offering goods and services in the virtual world.

References

10 trends for 2011, (2010) New York: JWT.

Avshalom M.A., Avshalom A.&Arik S. (2007). *Do Ethics Matter to E- Consumers?*. Journal of Internet Commerce, Vol. 6, Iss. 2, pp.19-34.

Bilińska-Reformat K. (2013). *Nowe trendy w e-commerce na przykładzie rozwoju zakupów grupowych* [New trends in e-commerce as exemplified by the development of group buying]. Handel Wewnętrzny, 2013, styczeń-luty, pp. 95-104.

Bourlakis M., Papagiannidis S.&Fox H. (2008). *E-Consumer Behavior: Past, Present and Future Trajectories of an Evolving Retail Revolution,* International Journal of E-Business Research, vol.4, Iss.3.

Bylok F. (2005). *Konsumpcja w Polsce i jej przemiany w okresie transformacji* [Consumption in Poland and its changing trends Turing the period of transformation]. Częstochowa: Wyd. Politechniki Częstochowskiej.

Bylok F. (2013). *Konsumpcja, konsument i społeczeństwo konsumpcyjne we współczesnym świecie*. *Studium socjologiczne* [Consumpion, consumer and the consumer socjety in the contemporary word. A sociological study].. Katowice: Wyd. Naukowe „Ślask".

Celeste G. (1991). *Trend Tracking, The System of Profit from Today's Trends*. New York: Grand Central Publishing.

Dąbrowska A. (2008). *Rozwój rynku usług w Polsce – uwarunkowania i perspektywy* [Development of the market of services in Poland – conditioning and perspectives]. Warszawa: Oficyna Wydawnicza Szkoły Głównej Handlowej.

Echikson W. (2001). *Inwazja telewizji interaktywnej* [Invasion of interactive television]. „Wprost", nr 15.

Flatters P.& W. Wilmott (2009). *Uderstanding the post-recession consumer*, Harvard Business Rewiew, vol.7, Issue 7/8, pp. 106-112.

Gemius Report (2012). *e-Commerce w Polsce 2012 w oczach internautów* [e-commerce in Poland 2012 in the eyes of internauts]. Interaktywny Instytut Badań Rynkowych, e-Commerce Polska. www.gemius.pl [excerpt 10.06.2014]

Internauci 2013 [Internauts] (2013). Komunikat z badań BS/75/2013, CBOS, Warszawa. www.cbos.pl [excerpt 10.06.2014]

Jäckel M.(2006). *Einführung in die Konsumsoziologie. Fragestellungen-Kontroversen-Beispieltexte.* Wiesbaden: Verlag für Sozialwissenschaften.

Jayawardhena Ch. (2004). *Personal values' on e-shopping attitude and behavior*. Internet Research, vol.14, Iss:2, pp.127-138.

Kotler Ph. (2005). *Marketing*. Poznań: Dom Wydawniczy Rebis.

Mazurek G. (2012). *Znaczenie wirtualizacji marketingu w sieciowym kreowaniu wartości* [Significance of the virtualization of marketing in the network creation of values]. Warszawa: Poltext.

Mróz B.(2013). *Konsument w globalnej gospodarce*, *Trzy perspektywy* [A consumer in the global economy, Three perspectives]. Warszawa: Oficyna Wydawnicza Szkoła Główna Handlowa w Warszawie.

Prisching M. (2006). *Die zweidimensionale Gesellschaft*, *Ein Essay zur Neokonsumistischen Geisteshaltung.* Wiesbaden: VS Verlag für Sozialwissenschaften.

Putman R.D. (1995). *Bowling Alone: American's Declining Social Capital*. Journal of Democracy, Vol.6, no. 1,1995, pp.65-75.

Ritzer G. (2001). *Magiczny świat konsumpcji* [Enchanting a Disenchanted World. Revolutionizing the Means of Consumption]. Warszawa: Warszawskie Wydawnictwo Literackie MUZA S.A.

Rust R. T.& Lemon K.N. (2001). *E-consumer and the consumer*. International Journal of Electronic Commerce, Vol. 5, No. 3/Spring, pp. 85-101.

Społeczeństwo informacyjne w Polsce w 2013 [IT society in numbers 2013] (2013). Warszawa: GUS.

Szymanek V. (2013). Społeczeństwo informacyjne w liczbach 2013 [A consumer in European space]. Warszawa: Wydawnictwo Ministerstwo Administracji i Cyfryzacji.

Tapsott D. , Williams A. (2008). *Wikinomia. O globalnej współpracy, która zmienia wszystko*, [Wikinomia. About global cooperation which changes everything]. Warszawa: WAMP.

TNS OBOP (2003). Interbus 2003. www.tns-obop.pl. [excerpt 10.06.2014]

Veilgaard B.(2008). *Anatomy of a trend.* New York: McGraw Hill.

Windham K., Orton K.(2001). *Dusza Nowego Konsumenta. Postawy, zachowania i preferencje e-klientów*. Warszawa: Wydawnictwo CeDeWu.

Wiswede G. (2000). Konsumsoziologie - Eine vergessene Disziplin.(pp.23-72). In D. Rosenkranz (Ed.) *Konsum: soziologische, ökonomische und psychologische Perspektiven*. Opladen: Verlag Leske+Budrich.

Wolny R. (2013). Konsumpcja e-usług jako przejaw innowacyjności konsumentów [Consumption of e-services as the indication of the innovativeness of consumers]. Handel Wewnętrzny, styczeń-luty, pp. 255-264.

Ziemba E., Eisenbardt M. (2014). Prosumers' eagerness for knowledge sparing with enterprises – a Polish study. Online Journal of Applied Knowledge Management, Vol. 2, Iss. 1, pp.40-58.

From Methodology of the Mother Tongue to Methodology of Slovak as a Foreign Language

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Abstract: The aim of second language methodology is to control teaching the language which is for minorities a foreign language. If foreign language teaching and learning is to be effective and successful, it needs to be related to a certain agent which functions as a mediator between the subject matter and learners. Teaching – either controlled or not - to minorities with a different mother tongue becomes a subject of interest of bilingualism (or multilingualism), where in the centre of attention various degrees of a mother tongue and second language mastery are.

Key words: Second language methodology, foreign language teaching, bilingualism (or multilingualism).

Introduction

For minorities, staying in a natural foreign language environment means spontaneous uncontrolled learning a target language (second language) – Slovak. Learners are able to absorb their target language through listening to the language which is not their mother tongue without interference of the teacher (or other mediating agent). The object of the Slovak language methodology for minorities living in Slovakia is to control foreign language learning and at the same time to reflect this phenomenon: various degrees of second language mastery in relation to the mastery of their mother tongues. This influence (besides sociometric factors such as age, education, etc.) is due to the stay of minorities in such environment where Slovak as an official language is used actively. Learners are influenced by a foreign language environment but there lacks the impact of the syllabus on language education. Learners do not learn in an effective and complex way without teacher´s controlled (methodological) intervention. This phenomenon is known as "practising prescription" and attracts attention within specifically different language education. Here we can see many faults related to training of Slovak language teachers in a minority environment (the Slovak language is a state language). The discipline such as Slovak language and literature methodology does not deal with (or only to a very small extend) specific needs of students who study at schools where a minority language is the language of instruction (Píšová, 2013, p. 2). The teacher is therefore trained for such kind of education the same methods as the teacher of Slovak as a mother tongue.

The object of methodology of Slovak for minorities is to study various possibilities how to make Slovak language teaching more accessible for minority groups in Slovakia. Gregorík (2014) says that knowledge of mother tongue – in oral and also written form – is one of the students´ key competencies for successful self-realization not only during the studies but also after the studies. Through analyses of the present situation – how the Slovak language is taught to minorities – a study of Slovak language acquisition is being created. The state language is considered to be a second/target language (L_2) and such education should take into consideration social requirements of the target ethnic group. Therefore the target language functions as a tool of communication among the citizens of Slovak nationality. It is important to build on the bilingual or plurilingual (more languages) concept but not from the multilingual concept. The typical feature of the last one is that learners can speak more languages or language knowledge is gained at school or in other educational environment. Typical phenomenon of multilingualism is present at schools where more than one foreign language is offered to study. The concept of plurilingualism (as well as bilingualism) exceeds this frame of language education – here we speak about knowledge of more languages or about co-existing of various languages in a certain society. The Common European Framework of Reference (CEFR) of 2002 assumes that this fact is taken into consideration when educational documents in individual countries of the European Union are created. CEFR emphasises the fact that "as an individual person's experience of language in its cultural contexts expands, from the language of the home to that of society at large and then to the languages of other peoples (whether learnt at school or college, or by direct experience), he or she does not keep these languages and cultures in strictly separated mental compartments, but rather builds up a communicative competence to which all knowledge and experience of language contributes and in which languages interrelate and interact"

(CEFR, 2002, p. 4). Such a concept of language and culture teaching is based on a relation between two (or more) languages and builds on a received communicative competence. This principle of language education is dominant also in the area of Slovak language as a foreign language education as well as a second/target language for minorities. The discipline of Slovak language and Slovak literature in this specific environment covers all the elements (grammar, conversation, stylistics, literature) which lead to communicative competence acquisition and to the ability to think in the target language. Language practice shows that this may be a functioning mutual relationship when the learner uses all the knowledge about a language. In comparison to teaching more languages at schools, there is a difference: language knowledge and skills gained in a natural multilingual environment overlap and are not isolated, they may influence each other. In a common performance, there is a spontaneous code switching and language changing, while the speaker fluently uses both languages with the aim to communicate in the most effective and understandable way. Code/language switching is very flexible and effective. Its advantage is also the ability to decode quickly international words. Vocabulary is not a dysfunctional isolated set of words used just for communicative purposes but becomes a practical and applicable communicative tool in a foreign language environment. That is why if there is an international word or a word of a similar format in more languages, the listener can (at least to certain extend) decode a communicative purpose and thus reach a certain degree of communication, even though his language abilities are limited.

Such a premise needs to have specified the description and control of Slovak language teaching to minorities as well as defining lingua-didactics of Slovak for minorities. Similarly, based on general methodology of the Slovak language, it is also necessary to create methodology of the Slovak language for minorities with the background of the theory of methods used within this educational environment. This is how we could eliminate basic conceptual faults in the teacher training programme of the Slovak language in such environment where minority´s language prevails. At present, such methodology is absent and what comes into being is "uniform training of Slovak language and literature teachers – those who are preparing to teach at schools with Slovak language of instructions and those who are going to teach at schools with minority language of instructions" (Píšová, 2014, p. 3). If we were to rely on methodology of foreign languages which is in many aspects very close to methodology of Slovak for minorities it is essential to build on the fact that this science is very practical and most of all applicable and all conceptual documents should be based on this fact.

When creating a concept of methodology of the Slovak language for minorities, it may be based on two different lingua-didactics concepts: methodology of the Slovak language as a mother tongue and as a foreign language – however, their penetration should reflect the needs and specifics of language education. The methodological concept of Slovak as a foreign language takes into consideration sociolinguistic and ethno-cultural specifics that need to be implemented in curricula. The methodological intention of foreign language teaching is reflected in the forms of language education. The aim is very specific and that is why the syllabus is modified to the creation of study materials. This is very similar in case of teaching Slovak through methods of foreign languages in a minority environment. It is also necessary to take into account the needs of language learner training with other language base and a reached level of acquired Slovak language. Methodology of the Slovak language needs to be narrowly specified and determined by an adjective in order to be clear that it is methodology of the Slovak language for minorities living in Slovakia.

Choděra (p. 24) states seven crucial factors (criteria) that identify foreign language methodologies. Those criteria may be applied when differing Slovak language methodology for teaching Slovak in which a minority language participates. According to aiming a target language teaching we differ:

- target language, or a taught language (however, not a language of instructions) – Slovak;
- mother tongue = languages of minorities in Slovakia (Hungarian, Ukrainian, Polish, Czech, Roman, Ruthenian, German, Russian);
- a target language or a mediating language when learning a target one is the Slovak language;
- natural language environment (minority language in a majority language environment);
- characteristics from the point of view of age in educational institutions: children and adolescents, students of primary and secondary schools who pass gradual development of language levels from beginners to intermediate ones;
- the language environment in this type of education may be called multidimensional as education of a minority language runs together with a second (target – Slovak) language.

Language syllabus of a second target language represents only a selected syllabus and a narrowed range of language units of the system which is described by linguistics. This selected set of syllabus is the so called language minimum, however, many authors of foreign language methodologies agree on the fact that it is more appropriate to call it "optimum" (the aim is to educate average students not those who are least language educated). In Slovak language classrooms where the language of instruction is a minority language, the selected optimum is widened – in comparison with foreign language education in multilingual teaching. Such widening is

related to a bilingual environment of students and the syllabus is extended at all language levels. According to that we speak about selected phonetic, grammar, lexical, vocabulary or syntactic minimum or optimum. Those aspects of curriculum cover three parts of language education in the National educational programme within subjects of the Slovak language and Slovak literature. That means that the curriculum (educational programme) is oriented on optimal (average) achievement of language abilities while optimum is clearly highlighted down to minimum – well defined and visibly bounded. Within the lexical part, it tackles vocabulary which is selected as passive and active. Its classification depends on either productive or receptive use of language phenomena in education. It is obvious that the set of passive vocabulary is more extensive because of receptiveness (understanding) of broad-spectrum types of texts during a learning/teaching process. Active vocabulary represents words which are more frequently used and activated and mostly in other types of texts, e.g. in various productive types of exercises. The same it is with grammar optimum/minimum, defined as didactic grammar. These are grammar structures selected out of the language system and its description from the point of view of teacher´s needs and student´s needs. Here we can also see a certain restriction of the grammar range in learning texts in the line from activeness to passiveness. We speak about productive (active) grammar and passive (receptive) grammar. How frequently they are going to be taught depends on curriculum-formal characteristics of language units. A term "lingua-realia" is related to disclosing target language structures. Choděra (2004) defines the term as realia which are closely linked to the language and jointly define what is being referred to and what is marked. In language practice it means learning/teaching a foreign language in comparison with a mother tongue (comparing target language units with native language units – as a tool for better understanding in the process of explanation – with the aim to achieve a certain goal).

Methods of teaching target language units

Methods could be classified as activities that help learners to acquire knowledge or develop their abilities. In a narrow sense, they may be considered tools to educate and make learning/teaching more effective, dynamic and vital. They are of a great priority – educational results depend on the teacher´s choice of a teaching method and the choice depends on certain teaching conditions. In a broad sense, we may consider methods as methodological approaches towards teaching – direct or indirect known also as grammar-translation method. Language education prefers a (direct) communicative method that leads to pragmatic goals of education, functional use of language units related to different communicative needs (thematically presented parts) and moreover concentration on language skills in language practice (tasks and exercises aimed at lexical, morphological and syntactical training). Nowadays, communicative approach has been manifested in activating methods that cover problem solving teaching and teaching through experience and didactic games. Frequently used and most common and preferred ones within Slovak language teaching are: *problem solving teaching* → a creative dialogue (in a closed circle, students speak, react, respond teacher´s motivating questions related to a recently read text); "Six thinking hats" (different attitudes towards a problem – from various perspectives); project method (creating a project means solving issues of a certain topic). *Experiental learning/teaching* (based on learning through a direct experience) → role plays (simulating a certain situation); brainstorming (producing ideas even though they sometimes – in the beginning - seem to be unrelated); "accuse – advocate – judge" (argumentations of people as if on the court); "Cinquain" (a five-verse poem on a certain topic with a defined process of creation – form the point of view of form and content). Opposing those methods, there are non-direct ones: when in a foreign language education a target language is compared to a mother tongue and grammar explanation is present. The result is the prime achievement of a language competence which does not always need to be a communicative competence (especially when foreign language acquisition). " ...to be communicatively competent does not cover only accurate and grammatically, stylistically and lexically correct expressions – moreover, the use of other devices is important, such as non-verbal communication (mimics, gestures, body language, haptics), distinction between formal and informal language according to a setting in which a conversation is carried out, according to participants of the conversation, or the topic/content of communication. It is essential to distinguish between oral and written discourse and keep in mind many other elements in various interactive situations. Here we also count the ability to pass information and express it with the use of graphs, symbols (numbers, musical notes), pictures and drawings; ability to communicate through information technologies, to present information, explain and clarify it in an understandable way; ability to listen actively; to read with comprehension and the skill to process facts/information" (Smetanová, 2012, p. 98).

The border between direct and indirect methods is not clear and is mostly defined by frequency of a preferred symbol according to Hellmich´s bipolarity of couples (1968) of methods direct and indirect. For instance, in a direct method there is a preference of a sentence to a word. Also it is preferred a situation, function and intention to the system (strauctures), speech to language and syntagmatics and paradigmatics, synthesis to analysis, induction to deduction, a spoken language to a written one, avoiding translation and comparison with mother tongue. Other preferences are: working with texts, practice (pragmatically oriented teaching) to the theory, content to form. Such bipolarity does not exclude preferences of direct methods in second language education,

on the contrary, it confirms the need and necessity of existence and application of both of the methods in the educational process. Such a compromise could be a mix of the methods that ingrates both parts of direct and indirect methods: communicative-functional and situational-thematic parts and at the same time a part of system-structure. The parts of direct method prevail also in mixed methods.

The aim of training teachers of the Slovak language and Slovak literature with a minority language of instruction is to show the bipolarity of preferred symbols and signs within a certain teaching method and the uniqueness of a current pedagogical-methodological situation. The selection of a method must be modified to the content, students, teachers (and their experience) and last but not least to teaching aids and technology that the teacher has to their disposal as well as to the form of teaching because without a carefully chosen and used teaching method the teacher cannot achieve the goals that are set (Hincová – Húsková, 2011, p. 25).

The possibilities to learn languages have contributed and visibly changed and developed advance information-communication technologies. We may speak about the so called digital books and e-learning/teaching. These forms support an idea of language education: to be able to learn a language in a flexible and effective way, to gain a communicative competence to react when in interaction with others. ICT are essential when teaching Slovak, however only when their implementing is not purposeless and that the teacher respects the requirement of certain extend and balance when choosing methodological processes (Luptáková, 2013, p. 3; source: http://www.jazyk-literatura-komunikace.cz/index.php/2-2013/category/23-clanky). Another method is connected with the usage of ICT in language education – audio-oral or audio-lingual method. This one prefers listening to oral performances in order to gain new communicative habits through presented language sources. Most often the teacher – who acts as a native speaker – becomes a model, however, other technologies, such as CDs are used as well – those are parts of textbooks for schools with minority language of instruction. The aim of such oral performances is to help students understand texts that are not spoken by their teacher.

Application of teaching methods when teaching Slovak as a mother tongue or as a second language is crucial. Those methods are modified and changed according to growing requirements and needs of learners when acquiring the language. This is the reason why Slovak language and literature teacher training becomes uniform – those who are going to teach at schools with Slovak language of instruction and those who are trained to be teachers at schools with minority language of instruction. As those languages are very specific and typologically different from Slovak, it is necessary to take a completely different approach to creation of school curricula that cover basic goals and structures of selected syllabuses. These documents also serve as a base for textbooks and methodological guides for teachers who apply and use them in the educational process. When creating didactic tools and aids, partly principles for creating textbooks for foreign language education and generally principles for managing foreign language education are used. Those meet the requirements to reach the goal of foreign language education: to be able to use a target language in various language environments – it means to gain a communicative competence. That is why methods which support oral communication are preferred which leads to weaken formal grammar and do not prefer isolated written translations into a mother tongue. The direct method is the centre of teachers´ attention – focused on communication – to grammar-translation method focused on form and structure. When Slovak is taught to foreigners, a modification of the direct Berlitz method is used, the one which has a system of ready-prepared communicative models of acquisition, grammar knowledge is not a direct part of teaching, rules are acquired based on imitation (Pekarovičová, 2004). Because this type of language education is very specific – the target language is a majority group language, learners are those whose mother tongue is a minority language and their levels of the target language differ from one to another – the most natural and effective method we suggest is the mixed (eclectic) method. It consists of the direct communicative method and grammar-translating method based on grammar rules explanation and acquisition of grammar structure through reading and translating texts in a target language and analysis of language phenomena that are present in the texts. Learners gain a grammar competence. In a communicative direct method, work with various types of texts is preferred – and those ones become topical for discussions and dialogues. Through role plays and imitating/simulating various communicative situations learners acquire the language and gain a communicative competence. As this is a mixed method, grammar structures in presented texts play their key roles. Textbooks for secondary schools are designed isolated in three separate/individual blocks: conversation – grammar – composition writing. They assume that secondary schools minority students already have a certain level of the target language. When textbooks are created, mother tongue methodology as well as a foreign language methodology uses the inductive-deductive approach and grammar phenomena are applied in basic texts. The authors of the textbook "Slovo za slovom" (translated: "Word by word") Tibenská and Zatkalíková (2007) have applied a specific way of processing individual topics and units. Their textbook focuses on Slovak as a target language and it is based on mutual linking of lexical and grammar elements and on their development and fixing through the method of gradual steps (confirmation of gained knowledge and adding new one as a spiral). In the beginning, learners are aware of a communicative purpose of the text, later they acquire model communicative situations in interactive exercises. Only after that they are aware of individual language phenomena applied and used in the texts and could practise them in their own language structures or

full texts or in grammar focussed exercise and tasks.

Conclusion

Because of a specific form of the Slovak language, it is necessary to devote a special attention to morphology when teaching Slovak to foreigners. Many pedagogical research and studies show deficiencies in creating grammar structures in language practice but also insufficiencies to use vocabulary appropriately to a communicative situation and incorrect sentences from stylistic and formal points of views. This reflects the fact that teachers – mediators of foreign language education – do not have enough experience with teaching Slovak using foreign language teaching methods. It is also because of the fact that teachers have many times problems to explain a language issue in the Slovak (target) language and use their mother tongue (language of their students) instead. However, this kind of code switching does not correspond with requirements connected with a target language acquisition. It is because languages (taught and learnt) are typologically and genealogically different and very specific. That is why it is necessary to process and create methodology of the Slovak language and Slovak literature with minority language of instruction that would serve as a subject of applied linguistics. Here, the need to teacher training will be highlighted – especially through methods of foreign language teaching. The principle of forms and working methods application, typical for foreign language education, is not the only postulate when teaching Slovak as a second language. The change should be related to making the whole educational process more effective – regarding goals, methods and forms of teaching and their usage in language education.

Minority languages in Slovakia could be arranged into two categories according to typology of languages: in Slavic languages (Czech, Ukrainian, Ruthenian, Polish and Russian) and non-Slavic languages (Hungarian, German, Roman). The Slavic languages have inflections in their grammar forms, on the contrary the Hungarian language (which is mostly spread in Slovakia) does not inflect at all and that is why this phenomenon is absolutely new for Hungarian learners of Slovak. This is the reason we ask to strengthen a formal-grammar approach not only in textbooks but also generally in the teaching process. Exercises focus on determining, selection or creation of a grammar structure. After communicative-grammar knowledge acquisition learners learn general knowledge (in the process of deduction). This step is strengthen in textbooks for primary schools through the final (formal-grammar) text called “Čo ja viem” (translated: “What I know”). Here are rules, principles and definitions of language terminology formulated. Without such formulations, learners would not be able to create (analogically) texts necessary for language practice. Or perhaps their texts would be incorrect and communicatively non-functional. That is why the presence of a mediator in the language education is crucial and a natural bilingual environment is not sufficient.

References

Gregorík, P. (2014) Problémy s určovaním vetnočlenskej platnosti v školskej praxi a maturitnom testovaní. In: *Jazyk – literatura – komunikace*. Olomouc: Katedra českého jazyka a literatury Pedagogické fakulty Univerzity Palackého v Olomouci, 2014-1, ISSN 1805-689X. http://www.jazyk-literatura-komunikace.cz/index.php/1-2014/category/27-clanky.

Hincová, K. – Húsková, A. (2011) Metodika výučby slovenského jazyka a literatúry v rámci nových pedagogických dokumentov. Bratislava: Metodicko-pedagogické centrum. 61 s.

Luptáková, V. (2013) Tradičné vs. moderné prístupy vo vyučovaní slovenského jazyka. In: *Jazyk - literatura - komunikace.* Olomouc: Katedra českého jazyka a literatury Pedagogické fakulty Univerzity Palackého v Olomouci, 2013-2, ISSN 1805-689X, 5 s. http://www.jazyk-literatura-komunikace.cz/index.php/2-2013/category/23-clanky

Pekarovičová, J. (2004) *Slovenčina ako cudzí jazyk : predmet aplikovanej lingvistiky.* Bratislava: Stimul. 208 s.

Píšová, J. (2013) Potreba vysokoškolskej prípravy budúcich učiteľov slovenského jazyka a literatúry na ZŠ a SŠ s vyučovacím jazykom národnostných menšín. In: *Jazyk - literatura - komunikace.* Olomouc: Katedra českého jazyka a literatury Pedagogické fakulty Univerzity Palackého v Olomouci, 2013-2, ISSN 1805-689X, 5 s. zdroj: http://www.jazyk-literatura-komunikace.cz/index.php/2-2013/category/23-clanky.

Choděra, R. (2004) *Didaktika cizích jazyků : úvod do vědního odboru.* Praha: Akademia.

Tibenská, E. – Zatkalíková, M. (2007) *Slovenčina slovo za slovom.* Metodická príručka. Viedeň: EDQ Zentrum. 103 s.

Smetanová, E. (2012): Language competence and its evaluation. In: *Interdisciplinary aspects of language study.* Davle : Kernberg, 2012. ISBN 978-80-87168-18-9, S. 96-103.

http://www.coe.int/t/dg4/linguistic/source/framework_en.pdf

Icons and Icons: New Paradigms In Interface Design

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Abstract: The use of icons in the visual communication of computer languages has recently increased in quantity and complexity with the widespread proliferation of icons in mobile dispositives such as smart phones, ipads, etc. Icon designers and analysts, however, seem to underestimate the semiotic and rhetorical implications in the representation of icons, the subsumed syntax leading to easy or difficult dialogue in iconic communication, the need for an architectural representation of iconic contents. I shall analyse terminological phallacies and conceptual limitations of present interpretations in icons usability and provide a possible further interpretation on the basis of semiotic, linguistic, rhetorical assumptions and related syntax. In particular I shall propose a syntactic interpretation based on the relation between metaphors and metonymies in iconic representation needed to validate the results of comprehension tests.

Key words: metonymic and metaphoric icons, semiotic and rhetorical interface design, iconic syntactic structures.

Introduction

The pioneering analysis of interface design by Nadin has put forward a number of basic issues of the semiotic perspective as he declared that "design principles are semiotic by nature" (Nadin, 1988, p.270). We leave aside the debate on the distinction between 'concrete' and 'abstract' in philosophy and linguistics, and turn to Nadin who introduced the opposition of *concrete* versus *abstract* icons.The visual representation may vary from the 'concrete' (namely pictograhic) representation of computer objects/functionalities to the abstract representation of the same (Nadin, 1988, pp. 283-284). The representations, moreover, can be realized as iconic, indexical or symbolic signs following Peirce's triad (Nadin, 1988, pp. 270-271). In this perspective, an object can be represented iconically, if the representation is based on resemblance, likeness; indexically if the representation is causally influenced by the object and symbolically when representation is based on convention (Nadin, 1988, p.270).

Concrete versus abstract, iconic versus symbolic signs

A first terminological check questions the definitions of concrete versus abstract icons and the related quality of iconic representation, as we shall see later on.
The Neozelandese school has widened Nadin's analysis of visual communication in the computer language (Ferreira, 2004, Ferreira, Noble, Biddle, 2005) according to semiotic and rhetoric criteria.
On the one hand, they apply the peircian triadic articulation of signs in icons, indexes and symbols to the analyses of icons in computer interaction using the distinction between *iconic* and *symbolic icons*.
On the other hand, they propose the interpretation of visual representations in interface design by applying the typology of language metaphors as cognitive devices put forward in 1980 by Lakoff and Johnson (2007) to graphic interfaces (Barr, Khaled , Noble & Biddle, 2005).
Dormann (1994) recalls Nadin's interpretation and proposes a typology of mechanisms of construction of *compound icons* to be considered as the 'syntax'of the iconic language.

These and other analyses, however, do not allow for an explanation of why certain icons in computer and mobile interfaces are understood better than others by users (Ferreira, Noble, Biddle, 2006; Gatsou, Politis, Zevgolis 2012).

The common generalization of the results of intuitive tests as administered to diverse targets of users in different studies on the basis of the concrete/abstract and the iconic/symbolic opposition seems to confirm a better usability of 'concrete' icons against a loose usability of 'abstract' ones with the only debatable specification that concrete and iconic signs would be closer to the object/function they represent, in a sort of tautological loop.

The degree of likeness of the icon to the represented object is called *articulatory distance* and implies the obvious consideration that the designer's intended meaning should coincide with the user's comprehension. What is not explained is the correspondence of an 'object' (?) with a 'function' and their translation into an iconic representation: in other words why should the icon of a printer stand for 'printing' or that of scissors fo 'cutting'.

In the above mentioned assumptions the assimilation of the notion of'concrete' to that of 'iconic' icons as well as the correlation of 'abstract' with 'symbolic' signs to be tested for comprehension is proposed. However the choice of the tested visual items appears as an arbitrary option. The assumption goes together with the obvious consideration that familiarity and previous knowledge of icons, both abstract and concrete, by users is an important variable in comprehension results: a statement that coincides with Nadin's view that the user must understand the computer language in order to use it.

Computer language is a specific language with rules such as the association of certain actions with certain icons, their syntax or else the logical structure underlying the interface.

The diffusion of fuzzy concepts such as *concrete* versus *abstract*, *iconic* versus *symbolic signs* does not help to detect specific rules in iconic communication and is not justified by the corpora of icons proposed to illustrate them. The use of these concepts explains the unsatisfactory and conflicting results in intuitive tests of icons comprehension as stated above (Ferreira, 2004, Ferreira, Noble, Biddle 2006, Gatsou, Politis, Zevgolis, 2012).

I believe the reason lies in a limited exploitation of semiotic and rethorical mechanisms involved in visual communication that specify the syntactic iconic structure underlying images.

The overall question concerns the feasability of iconic communication through new icons, whether concrete or abstract, whose meaning be not specified by linguistic means, namely the labelling of intended meaning, in order to be memorized and conventionally recalled by users.

This implies the differential ease in intuitive recognition and memorization of new icons and whether or not the verbal language is always needed as a metalinguistic support to visual communication (Zuanelli, 2012).

In order to identify the phallacy of simplified interpretations I shall briefly recall approaches, analyses and solutions to pass on to a different position. I shall first recall Nadin's distinction between concrete and abstract icons and the triadic peircian articulation of signs in icons/indexes/symbols as applied to the analysis of interface design.

According to Nadin and the peircian triad of signs, the representation of iconic entities may be articulated as follows. The example concerns the representation of a pocket 'calculator'.The image seems to maintain certain visual features of the object in the real world, namely some quality of the physical object to which the image is related according to Peirce's assumptions.

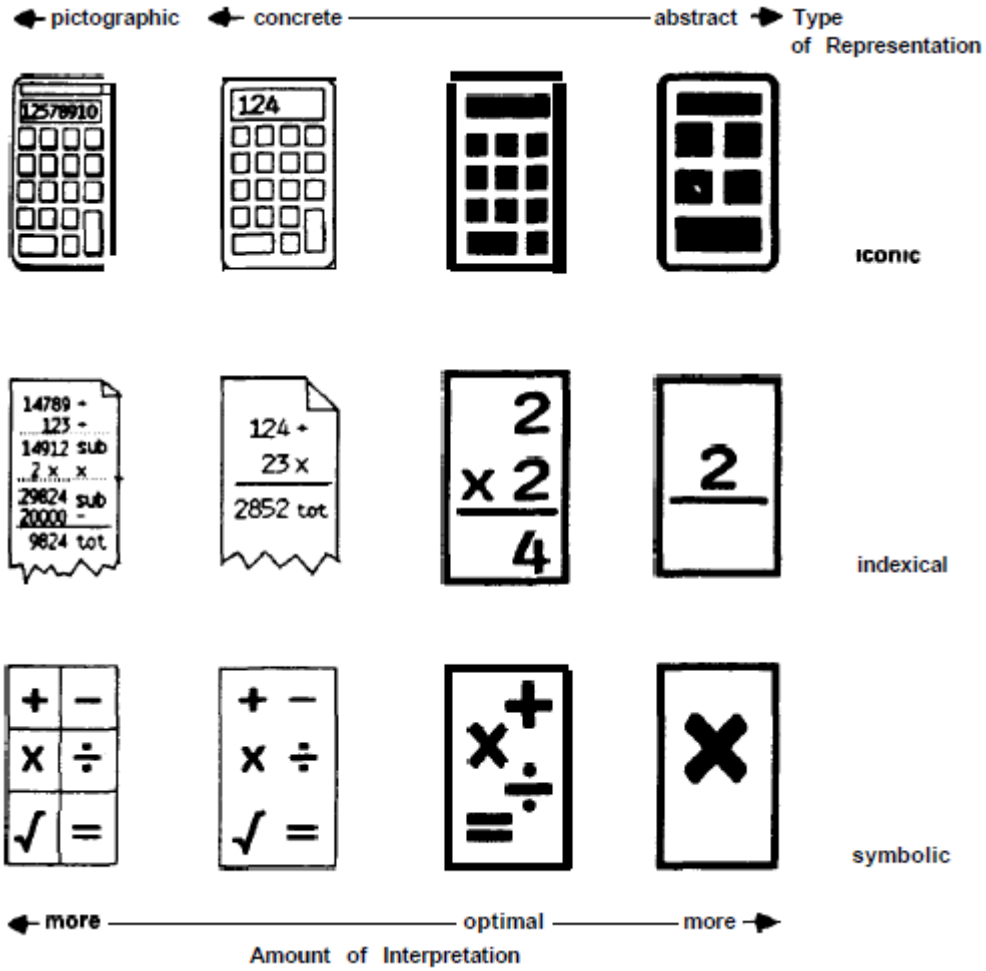

Figure 1: Nadin's representation of visual signs (1988)

The range of visual representations of the same virtualized object/function proposed by Nadin goes from a pictographic representation which is considered to be concrete and iconic to a gradual simplification of the graphic rendering of the same object down to a so called abstract representation which is considered to be symbolic. The same concrete/abstract distinction applies to the indexical and the symbolic representation of the object. Nadin's interpretation elicits a number of questions.

First, we can observe that the reduction of graphic details in the four items of the first row from concrete to abstract in the iconic representation still releases a concrete, almost figurative realization in the abstract icon too. In the abstract iconic representation, in fact, we can still guess the identification of the virtual object 'calculator' through essential features such as the rectangular shape, the proportion of lines and the articulation of square boxes/buttons inside the rectangular figure. A possible ambiguity is present in items three and four of the row where the lack of numbers that refer implicitly to operations might elicit other interpretations of the object/functionality if the icon were taken outside a specific context, namely the reference to a TV remote control dispositive or a cellular phone. Therefore, beside the shape and the boxes, the third visual information clue seems to be the presence of numbers and their metonymic/indexical relation as referred to operations in a calculator: 'if numbers on an object then digital operations through a calculator' since numbers are metonymically implied in operations and the tool for this action is a calculator.

Visual metaphors and metonymies

At this point, let me introduce, the concept of *visual metonymy* to explain the correlation of icons with the intended meanings.

In the essay on translation Jakobson evokes the semiotic nature of the verbal language, indirectly quoting Peirce by referring to the fact that the meaning of a word is its transposition into another sign that can replace it more completely (Jakobson, 1966 a, p. 57). He defines the *intersemiotic translation* as the interpretation of verbal signs by means of non verbal sign systems.

In another famous essay on aphasia (Jakobson, 1966 b) he introduces the semantic distinction between the metaphorical and the metonymic orientations in language constructions referring to the relation of one theme with another by *similarity* (typical of metaphors) and *contiguity* (typical of metonymy). The verbal metonimy presents a semantic contiguity with the verbal item it stands for, for instance the part for the whole, the tool for the action, the container for the content. The contiguity concerns position that is the syntax/combination of words. If we accept this analysis we can define a metonymy as the replacement of an expression with another semantically related to it by contiguity that is by means of a syntactic relation. What is implied is that the meaning of a metonymy requires a syntactic analysis that specifies the relation.

Let us apply these assumptions to the intersemiotic translation namely from words to icons through the metaphorical (substitution) and the metonymic (combination) relations and return to the calculator example.

The visual component,'numbers', is a doubly indexical/metonymic clue, meaning 'if numbers then mathematical operations' and 'if mathematical operations then the tool calculator'. The conclusion would be that the first and the second image are 'concrete' as far as the iconic metaphor of a calculator is accomplished through the presence of an additional clue, numbers, that is not available in the third and the fourth items of the row, being insignificant the number and the types of boxes inside the rectangular shape for an unambiguous interpretation. A direct implication would be that in concrete representations of interface design for a virtual calculator, essential and *distinctive* graphic clues are needed as compared with a general photographic or pictographic miniaturized iconic representation.

A second observation concerns the indexical representations in the second row. The first three items are really indexical, 'if mathematical operations on a sheet then an implicit activity of calculus and a virtual tool for operations' that is a virtual calculator, whereas the last item of the row would very doubtedly be understood as an operation and could only be considered a symbol for operations through a visual convention. Two further details are offered for items one and two of the indexical row, namely the sheet/file. The sheet adds an indexical detail: the virtual sheet for operations is the indexical realization of the 'concrete' sign/function, operations written on a piece of paper, to be virtualized in a further metonymic assumption namely the translation from the virtualized sheet to the implicit tool/calculator display. This indexical clue is not present in the two other images.

The third row poses a different question consisting in the arbitrary nature of symbols as historically discussed by Peirce and Saussure (Peirce, 1998, Saussure, 1972, Zuanelli, 2012). If a symbol is originally arbitrary and can be interpreted only by means of convention, the four images are not properly symbols, unless they be conventionally used as such. In fact, the three items are rather indexical whereas the 'abstract' quality of the image should be originally unmotivated and conventional in order to be a symbol, at least according to Saussure. The different nature of symbols is the basic distinction between the verbal and the iconic language.

The complex relational structure of iconic *semes*, defined here as the pertinent and distinctive graphic components of the icon, becomes evident and blurs the notion of concrete representations as opposed to abstract ones of the types we have examined. Either we accept the fact that abstract icons coincide with an originally arbitrary representation of symbolic icons that only communicative digital conventions can turn into symbols or admit that a symbolic sign may be as concrete as an iconic one and this assumption would blur the distinction between iconic and symbolic signs, given the fact that both must be conventionally recognized as such. In other words, we must accept the fact that iconic symbols are not necessarily arbitrary at their origin as words are. The symbol of justice, a humanized female figure that holds a scale, has an undoubtful metaphoric and metonymic meaning that was conventionally assumed whereas the symbol/word 'justice' does not present inherent properties of the concept of justice in its *signifiant* that could have been originally a totally different string of phones/sounds. We must also face the problem of the introduction of new icons whose not 'figurative' quality does not correspond yet to a conventional meaning. In other words 'figurative' signs related to objects/functions seem to elicit complex semantic structures that lead to comprehension through metaphoric and metonymic translation, which is not the case with 'abstract' non figurative signs. If this is the assumption, we can revisit the results of intuition tests formulated according to the opposition of iconic versus symbolic signs, concrete versus abstract ones, as we shall see. In order to do that, we must deal with another problem: the syntactic difference between *single* and *compound* icons. Finally, we need to distinguish among typological sets of computer functionalities recalled by icons to be interpreted in different ways according to context, namely their being system icons or application icons or state icons. In order to anwer these questions we formulate the hypothesis of the existence of an implicit verbal syntax under the iconic representations that mediates and conditions their comprehension. Let me come to the point.

Single and compound icons: a syntactic analysis

In a previous analysis of mine, I had recalled the fact that icons as present in graphic user interfaces (GUIs) inform us of two basic things.

First, icons and words define both the *context of interaction* and the *actions* suggested for interaction to users in the computer dialogue. The context is generally rendered through visual environment metaphors and verbal labelling as in menus and functionalities/actions are conferred to visual metaphors/metonymies usually verbally defined. Second, graphic interfaces use different functional typologies of visual information: graphs, icons, colors, space, etc. with the implication that *concrete icons*, which I had rather called *figurative icons*, as we have seen, are better understood than *abstract* or new ones (Dormann, 1994, Ferreira, 2004, Zuanelli, 2012, 2013).

As a second assumption, both single and compound icons imply a verbal syntax where the verb/action, as in a prefix rule, is evocated by an iconic metonymy: the visual tool 'printer' for the action of printing, the visual object 'sheet' for the action of opening a file. The implied iconic verbal linear syntax would appear as follows:

Verb (either iconically implicit or explicit) + **Object** or **Complement**

The synopsis of Microsoft Windows Word and Outlook Express presents a linguistic syntactic typology that refers to the conceptualization of contents identifying digital functionalities.

Types of icon	Iconic metaphors	Syntactic relations in icons	Linguistic syntactic relations	Abbreviated syntactic relations
TYPE 1 	single concrete icon **iconic metaphor** FILE	object (file) for action (open) (**syntactic metonymy)**	verb ellipsis +object	**(V) O**
TYPE 2 	single concrete icon **iconic metaphor** SCISSORS	tool (scissors) for action (cut) (**index/syntactic metonymy**)	verb derived from name/iconic metonymy+object ellipsis	**N V (O)**
TYPE 3 	single abstract icon **(conventional iconic orientation metonymy**) ARROW	graphic **symbo**l (arrow) for action (cancel) (**symbol/syntactic metonymy)**	verb+object ellipsis	**V (O)**
TYPE 4 	composite abstract icon **(conventional orientation metonymy)** ARROW + concrete icon (envelope)+ abstract composite icon (electronic address symbol over paper/email) (**conventional orientation metonymy/composite icon**) ENVELOPE and EMAIL	graphic **symbol** (arrow) for action (**symbol/ sintactic metonymy + object** and **modifier** (electronic envelope) (web address symbol)	verb+object	**V NN →VO**
TYPE 5	same concrete icons/duplication (**metaphors**) WRITTEN SHEETS	**duplicated icon** for action (copy) **(sintactic metonymy) +** object (sheets**/iconic metaphor)**	verb and iconic object coincide	**NNVO**
TYPE 6 	abstract icon and concrete icon (**metonymy/metaphor**) ARROW + FOLDER	**graphic symbol** for action (open) object of action (**iconic metaphor**)	verb and object	**V O**

Figure 2: Iconic syntax (Zuanelli, 2013)

The functionalities are translated into the iconic language by means of rhetoric-semiotic mechanisms. In the synoptic table, types correspond to 'concrete' and/or 'abstract'/conventional icons, single and compound, namely two or more visual signs.The composition of icons, two or more, is realized through a horizontal or a vertical spatial location, juxtaposition or superimposition of iconic signs. Even when superimposed, the compound icons correspond to a linear syntactic sequence mutuated from the English language.

In Type 3 we can observe that the 'symbolic' icon arrow for the verb 'delete', as stated above, contains a double metonymy: the 'return' action that implies the action of 'deletion' in an indexical causal extension: 'if virtual return then delete'. Moreover the semiotic value of the arrow varies as related to the implied syntactic context and composition: in Type 4 the arrow means 'send' whereas the doubly oriented arrow in email means 'send and receive'.

As a conclusion, the intersemiotic metaphor from the verbal to the iconic code by means of a 'concrete' or an 'abstract' icon coincides with a specific structure where the concrete image is an icon that in Peirce's approach has a physical qualitative resemblance to the virtual object it represents, as well as an index/metonymy based not only on the causal relation (if...then) but also on the semantic *contiguity* (Jakobson, p.40) typical of the metonymic relation, in general.

We may also assume that abstract concepts (such as 'justice', 'peace' or 'Internet', 'phone call') imply originally a verbal metonimy that is translated into a 'concrete' symbolic visual metaphor, the symbol for justice, peace, Internet, etc. and a visual metaphor of the verbal metonymy as in 'phone call' or 'message'.

Single versus compound icons: predicative or modifying structures

Among problems to be faced in this analysis we should now deal with the following issues: are single icons easier to understand then compound ones and concrete icons better then conventional or new abstract ones; are photographic iconic representations better than pictographic ones and do compound icons subsume the same syntactic structure as single ones? An overall question to be posed could be whether different subsumed syntactic structures imply different degrees of comprehension, namely if a Verb+Object structure is easier than a Verb+Complement structure. Now we can address these issues. Let me start with the first question concerning the structural quality of compound icons.

In her proposal of compound icons Dormann theorizes the existence of an 'iconic' syntax where the term syntax coincides with different ways of combining icons: *combination* (superimposition, conjunction, concatenation, juxtaposition), *transformation*, *derivation* and *inheritance*, *duplication*.

Figure 3: Examples of iconic combination (Nadin, 1994, p. 82)

These techniques, as she calls them, for creating compound icons are 'the syntax' (Dormann, 1994, p. 81).The visual techniques for different types of combination are represented above. Whilst examples of superimposition let understand that two icons are put together, one on top of the other, to create a new concept, concatenation can be described as the multiple duplication of the same icon on a vertical superimposition. Juxtaposition appears to be the composition of an icon with another one on a spatial coexistent area.

Whatever the combination, the important observation is that compound icons 2, 3 and 4 create a new conceptual entity: 'modem', 'stack', whereas items 1 and 5 correspond to a compound icon of a second type where one icon is the *modifier* of the other: idea 'of a stack', 'world wide' network according to the verbal syntax of the English language with left and right modification. In these cases, there is no *predicate syntax* but only a *word composition*. According to my analysis, the substantial matter is that different compound icons correspond to different syntactic functions: a *modifying function* and a *predicative function*. One way of considering icons and their functionalities would then be that the identification of different verbal structures subsumed by different types of compound icons is needed for comprehension.

In other words, we can make the guess that the meaning of compound icons is more difficult to retrieve, given the need to understand a different underlying syntactic structure: a predicative structure straightly related to the functionality as different from a modifying structure having to do with an adjectival/appositional and specificational property attributed to the object/function. Secondly, as evidentiated by various analyses, the

specific context of icons (static, system, application functions) would determine their proper comprehension, having to do as well with the familiarity/previous knowledge of the icons by users.

Predicative and modifying structures

Let us come to this point and have a look at *system icons*, both single and compound, to put forward examples of their different structure and check the double, often semantically ambiguous value of compound ones.
In the Control Panel of Microsoft Windows 98, the system icons are rendered through single and compound icons that correspond all to an implied generic function of 'management of programs' and have to do with the thematic contents of the implied function. Only a few verbal labels specify the kind of actions explicitly proposed to users even though the verbal labelling of functionalities does not correspond to an imperative/directive function but has to be considered as a *false imperative*, standing for a title of the function (Zuanelli, 2009). See, for instance **Add new Programs, Add and Remove Programs, Find Fast.** In these cases, the verbs represent thematic functionalities as confirmed by all the other nominal formulations of contents. They are *thematic labels* performing the titling function that includes a number of internal actions related to system, network and Internet functionalities.

Figure 4: Microsoft Windows 98 Control Panel

In the iconic presentation of the programs of the control panel, predicative structures and modifying syntactic structures are present. Let us comment a few cases.

In **Desktop Themes**, we can see the juxtaposition of four metaphoric/metonymic icons: the metonymic capital **A** standing for 'graphic letters', the metonymic **palette** standing for 'colours', the metonymic **megaphone** standing for 'sound', the background **computer screen** meaning the literal metaphorical concept of a computer screen.

In a syntactic iconic analysis we can interpret the three superimposed icons on the fourth one as 'manage the screen script, colour and sound'.The syncretic comprehension of the icons is facilitated by their concrete metonymic meaning and by a simple (V) + O relation, the object being the appositive modifying structure we have postulated ('screen script, colour and sound'). An intuitively simpler structure (V) + O is the case with **Mouse** whereas **Regional Settings** could hardly be understood iconically as such, due to the use of the globe as a conventional concrete symbol for the Internet, metonymically meaning instead 'geographic areas as part of the

globe'. A slightly more complicated analysis would be applied to **Find Fast** that presents an iconic modifying structure (Verb + Adverb) that would loosely correspond to the iconic representation that is proposed in a reverse order as 'fast find' (first the 'lightning' for 'fast' then the 'binocular' for 'find'). The iconic structure presents a rather complicated visual metonymy: the lightning icon standing for quick, 'fast' and the binocular virtual tool for 'finding'. A double metonymy is implied: 'a binocular for a magnified vision' as related to a 'tool for search' and 'if search then (possibly) find'. In this analysis we could wonder how many of the iconically synthesized functions represented in the table could have been interpreted without a verbal labelling. We could also wonder if the compound icons, as the case is with **Find Fast,** corresponding either to a verb (find), however placed iconically in a reverse position (fast find) and a modifying adverb (fast) or to an adjective + noun (iconically 'fast find') as applied to virtual contents, can be more intuitively understandable than a single object icon as the case is with **Mouse**, a literal iconic metaphor. The complex syntactic iconic structure for **Find Fast** as compared with **Mouse** would appear as follows.

Find Fast: the reverse order in the iconic representation

V + **Modifier** (adverb) + (**Object** implicit)

Fast Find: iconically correspondent

Modifier (adjective) + **Noun**
'fast search'

Mouse

(Verb) + **Object**
('manage') mouse'

Our conclusion, to be tested, is that compound icons subsume conceptually complex and at times ambiguous structures that require more processing time for the detection of their meaning as compared with the comprehension of single ones. Further difficulties derive from the creation of 'abstract contents' such as 'settings' rendered through a concretization of 'regional' into a globe metaphor and a misleading icon combination that implies a poor or unsatisfacory iconic rendering as the case is with **Regional Settings.** Moreover, the overall menu testifies the lack of an iconic logical architecture if compared with local menus of programs such as Word or Outlook express. In subsequent Microsoft examples the problem is faced by grouping icons according to a labelled content categorization.

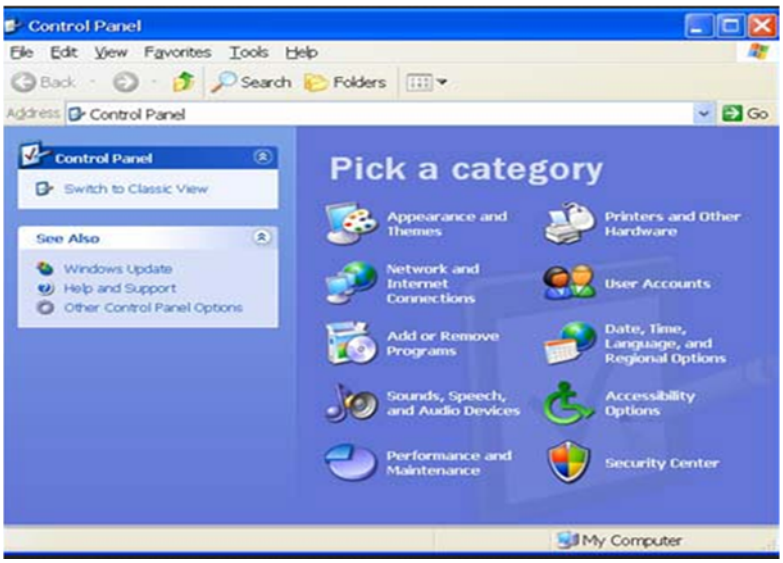

Figure 5: Microsoft Microsoft Windows XP Control Panel

The need for an architectural cognitive and functional iconic display and the choice of iconic solutions is dramatically evident if we pass on to mobile devices (smart phones, ipads, etc.) where the iconic mania is furiously fighting against the need for a simple comprehension of contens by users.
In the following example, the iconic language appears more and more as a mixture of conventional icons taken from other types of contents representations, new single and compound icons, and a multilingual combination of icons, verbal language, numbers.

Figure 6: Iphone 4

A quick look at this menu leaves us puzzled, both with single and compound icons, when labels are missing and system or network applications are not displayed in a structured scheme.

Let us conclude the analysis with a redefinition of the results of an intuitive test of mobile icons identification in order to verify our position.

A redefinition of results of mobile icons comprehension

In the application of the concrete/abstract opposition for mobile icons recognition, Gatsou, Politis, Zevgolis (2012) propose the following test and results.

Given a multiple representation of the same functionalities, according to different technological brands, tested through gender and age diversity as well, the authors offer results whose interpretation is given according to the concrete/abstract opposition.
Assuming as a reference parameter the percentage of correct guesses equal to 66% in order to consider icons as accepatable by ISO, according to their analysis, the results display a various range of comprehension problems, ranging from a poor visual rendering of the function to the assumed better performance of 'concrete' icons as compared with abstract ones.

No	A1	A2	A3	A4	A5	A6	A7	A7	
Phone book									
Recognition	56.7	63.3	78.3	30.3	56.7	56.7	40.7	70.0	
No	B1	B2	B3	B4	B5	B6	B7	B8	B9
Phone call									
Recognition	75.0	50.0	60.0	20.0	53.3	21.7	55.0	60.0	60.0
No	C1	C2	C3	C4	C5	C6			
Message									
Recognition	98.3	93.2	88.3	86.7	95.0	96.7			
No	D1	D2	D3	D4	D5	D6	D7	D8	
Setting									
Recognition	65.0	91.7	90.0	68.3	95.0	58.3	58.3	91.7	
No	E1	E2	E3	E4					
Camera									
Recognition	78.3	96.7	96.7	100.0					
No	F1	F2	F3	F4					
Clock									
Recognition	60.0	100.0	61.7	61.7					
No	G1	G2	G3	G4	G5	G6	G7	G8	G9
Internet									
Recognition	40.0	68.3	93.3	45.0	95.0	91.7	95.0	85.0	65.0
No	H1	H2	H3	H4	H5	H6			
Games									
Recognition	78.3	40.0	30.0	81.7	85.0	93.0			

Figure : 7 Gatsou, Politis, Zevgolis (2012)

In all cases we can observe that single icons score best. The same is true of concrete versus abstract conventional icons as the case is with the conventional 'abstract' **double arrow** in phone call and **the tools** (concrete and metonymic) in setting.

The best score is for **camera** and **clock** (100.0) where the implied syntactic structure is **(V) + O,** a literal metaphor of the type 'manage camera', 'manage clock' with no metonymic extension.

Summing up the results of our analysis, we can draw the following conclusions for new improved parameters in icons design.

Conclusions

In my analysis I have tried to demonstrate that the opposition concrete versus abstract icons and iconic versus symbolic icons needs redefinition. The following are the summarized lines of analysis that are needed to define new paradigms in interface design.

'Concrete' icons may refer to:

i. a physical object as a literal metaphoric transposition from the verbal referent to the iconic code as the case is with 'camera', 'clock', etc.;
ii. a physical object that is metonimically related to its referent as in 'file', 'scissors';
iii. an abstract concept metonymically related to a physical referent as the concrete envelope for 'mail' or the concrete telephone for 'telephone call'.

Abstract icons correspond to:

i. a conventional arbitrary graphic representation as in 'games' (H1);
ii. a conventional Logo such as the Microsoft, Apple, etc. symbols;
iii. a conventional symbol in the computer language: the 'globe' for Internet, the @ for the 'at' of email;
iv. conventional computer symbols belonging to other codes as the X for 'closing' or the arrow for 'orientation';
v. a totally new non conventionalized/arbitrary icon to be acquired as a symbol.

As a consequence, iconic and symbolic icons can both be 'concrete' according to the metaphoric and/or metonymic reference they imply.

As for single versus compound icons we may state that single icons imply a simpler predicative structure (Verb+Object, Verb+ Complement) whereas compound icons may imply an ambiguous modifying structure that possibly requires more processing time to be understood.

Finally, iconic concrete metaphors seem to guarantee a simpler translation when they do not require a further metonymic analysis as the case is with 'camera'or 'clock' that imply a (V)+O sintactic structure as compared with 'file', iconic metaphor of a phisycal sheet and metonymic syntactic extension for 'open file' (V)+ O or scissors for cutting (V)+C.

I consider this analysis a new prospective paradigm for interface design in iconic digital communication.

References

Barr P., Khaled R., NobleJ. & Biddle R. (2005). A taxonomic analysis of user-interface metaphors in the Microsoft Office project gallery. In M. Billinghurst & A. Cockburn (Eds.). Conferences in Research and Practice in Information Technology, Vol. 40. Newcastle, Australia: Australian Computer Society, Inc.

Dormann C. (1994). Self-explaining icons. In Digital creativity, 5, 81-85.

Ferreira J. (2004). Semiotic explorations in user interface design. Retrieved from www.mcs.vuw.ac.nz/comp/pdf.

Ferreira J., Noble J. and Biddle R. (2005).The semiotics of user centered design. Retrieved from www.mcs.vuw.ac.nz/~jennifer/chapter-iwos pdf.

Ferreira J., Noble J. & Biddle R. (2006). A case for iconic icons. In W. Piekarsky (Ed.). Conferences in Research and Practice,Vol. 50. Hobart, Australia: Australian Computer Society, Inc.

Gatsou C., Politis A. & Zevgolis D. (2012).The importance of mobile interface icons on user interaction. International journal of computer science and applications, Vol. 9 (3), 92 – 107.Technomathematics Research Foundation.

Jakobson R. (1966 a). Aspetti linguistici della traduzione. In R. Jakobson., Saggi di linguistica generale (pp. 56-76), transl.from English by L. Heilmann & L. Grassi. Milan: Feltrinelli.

_____ (1966 b). Due aspetti del linguaggio e due tipi di afasia. In R. Jakobson, Saggi di linguistica generale (pp. 22-45), transl. from English by L. Heilmann & L. Grassi. Milan: Feltrinelli.

Lakoff G. & Johnson M. (1988). Metafora e vita quotidiana. Transl. from English 2007. Milan: Bompiani.

Nadin M. (1988). Interface design: a semiotic paradigm. Semiotica, 69 (3-4), 269-302.

Peirce C.S. (1998).The essential Peirce, Vol. 2. Bloomington: Indiana University Press, Peirce Edition Project.

de Saussure F. (1972). Corso di linguistica generale (3rd ed.). Transl. From French by T. De Mauro. Rome: Laterza

Zuanelli E. (2009). Comunicazione digitale. Un approccio semiologico linguistico. Rome: Colombo.

Zuanelli E. (2012). Progettazione dei siti: la prospettiva semiologica. In E. Zuanelli (Ed.), Comunicazione digitale e comunicazione in Rete (pp. 211-242). Rome: Aracne.

Zuanelli E. (2013). Elearning content 'usability': semiotic and didactic parameters in digital texts and textuality, Procedia - Social and Behavioral Sciences 106, 1039 – 1049.

Is IBL (Inquiry based learning) Helping Zayed University Students Acquire Scientific Skills In A General Science Course?

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Abstract The purpose of this work is to investigate if higher education students can develop scientific skills throughout the learning process supported by the approach of inquiry based learning (IBL). This method has been known to be a process where students have the chance to formulate questions, investigate to look for answers and earn new meanings and knowledge. This study suggests that IBL has considerable potential to create a non-traditional community for educational purposes. With the use of the IBL approach, Zayed University students have shown a good improvement within the area of scientific skills, and most important of all, students have shown a high level performance and course satisfaction.

Keywords: Scientific skills, Inquiry based learning approach (IBL), General education course.

Introduction

In the last two decades, higher education has known great changes, the main thrust in teaching is more on professional programs rather than knowledge based programs, and therefore a lot of concerns toward teaching effectiveness have been raised within many educational institutions around the world.(Biggs & Tang, 2011) In this regards, many approaches have been developed to improve the quality of higher education, to convert learning from teacher centered to student centered and to adopt interactive methods.(Justice, Rice, Roy, Hudspith, & Jenkins, 2009) These approaches have used several methods such as problem solving, problem based learning, project based learning and inquiry based learning.(Smith, Sheppard, Johnson, & Johnson, 2005) All these approaches suggested that opportunities for gaining a good understanding in higher education could be achieved via courses that use interactive methods.(Egenrieder, 2007) In fact, these comprehensive strategies allow students to work in groups and conduct investigations of real world topics. Students usually work over extended period of times to solve challenging questions or problems. Therefore students would be involved in the process by: designing and conducting investigations, gathering information, collecting data, asking questions, drawing conclusions based on their results and reporting their findings toward the end of their work.(Brickman, Gormally, Armstrong, & Hallar, 2009)

Inquiry-based learning (IBL) is a pedagogical approach, developed in 1960 as a trial to enhance new instructional methods against traditional forms of instruction that were primarily based on memorization.(Bruner, 1961) The main idea behind IBL is that students can generate information themselves and make sense out of it. Students are engaged with the content or the material, and come up with questions and investigate. The meaning constructed from an experience or experiment can be concluded individually or within groups.(Bächtold, 2013; ROTH & Jornet, 2014) The process of using the IBL approach involves many steps such as: developing questions, making observations, searching for related information, designing experiments and collecting data, analyzing and interpreting data, and finally concluding and outlining possible explanations and developing recommendations for future studies.(Haury, 1993) For science education, a lot of criticism was made about the fact that science courses were taught in a way that does not encourage thinking. John Dewey, a well-known scholar in the field of education, was the first to propose at the beginning of the 20th century that science should be presented to students as a process and way of thinking rather than a subject with facts to be memorized.(Loucks-Horsley & Olson, 2000) Furthermore, science courses lend by nature to investigation and collection of data, therefore the IBL approach was firstly adopted within the sciences' community.(Bianchini & Colburn, 2000; Crawford, 2007; Wood, 2003)

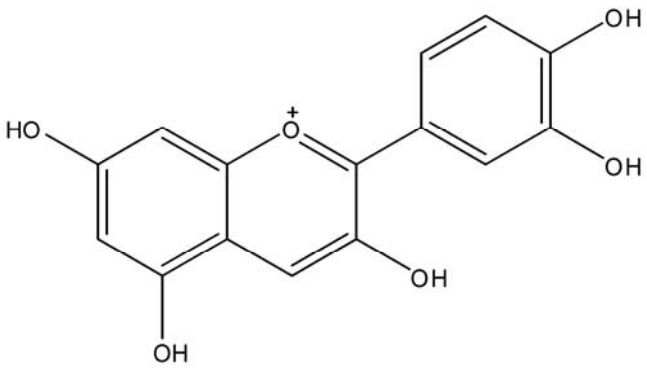
The main goal of this study was to investigate the important effect of IBL in promoting sciences' learning within undergraduate students' population at Zayed University. Students performance in the second

required science course (The introduction to the environemtal sciences) has been compared with that of students who did not take the first IBL science course. Three methods were used to evaluate the ouput of the study: class observation, grade's comparison and students' survey. And the reseeach results revealed that achievement in a general education science course of undergraduate students significally improved with the acquiring of sciences skills via inquiry based learning approach.

Study method

The sample of the study conducted at Zayed University, Dubai campus, UAE, consisted of a total of 77 (four sections) female students from the general education level (COL 165 course: The nature of science discovery). The inquiry based learning approach was used for a non- major introductory science course taken by all undergraduate students to fulfill the science general education requirement. The course was normally scheduled to meet two times a week for a period of 80 minutes each time. Course sections had in average 19 students. And, over consecutive semesters (Fall, spring and summer) of the academic year 2013-2014, data were collected. The students of the general education science course needed first to work on different scientific classroom activities that helped them acquire different scientific skills. They have started learning how to formulate scientific questions, how to make good qualitative and quantitative observations. Then the focus was to learn throughout designed activities how to come up with possible explanation by trying to find answers (Conjectures). Students then have been guided to come up with a testable hypothesis and to design experiments that will allow them to provide evidence for their chosen hypothesis. In this specific phase of the IBL course, students needed to be introduced to different types of variables (dependent variables, independent variables, fixed variables and controlled group). After few activities, where students had the chance to practice the above skills within a chemistry, physics or biology frame, they were able to start conducting scientific experiments. Students were ready to collect data, analyze and interpret it and conclude. Around the middle of the semester, students were ready to start working on a scientific project. Students were given the chance to choose a topic on their own, and start their scientific investigation. This assessment component has helped students put what they learned in action (Knowledge in action) and investigate something that interest them (Ownership of knowledge).

Example of scientific activities: The IBL approach is mainly based on designed activities where students learn through inquiries and investigating theses inquiries. For instance, one example of class activities conducted in the COL 165 course at Zayed University within the chemistry frame of the course, consisted on investigating the color change of a cyanidin solution. The main objective of the activity was to help students formulate scientific questions, make qualitative and quantitative observations and come up with conjectures. Students were given first cyanidin solution and they needed to add it to other different solutions. Students needed to come up with a question that implies the relationship between the cyanidin solution and the color change. After that, students needed to investigate more the chemical concept of the color change by trying specific solutions (Acid and alkali). At this moment, students started to come up with observations that address the link between the color change and the acidity of the solution. Most of the observations highlighted the fact that when cyanidin is added to acidic solutions, the color change is different compared to when the same cyanidin was added to alkali solutions. Yet within the same acidity, the color change was the same. At this phase of the activity, students needed to come up with conjectures and therefore needed to use their prior knowledge or start a search on the subject. At the end of the activity and based on the inquiry based learning approach, students had learned independently about indicators, natural indicator and artificial indicators, solution acidity, color change and pH. At this specific activity, students did not investigate further the color change concept, their main focus was not yet to provide evidence, it was rather to investigate based on formulating questions, making observations and coming up with conjectures. Later on during the semester, students needed to work on various investigations by using other skills that include hypothesis, experiment design, data collection and others.



Structure de cyanidin: 2-(3,4-Dihydroxy-phenyl)-3,5,7-trihydroxy-chromenylium

Study evaluation: Throughout the semester, general education students were observed inside the class and their involvement in various course activities (COL 165) was closely followed up. In addition, and toward the end of the fall semester, students were asked for their feedback concerning the course. Furthermore, and during the following semesters (spring and summer), grades of students who have taken the first science course (COL 165) then the second science course (COL 260) were investigated and a comparison between the performance in the second science course was conducted between this population of students and another population of students who took the second science course without taken the first science course. The figure below shows different component of the study's methodology.

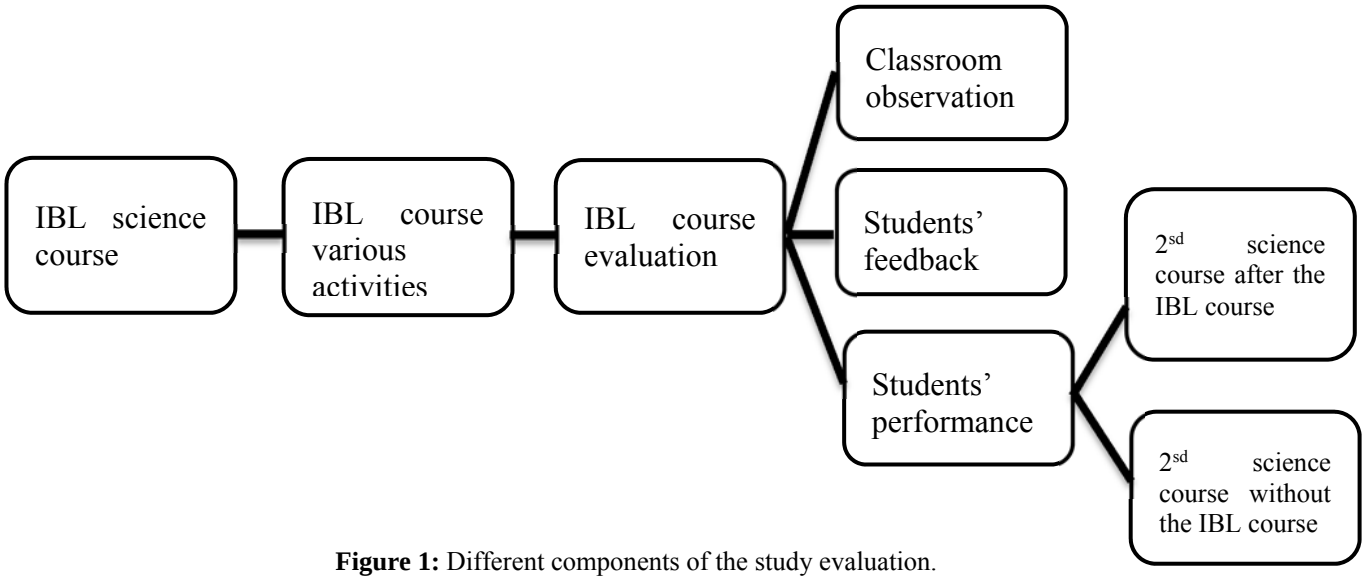


Figure 1: Different components of the study evaluation.

Results and discussion

In higher education, it has been proven that the success of using the approach of IBL within the instructing process is based on the practice nature of knowledge and learning, on the nature of the different activities, and finally on the knowledge integration. All of that has proved to overcome challenges of the learning process for university students. Using IBL, students normally use the scholarly and research practices to engage in a discipline or interdisciplinary activities or problems in a learning environment rich of challenge and support.(Li & Zhao, 2015) In a traditional general education science course, undergraduate students usually are presented with the contents of three different disciplines (chemistry, physics and biology). Different scientific concepts are discussed, and each part of the course is followed by a test. In the redesigned form of the course developed in Zayed University using the IBL approach, students need to work continuously to acquire scientific skills throughout various activities inside and outside the class. The assessment is not test driven, rather it is mostly based on scientific activities performed inside the class and an individual project. Achieving success in each part of the IBL course provided students with self-confidence and brought motivation and enthusiasm for the course.

In this work, the main objective behind using the inquiry based learning in a science subject, is to prove that designing course activities that are relevant and interesting can practically provide students with good opportunities to become independent learners. The students' population involved in this study is non-science major that implies that students had various levels at sciences and quantitative background. Teaching this heterogeneous group of students is known to be a very challenging task. However, if the IBL approach is used, every one of these students will be given a chance to contribute, and to develop skills depending on her abilities and understanding. Furthermore, and in addition to students acquiring many scientific skills, students can in parallel develop the skill of working with a clear objective (Knowledge in action) as well as the skill of working within groups. The first part of the study evaluation conducted in Zayed University in the Dubai campus, was based on classroom observation. Students' involvement in various activities inside the class has shown a positive improvement throughout the semester. Students have seemed to like different practical activities where they needed to work on their own and take responsibility of their own learning. Figure 2, shows that a good percent (64%) in the COL 165 course have loved working in different activities inside the classroom. Only 9% of the COL 165 students seemed not to agree about the usefulness of these various class activities. This finding is expected, as many students resist the change and like to learn in the same way previous generations had learned.

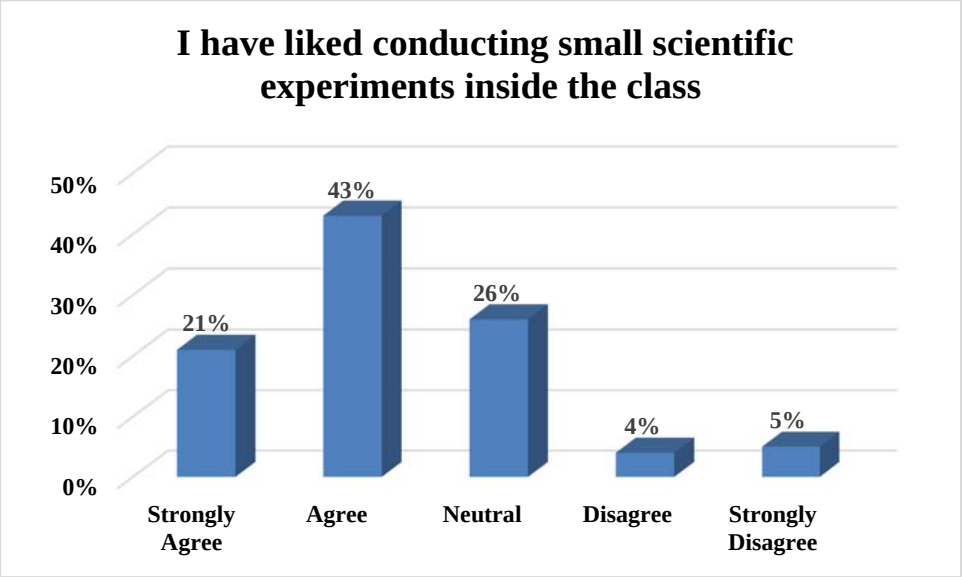


Figure2: Data reflecting students' involvement inside the class.

The second part of the study concentrated on evaluating the impact of the scientific skills that students have acquired in the COL 165 course on their performance in the second science course they need to take (COL 260) during the following semesters (Spring or summer). These students' performance was compared to that of students who did not take COL 165 but took directly COL 260. The table below presents grades comparison.

	Without COL165	With COL165
A	2%	28%
B	25%	43%
C	55%	15%
D	16%	13%
F	2%	2%

Table 1: Grades data for two categories of students. The first category forms students who have taken directly COL 260. The second category forms students who have taken COL 165 first then COL 260.

The table shows that students who have taken COL 165 course first then COL 260, as part of their sciences' requirement of the general education courses in the university, had performed better compared to students who took directly COL 260. The number of students who got A in the second science course has positively changed from 2% to 28%. The percent of students who got B in COL 260 has jumped from 25% for students who took directly the course as opposed to 43% for students who took first COL 165 then COL 260. For students who got C the number have dropped from 55% to 16%, and finally the number of students with D has dropped from 16% to 13%. This data that was collected from students who took COL 165 first during fall 2013 then COL 260 during spring- summer 2014 (64 students). The COL 260 data of students who did not take COL 165 was based on previous entries of students' grades during fall 2012, before the new science course was offered for general education students in Zayed University. The performance comparison shows clearly that students who took COL 165 first had performed better.

The last part of the study was based on student's feedback. At the end of the 2013 fall semester, an online survey was conducted for four sections of COL 165 of an average of 77 students. Figure 3 presents an example of students' answers.

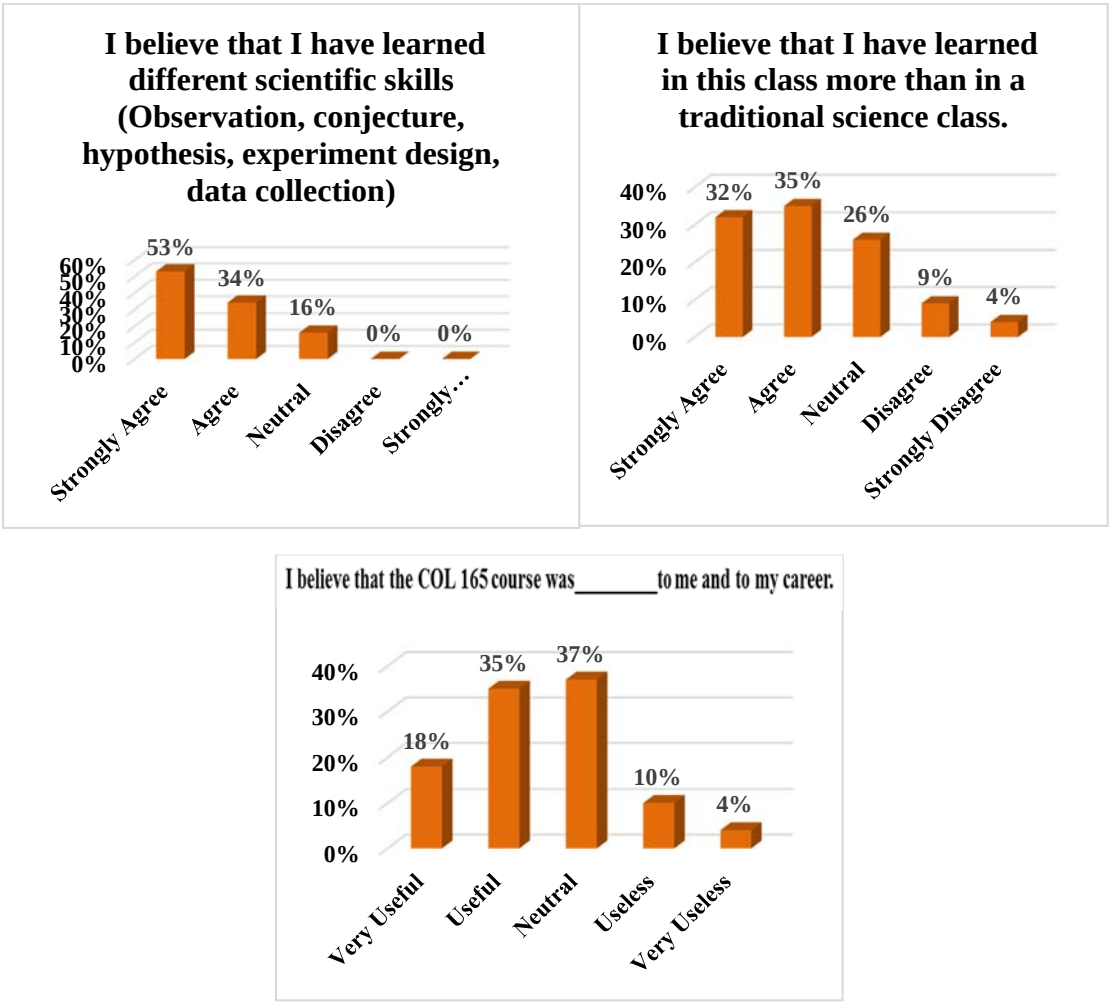


Figure 3: Students' feedback as per the COL 165 course. The online survey was conducted toward the end of the semester (Fall 2013)

The data shows that students were mostly positive about the IBL science course. Around 87% of students either strongly agree or agree about the fact that the course allow them to acquir scientific skills. A percent of around 70% believed that they have learned sciences in the IBL course better than in a traditional science course. Finally around 53% of students thought that the IBL science course was useful and would help them in their careers, while 37% of these students were neutral about that. As explained previousely, that will always be a population of students who would resist the change and would prefere to learn in a traditional teacher centered environment.

In addition to asking students for their feedback in my own sections (77 students in four different section of the COL 165 course). Students' feedback from other sections of the same course was used and a population of 50 students was asked for their feedback toward the end of spring 2014. Interesingly, similar patterns were obseved. Infact, across different sections of the COL 165 course, around 72% of students believed that IBL allowed them to acquire scientific skills. Students of different sections (54%) said that they have learned in the IBL medium more than a traditional environment. A percent of 46% thought that the IBL course was useful to them as well as to their carreers. Below is an example of students' feedback obtained from other COL 165 sections during spring 2014.

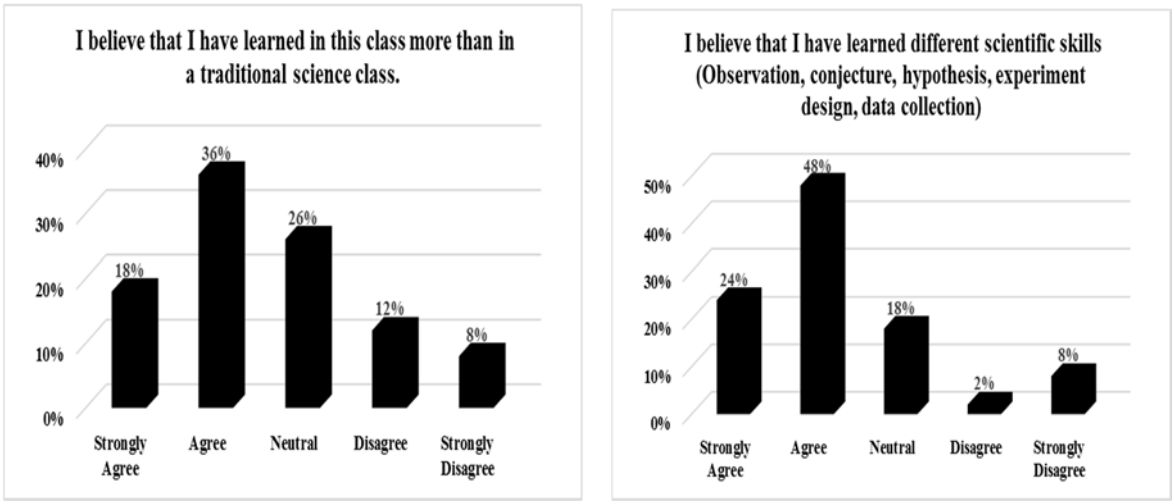


Figure 4: Students' feedback as per the COL 165 course. The online survey was conducted toward the end of the semester (Spring 2014)

Conclusions

This study has shown that inquiry based learning is an effective pedagogical approach in which students engage in intellectually challenging work that allow them to gain knowledge and skills. At Zayed University, IBL has enabled students of the first general education science course to work on real scientific cases, to quantify their funding and to comprehend the process of using the scientific method to investigate or solve a problem. The IBL course was designed to provide students with enjoyable and effective activities. Students have put their knowledge in action, they have practice how to make quantitative and qualitative observations, how to come up with good and relevant conjectures, how to make a testable hypothesis, how to design experiments to provide evidence for their hypothesis, how to collect data, analyze and interpret it and finally how to conclude. Students had afterwards the chance to practice these skills on an individual project of their own. The study evaluation has shown that the IBL approach was overall a positive experience for the general education students, classroom observation, students' performance and students' feedback has proved that university courses can be a good area for students to acquire scientific skills as well as knowledge in an interactive and student centered model. The approach should be used though carefully as skills can overtake the knowledge area of the course, therefore, classroom activities and different components of the course should be designed in a way that balances skills and knowledge. Finally, Zayed University can create an autonomous life-long learning environment by: Identifying learning objectives, employing non-traditional learning approaches such as IBL, using appropriate resources, training its faculties and spreading the awareness of the importance of the learning opportunities that exist inside classrooms.

Acknowledgements

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References

Bächtold, M. (2013). What do students "Construct" according to constructivism in science education? *Research in Science Education, 43*(6), 2477-2496.

Bianchini, J. A., & Colburn, A. (2000). Teaching the nature of science through inquiry to prospective elementary teachers: A tale of two researchers. *Journal of Research in Science Teaching, 37*(2), 177-209.

Biggs, J., & Tang, C. (2011). *Teaching for quality learning at university* McGraw-Hill International.

Brickman, P., Gormally, C., Armstrong, N., & Hallar, B. (2009). Effects of inquiry-based learning on students' science literacy skills and confidence. *International Journal for the Scholarship of Teaching and Learning, 3*(2), 1-22.

Bruner, J. S. (1961). The act of discovery. *Harvard Educational Review,*

Crawford, B. A. (2007). Learning to teach science as inquiry in the rough and tumble of practice. *Journal of Research in Science Teaching, 44*(4), 613-642.

Egenrieder, J. A. (2007). Community-focused, project-based learning to promote diversity in STEM. *Journal of Virginia Science Education, 1*(2), 5-16.

Haury, D. L. (1993). Teaching science through inquiry. ERIC/CSMEE digest.

Justice, C., Rice, J., Roy, D., Hudspith, B., & Jenkins, H. (2009). Inquiry-based learning in higher education: Administrators' perspectives on integrating inquiry pedagogy into the curriculum. *Higher Education, 58*(6), 841-855.

Li, M., & Zhao, Y. (2015). Exploring learning & teaching in higher education. *New Frontiers of Educational Research (,*

Loucks-Horsley, S., & Olson, S. (2000). *Inquiry and the national science education standards:: A guide for teaching and learning* National Academies Press.

ROTH, W., & Jornet, A. (2014). Toward a theory of experience. *Science Education, 98*(1), 106-126.

Smith, K. A., Sheppard, S. D., Johnson, D. W., & Johnson, R. T. (2005). Pedagogies of engagement: Classroom-based practices. *Journal of Engineering Education, 94*(1), 87-101.

Wood, W. B. (2003). Inquiry-based undergraduate teaching in the life sciences at large research universities: A perspective on the boyer commission report. *Cell Biology Education, 2*(2), 112-116. doi:10.1187/cbe.03-02-0004 [doi]

The Motion of Slovak Vocabulary As a Reflection of Society Development After Year 1989

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Abstract: Vocabulary belongs to the most flexible part of the language and it often changes and evolves together with the society and nearly immediately reacts on the movement is society system and mirrors its social, community and political relationships. Slovak language as a state language had a function in variety of state establishments. The noticeable changes in these units often had as well an influence on the Slovak language. Since the year 1989 is considered the considerable milestone change in our society, we are concentrating on the vocabulary movement before and after this period. We note the dynamics of the lexical Slovak language in the last decades, in other words the spontaneous processes direct or lead in the retreat of certain lexical units, stylistics review, semantic changes and revitalization of those units as well as the growth of new words and phrases from domestic and foreign languages.

Key words: Slovak vocabulary, vocabulary units, creation of new vocabulary units, revitalization of vocabulary units

Introduction

In general it is accepted that within the timeline language and society are interrelated systems and are interconnected by a variety of links, and therefore any change in the society reflects the changes in the language. These changes occur in social society changes and they are most obvious when it comes to vocabulary.

Vocabulary belongs to the most flexible parts of the language and it often changes and evolves together with the society and nearly immediately reacts on the movement is society system and mirrors its social, community and political relationships. This is reflected by the same lexical units with the emergence of new facts, the development of new technologies and new phenomena in politics, government and in everyday life entering the vocabulary as new members, for example. In recent decades these words have been added to lexical resources such as: internet, hardware, recycling, insulate etc. Some words on the other hand are having declining tendency when it comes to occurrence. These are, first, the terms that depicts the now non-existent realities and facts, for example: *drab* (beadle), *panské* (manor), etc. and secondly, these are the words that have been replaced by newer terms, although realities that depict them remain in society e.g.: *merba* (geometry), *dejespyt* (History) etc. Some older and decades unused words are revitalized or in other words re-introduced, for example: *starosta* (mayor), *executor* (bailiff).

Materials and Method

Slovak language as a state language had a function in variety of state establishments. The noticeable changes in these units often had as well an influence on the Slovak language. One of the major milestones in the development of our society and, therefore in the language can be seen in November 1989. On this basis, we will provide few examples in the movement of the lexicon in Slovakia after 1989, which it will be based on the excerpted material from the dictionary of Slovak language (SSSJ, 1959 – 1968), three issue Short Dictionary of Slovak Language (KSSJ, 1987, 1997, 2003) and two volumes of the Dictionary of Contemporary Slovak language (SSJ, 2006, 2011). One great advantage of tracking the meaning of words after 1989 is the existence of special kind of dictionaries, such as analyzing ones, processing ones as they consist lexical stock, which overlaps with the period by period in History of Slovak language and it is defined as the current standard Slovak allowing

to achieve, even in principle, synchronous description of the current language and has a certain temporal depth (SSSJ, 2006, p. 13). Another advantage is that the dictionaries are existing in electronic form, as well as the fact that one of the sources of the third and fourth output Short Dictionary of Slovak Language has been computerized in texts (containing material from the period of the nineties of the 20th century) and Dictionary of Contemporary Slovak language is virtually from the beginning processed as a work computer lexicography. The authors of the Dictionary are using electronic information resources from Slovak National Corpus plus they are using electronic versions of basic lexicographical works, with the help of search on the internet and Slovak websites.

Results

In the observed Glossary of the Slovak language, the radical political and social changes after 1989 are mainly reflecting the re-evaluation of lexical items which somehow reflect the ideology of the previous regime. Such examples in the lexical units after 1948 are relegated to passive vocabulary, as they were nearly fifty years not been used, but in November 1989 they got into the active vocabulary that means they were revitalized. Concrete reflection of these facts is to change the time of inclusion of these words and phrases in the interpretation of meanings and in the explanatory notes.

In KSSJ (1987) in their interpretation of every denomination holders of traditional crafts in the meaning of "samostatný živnostník" ("independent tradesman") (Pisárčiková, 1984, p. 63), the owner or lessee shall apply note "v minulosti" ("in the past"), for example. *cukrár* (confectioner)... person that makes or sells sweets or chocolates; "v minulosti" i samostatný živnostník; *krajčír* (tailor)... clothes maker "v minulosti" i samostatný živnostník. The SSJ (1959 – 1968), when these lexemes abbreviated predsoc. (pre-socialist concept) or notice pred znárodnením (before nationalization), for example *hotelier* (hotelier) ... a person who manages or owns a hotel (pred znárodnením), *obchodník* (businessman) ... predsoc. a man who works in business. The total change in socio-economic relations after 1989 and especially the emergence of various forms of private property was immediately reflected in the interpretation of these lexical units in the third and fourth editions KSSJ. Those lexical units are supplemented and revised in edition of the Dictionary without explanatory notes "v minulosti" ("in the past"), respectively. predsoc. (before nationalization). In the past SSSJ the notes draws attention to the period of the 19th and early 20th centuries.

The evaluation notes of the type v kapitalizme (of capitalism), v kapitalistickom zriadení (the capitalist establishment), v kapitalistických štátoch (in capitalist countries), v kapitalistickom hospodárstve (in the capitalist economy) and so on. occur at the SSJ at headwords, eg. *bankrot* (bankruptcy), *detektív* (detective), *maklér* (broker). The same remarks also found in KSSJ (1987). Although KSSJ hardly contain elements tendentious interpretations, yet reflects the period in which they arose. In such headwords not the idealized interpretation, but a realistic description of the meaning of words that are not used in the previous period, since the relevant economic phenomena operate differently and otherwise also named by (Pisárčiková, 1996, p. 132). In KSSJ (1987), the abbreviation kapit. used in interpretation passwords *bankár* (banker), *bankrot* (bankruptcy), *burza* (burza), *kartel* (cartel), *nezamestnanosť* (unemployment), *producent* (producer). Because these words, given the change in social situation and international relations, returned after 1989 again active vocabulary in KSSJ (1997, 2003) and SSSJ (2006, 2011) are given without qualifier qualifiers or admin. (administrative), fin. (financial), ekon. (economic).

Relatively large group of words and phrases in the analyzed dictionaries are forming lexical units from 50th to 80th years of the 20th century. These terms, meanings and phrases could be labeled by qualifier as historicism, as meeting the essential characteristic of historicism that named by the now non-existent realities and facts. After 1989, in connection with the already mentioned social and political changes, namely disappeared many institutions, enterprises, organizations as well as their names, for example: *bezpečnosť* (the police), *káder* (member of the former communist structures, especially in higher positions), *papaláš* (higher public official, especially for socialism), *pionier* (member of the past Pioneer group), *spartakiáda* (mass workout performance), *súdruh* (depiction and also a greeting in the former socialistic establishment), *zväzák* (member of the youth union in the former Czechoslovakia in the years 1949 – 1989). While the SSJ and KSSJ (1987) when these passwords used notes v socialistickej spoločnosti (in socialist society), v socialistickom hospodárstve (in the socialist economy), etc., in the analysed editions KSSJ running off after 1989 they involve not only a change in the content of the

evaluation notes, but also relieved's notes abbreviations býv. (former), v min. (in the past) or notes v bývalom socialistickom zriadení (in the former socialist establishment), za socializmu (under socialism).
The political changes after 1989 brought the release of various social conventions and allow the opening of many topics that previously were considered as social taboos or somehow circumvented or concealing. This was also reflected in KSSJ third edition (1997). Words were added to the dictionaries which were known even before 1989, but the same ideological reasons were officially not used. These are words of type *eštébé* (State security for a totalitarian regime); *eštébák* (member or associate of the State Security for the totalitarian regime); *normalizácia* (restoration of hard-line communism after year. 1968 in the former. Czechoslovakia; the period of the event to r. 1989); *pétépé* (PTP, Auxiliary Technical Battalions; unit for military service in the form of forced labor for politically unreliable citizens in the first half of the 50s), which is in the dictionary "new" as a socio-political Breaking the taboo vocabulary (Šimková, 1999, p. 126.)
Analysis headwords in dictionaries showed that compared to a spontaneous process that lead to the withdrawal of lexical items from the period 50th to 80th years of the 20th century, standing processes that enrich their vocabulary with new words and phrases. Already in the third edition KSSJ been added "new words, without which the image of contemporary literary language was not true and relatively complete" (KSSJ, 1997, p. 11). In KSSJ (2003) and SSSJ (2006, 2011), the processing of vocabulary updated with additional naming realities of domestic resources from other languages.

Among the new words and phrases as the same topics show:
names related to the field of informatics and new technologies, for example
bajt (byte), *displej* (display), *e-mail*, *hardvér* (hardware), *softvér* (software), *processor* (processor), *formátovať* (format), *modem*, *scanner/skener*, *server, hacker/heker*, *fax, telemost* (teleconference session), *odkazovač* (answering machine), *handsfree, hi-fi, stereo, video, videokamera* (video camera), *videoprehrávač* (video recorders), *videokazeta* (video cassette), *volkmen/walkman* (walkman), *mikrovlnka* (microwave);

names related to the field of sport, for example.
hetrik (hat-trick), *nohejball* (football), *ragby* (rugby), *skialpinista* (skialpinist), *snoubording* (snowboarding), *snoubordista* (snowboarder), *triatlon* (triathlon), *windsurfista* (windsurfer);

names in music and film, for example.
disco, metal, heavy metal, pop, pop music, rap, rock and roll, hip-hop, punk, single (single), *sci-fi, western, šéfproducent* (chief producer), *upútavka* (teaser), *happening, happyend/happy end*;

expressions characterizing individual garment parts, kinds of textile products, for example.
legínsy (legins), *rifle* (jeans), *slipy* (shorts), *rifľovina* (Denim);

expressions characterizing food and drinks, for example.
hamburger, *pizza*, *nealko* (soft drinks), *neska, neskafé*, *preso* (espresso);

names associated with the economy, banking, finance, for example.
audit, *akciovka* (stock company), *bankomat* (ATM), *eseročka* (limited company), *etablovať* (establish), *hedging/hedžing* (hedging), *holding*, *konkurencieschopnosť* (competitiveness), *lízing* (leasing), *manažment* (management), *mikroekonómia* (microeconomics), *privatizácia* (privatization), *portfolio* (portfolio), *rating* (rating);

names associated with the government, the organization of social and economic life, the judiciary, for example.
bezdomovec (homeless), *dissent* (dissent), *dissident* (dissident), *euroskepticizmus* (euroscepticism), *líder* (leader), *lobby*, *lobista* (lobbyist), *mafián* (mobster), *migrant*, *mimosúdny* (non-judicial), *narkomafia* (drug traffickers), *normalizátor* (normalizer), *ombudsman*, *ponovembrový* (the post-November), *postkomunistický* (postcommunists), *samit/summit*, *samizdat*, *spolitizovať* (politicize), *totalitne* (totalitarianism), *vicepremiér* (Deputy Prime Minister).

In some passwords were added current so called live-link-type *progresívna daň* (progressive tax), *daň z pridanej hodnoty* (value added tax), *čierna diera* (a black hole), *ozónová diera* (the ozone hole), *skleníkový efekt* (the greenhouse effect), *kreditový system* (the credit system), *tvrdé drogy* (hard drugs), *mobilný telefón* (cell phone), *umelý sneh* (artificial snow), also added some of the latest idioms such as type *to je iba špička ľadovca* (the tip of the iceberg), *mať rovnakú krvnú skupinu (*be on the same page, having same blood line), *robiť niečo na doraz* (be grinding, striving to be the best), *robiť mŕtveho chrobáka* (playing dead rat), *(ne)vedieť, kde je sever* (be out of the mind, be wired to the moon), *to je gól* (something surprising), *slovenská hádzaná* (Slovak handball; drinking alcohol); *nemať ani haka/háka* (be skint); *tým to pre mňa hasne* (it is over for me).

Conclusions

Movement in Slovakia lexicon after 1989 is characterized on one hand with the processes that leads to the withdrawal of certain units associated with the previous regime and semantic change (in increase or decrease of existing meanings of words). On the other hand is the Slovak vocabulary enriched by new words and phrases not only from domestic sources, but also from other languages (especially English) what helps the language to get more updated with new phrases and idioms.

References

Krátky slovník slovenského jazyka. (1987). Bratislava : Veda.

Krátky slovník slovenského jazyka. (1997). Bratislava : Veda.

Krátky slovník slovenského jazyka. (2003). Bratislava : Veda.

Slovník slovenského jazyka 1 – 6 zv. (1959 – 1968). Bratislava : Vydavateľstvo SAV.

Slovník súčasného slovenského jazyka. (2006). Bratislava : Veda.

Slovník súčasného slovenského jazyka. (2011). Bratislava : Veda

Pisárčiková, M. (1996). Krátky slovník slovenského jazyka v doplnenom a upravenom vydaní. In *Kultúra slova* (pp. 129 – 134).

Pisárčiková, M. (1984). Z metodických postupov prí sémantickom opise slovnej zásoby v jednozväzkovom slovníku. In *Obsah a forma v slovnej zásobe* (pp. 61 – 64). Bratislava.

Skladaná, J. (1997) Čo s historizmami a archaizmami v súčasných slovníkoch. In *Slovenčina na konci 20. storočia, jej normy a perspektívy* (pp. 246 – 251). Bratislava : Veda.

Skladaná, J. (2000). Kvalifikátory vo výkladovom slovníku na časovej osi. In *Nová slovní zásoba ve výkladových slovnících* (pp. 91 – 97). Praha : Ústav pro jazyk český AV ČR.

Šimková, M. (1999). Pohyby v slovenskej lexike v 90. rokoch. In *Internacionalizácia v súčasných slovanských jazykoch* (pp. 116 – 136). Bratislava : Veda.

Trends in Human Development Index of European Union

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Abstract: The Human Development Index is a measure of development index calculated from life expectancy, literacy, education and standards of living. In this paper, Human Development Index data of European Union are collected for periods 1980-2013, and analyzed using Generalized Estimating Equations to investigate whether there is a trend through the years. Generalized Estimating Equations method is often employed to analyze longitudinal and other correlated response data does not require any multivariate distribution assumption.

Key Words: Human Development Index, Generalized Estimating Equations, European Union

Introduction

Longitudinal studies involve repeated observations of the same items over long periods of time and, often arise in psychology, sosiology, education, medical sciences to analyze developmental trends across time (Diggle et. al. 1994 ;Diggle et. al. 2002; Twisk, 2002). Variable for each subject observed repeatedly over time cause dependency structure between variables. Correlated data are particularly very common in educational and more generally in social science researches. Longitudinal studies also allow researches to reveal the short from long-term phenomena, such as poverty, infant mortality rate, economic development ect. Ignoring the dependency of the observations will overestimate the standard errors of the the time-dependent predictors. This means that we also ignore the between-subject variability. Repeated measure ANOVA is used for longitudinal studies because of simplicity, but it has some limitations. For instance, it assumes categorical predictors; does not take the time-dependent covariates into account; assumes that subjects are measured at the same and equally spaced time intervals and it requires restrictive assumptions about the correlation structure. Hence, Generalized Linear Model approach to longitudinal studies has been growing in recent years. Generalized Estimation Equatios (GEE) methodology were developed by Liang and Zeger (1986); Zeger and Liang (1986) as the extension of the Generalized Linear Models (GLM) (McCullagh and Nelder,1989) for the data in longitudinal form.

In this paper, it is aimed to model the Human Development Index (HDI) data of the European Union (EU) countries via GEE. HDI has become an important alternative measure of development. The HDI data are collected between the 2005-2010 periods, and analyzed using GEE to investigate whether there is the trend through the years.

The simple model can be written as

$$HDI=\beta_0 + \beta_1 TIME + CORR + ERROR. \quad (1)$$

Where, the intercept β_0 and the slope β_1 are unknown parameters. Time is treated as a continuous variable and measured in years. The aim is test the trend over years.

Generalized Estimating Equations

The idea of GEE was first introduced by Liang and Zeger (1986); Zeger and Liang (1986). GEE methodology fits a model to repeated categorical responses, that could be correlated and clustered responses. The advantages of GEE can be also summarized as: It does not require a multivariate distribution; estimates of model parameters are valid even if misspecification of the covariance structure; it is preferred to Maximum Likelihood (ML) because of its computational simplicity. In recent years, GEE has been a popular alternative to maximum likelihood.

Let Y_{ij} be the jth outcome for the ith subject, where we assume that observations on different subjects are independent; the association between outcomes is observed on the same subject. Y_i denotes a response vector for each subject j and Y is the vector of measurement off all units.

$$Y_i = (Y_{i1}, Y_{i2}, \dots, Y_{in}),\ i = 1,\dots, N;\ j = 1,\dots, n_i$$

Marginal response is defined as $\mu_i = E(Y_i)$. Linear combination of the covariates are $g(\mu_i)=X_i\beta$. Where , X_i is a $n_i \times p$ matrix of covariates ; β is a $p \times 1$ vector of unknown regression coefficients and $g(\cdot)$ is the link function.

For unknown parameter vector β , Equation (2) is given as

$$U(\beta) = \sum_{i=1}^{N} \frac{\partial \mu_i}{\partial \beta} V_i^{-1}(Y_i - \mu_i) = 0 \qquad (2)$$

where, V_i is the $n_i x n_i$ variance covariance matrix, $V_i = A_i^{\frac{1}{2}} R_i(\alpha) A_i^{\frac{1}{2}}/\phi$. A_i is a diagonal matrix with elements Var (Y_{ij}) and $R_i(\alpha)$ is referred as working correlation matrix (Liang and Zeger, 1986; Zeger and Liang, 1986). ϕ is the over-dispersion parameter. Working correlation matrix choices are: Independent, Exchangeable, Autoregressive , M-dependent and Unstructured. But, the advantage of GEE is that it is fairly robust against a misspecification of correlation matrix (Hin and Wang, 2009).

Solution the Equation (2) gives the parameter estimates. In the GEE procedure, ordinary linear regression analysis is firstly performed, assuming the observations within subjects are independent. Then, residuals are calculated from the ordinary model and a working correlation matrix is estimated from these residuals. Then the regression coefficients are estimated, correcting for the correlation.

Human Development Index

HDI is an aggregated measure of development index calculated from life expectancy, literacy, education and standards of living (UNDP, 2011). Until 2010, the HDI had been defined as a simple arithmetic average of normalized indices in the dimensions of health, education and income:

$$HDI = \frac{1}{3}\left(H_{health} + H_{education} + H_{living\ standards}\right). \qquad (3)$$

Each of these indices are normalized indicators of achievements for each dimensions and based on life expectancy (LE) , GDP per capita (GDP), literacy (LIT) and the gross enrolment ratio (GER).

Where, the subindices:

$$H_{health} = \frac{(LE - LE_{min})}{(LE_{max} - LE_{min})} \qquad (4)$$

$$H_{education} = \frac{1}{3}\left(\frac{GER-GER_{min}}{GER_{max}-GER_{min}}\right) + \frac{2}{3}\left(\frac{LIT-LIT_{min}}{LIT_{max}-LIT_{min}}\right) \quad (5)$$

$$H_{living\ standards} = \frac{(ln(GDP)-ln(GDP_{min}))}{(ln(GDP_{max})-ln(GDP_{min}))} \quad (6)$$

Hence, the indices are normalized using given upper and lower bounds which were defined in the 2009 report. The 2010 Human Development Report presented some changes in the HDI as

$$HDI = \sqrt[3]{H_{health} \cdot H_{education} \cdot H_{living\ standards}} \quad (7)$$

Life expectancy still represents the health dimension, while Gross National Income (GNI) replaces GDP as the measure for living standards. Mean years of schooling (MYS) and expected years of schooling (EYS) now are the new indicators of the education dimension.

$$H_{health} = \frac{(LE-LE_{min})}{(LE_{max}-LE_{min})} \quad (8)$$

$$H_{education} = \left(\frac{MYS-MYS_{min}}{MYS_{max}-MYS_{min}}\right)\left(\frac{EYS-EYS_{min}}{EYS_{max}-EYS_{min}}\right) \quad (9)$$

$$H_{living\ standards} = \frac{(ln(GNI)-ln(GNI_{min}))}{(ln(GNI_{max})-ln(GNI_{min}))} \quad (10)$$

The HDI enables to researchers to detect the changes in development levels over time and to compare development levels in other countries. The value of HDI vary between 0 and 1. The interpretation of HDI can be made as:

HDI ≥ 0.800 is high development,

HDI 0.500—0.799 is medium development,

HDI < 0.500 is low development

(UNDP, 2011). High HDI means more prosperity and achievement on the developmental factors.

Analysis of HDI data for the Member Counties of European Union

United Nations Development Program has been calculating HDI for the member countries. This paper's goal is to asses the changes HDI for the member countries of EU over nine years . The human development indices of the countries were obtained from a Human Development Report (Table 1). Data set was downloaded from the United Nations Development Program web page (http://hdr.undp.org/en/data).

Recall the member states of the European Union: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom. These countries are included in the analysis.

Table 1: Human Development Index trends, 1980-2013.

		Human Development Index (HDI)								
	Country	**1980**	**1990**	**2000**	**2005**	**2008**	**2010**	**2011**	**2012**	**2013**
1	Netherlands	0,783	0.826	0.874	0.888	0.901	0.904	0.914	0.915	0.915
2	Germany	0.739	0.782	0.854	0.887	0.902	0.904	0.908	0.911	0.911
3	Denmark	0.781	0.806	0.859	0.891	0.896	0.898	0.899	0.900	0.900
4	Ireland	0.734	0.775	0.862	0.890	0.902	0.899	0.900	0.901	0.899
5	Sweden	0.776	0.807	0.889	0.887	0.891	0.895	0.896	0.897	0.898
6	United Kingdom	0.735	0.768	0.863	0.888	0.890	0.895	0.891	0.890	0.892
7	France	0.722	0.779	0.848	0.867	0.875	0.879	0.882	0.884	0.884
8	Austria	0.736	0.786	0.835	0.851	0.868	0.877	0.879	0.880	0.881
9	Belgium	0.753	0.805	0.873	0.865	0.873	0.877	0.880	0.880	0.881
10	Luxembourg	0.729	0.786	0.866	0.876	0.882	0.881	0.881	0.880	0.881
11	Finland	0.752	0.792	0.841	0.869	0.878	0.877	0.879	0.879	0.879
12	Slovenia	.	0.769	0.821	0.855	0.871	0.873	0.874	0.874	0.874
13	Italy	0.718	0.763	0.825	0.858	0.868	0.869	0.872	0.872	0.872
14	Spain	0.702	0.755	0.826	0.844	0.857	0.864	0.868	0.869	0.869
15	Czech Republic	.	0.762	0.806	0.845	0.856	0.858	0.861	0.861	0.861
16	Greece	0.713	0.749	0.798	0.853	0.858	0.856	0.854	0.854	0.853
17	Cyprus	0.661	0.726	0.800	0.828	0.844	0.848	0.850	0.848	0.845
18	Estonia	.	0.730	0.776	0.821	0.832	0.830	0.836	0.839	0.840
19	Lithuania	.	0.737	0.757	0.806	0.827	0.829	0.828	0.831	0.834
20	Poland	0.687	0.714	0.784	0.803	0.817	0.826	0.830	0.833	0.834
21	Slovakia	.	0.747	0.776	0.803	0.824	0.826	0.827	0.829	0.830
22	Malta	0.704	0.730	0.770	0.801	0.809	0.821	0.823	0.827	0.829
23	Portugal	0.643	0.708	0.780	0.790	0.805	0.816	0.819	0.822	0.822
24	Hungary	0.696	0.701	0.774	0.805	0.814	0.817	0.817	0.817	0.818
25	Croatia	.	0.689	0.748	0.781	0.801	0.806	0.812	0.812	0.812
26	Latvia	.	0.710	0.729	0.786	0.813	0.809	0.804	0.808	0.810
27	Romania	0.685	0.703	0.706	0.750	0.781	0.779	0.782	0.782	0.785
28	Bulgaria	0.658	0.696	0.714	0.749	0.766	0.773	0.774	0.776	0.777

Descriptive statistics for HDIs are given in Table 2. From Table 2, it can be seen that the very high human development group over nine years corresponds to Netherland, Germany, Denmark, Ireland, Sweden, United Kingdom Belgium and Luxembourg.

Table 2: Descriptive statistics by country

Country	N	Minimum	Maximum	Mean	Std. Deviation
Austria	9	0.7360	0.8810	0.8437	0.0509
Belgium	9	0.7530	0.8810	0.8541	0.0448
Bulgaria	9	0.6580	0.7770	0.7426	0.0432
Croatia	8	0.6890	0.8120	0.7826	0.0438
Cyprus	9	0.6610	0.8500	0.8056	0.0674
Czech Republic	8	0.7620	0.8610	0.8388	0.0362
Denmark	9	0.7810	0.9000	0.8700	0.0457
Estonia	8	0.7300	0.8400	0.8130	0.0395
Finland	9	0.7520	0.8790	0.8496	0.0467
France	9	0.7220	0.8840	0.8467	0.0575
Germany	9	0.7390	0.9110	0.8664	0.0636
Greece	9	0.7130	0.8580	0.8209	0.0550
Hungary	9	0.6960	0.8180	0.7843	0.0506
Ireland	9	0.7340	0.9020	0.8624	0.0633
Italy	9	0.7180	0.8720	0.8352	0.0568
Latvia	8	0.7100	0.8130	0.7836	0.0407
Lithuania	8	0.7370	0.8340	0.8061	0.0378
Luxembourg	9	0.7290	0.8820	0.8513	0.0553
Malta	9	0.7040	0.8290	0.7904	0.0458
Netherlands	9	0.7830	0.9150	0.8800	0.0462
Poland	9	0.6870	0.8340	0.7920	0.0547
Portugal	9	0.6430	0.8220	0.7783	0.0622
Romania	9	0.6850	0.7850	0.7503	0.0410
Slovakia	9	0.7470	0.8300	0.7180	0.2708
Slovenia	8	0.7690	0.8740	0.8514	0.0380
Spain	9	0.7020	0.8690	0.8282	0.0598
Sweden	9	0.7760	0.8980	0.8707	0.0457
United Kingdom	9	0.7350	0.8950	0.8569	0.0610

Figures (1-28) below show trends in HDI values of EU countries separately, during the period 1990 to 2013. It can be clearly seen that the HDIs increased considerably for the years from 1990 to 2013 for all countries. Some countries 2004 there has been a steady increase such as Netherland, Germany, France and Austria.

Cyprus is the only country where it was observed a downward trend slightly in recent years. The highest level of progression in HDI is observed in for instance, for Portugal and Germany. They strongly move up through 2000's. The lowest HDI values are for Bulgaria and Romania with overall means 0.7426 and 0,7850, respectively. A consistent increase draw the attention particularly in Spain, Chezh Rebublic, France and Austria.

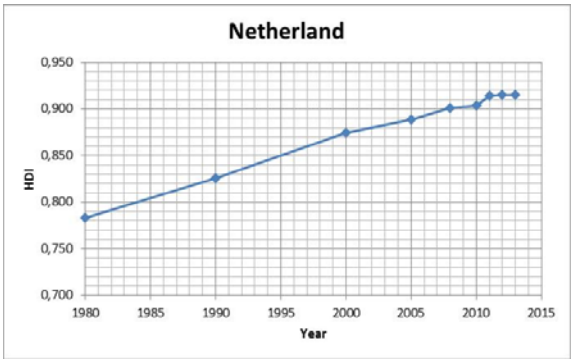

Figure 1: Human Development Index of Netherland, 1980-2013

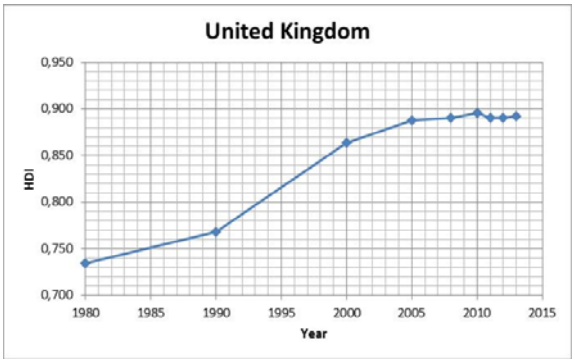

Figure 2: Human Development Index of United Kingdom, 1980-2013

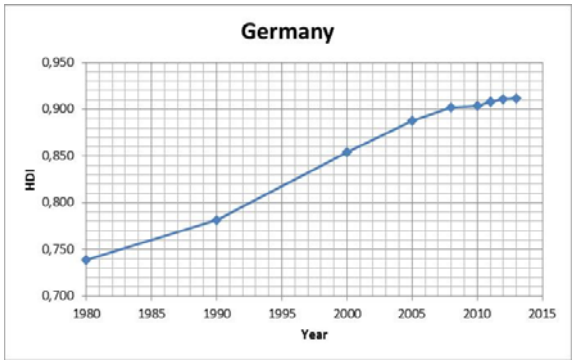

Figure 3: Human Development Index of Germany, 1980-2013

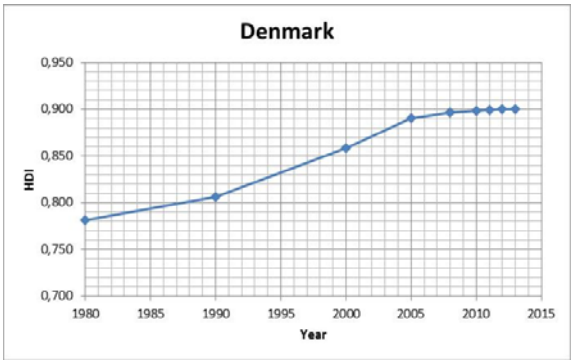

Figure 4: Human Development Index of Denmark, 1980-2013

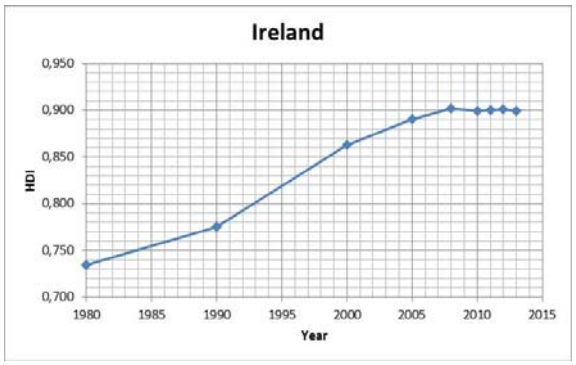

Figure 5: Human Development Index of Ireland, 1980-2013

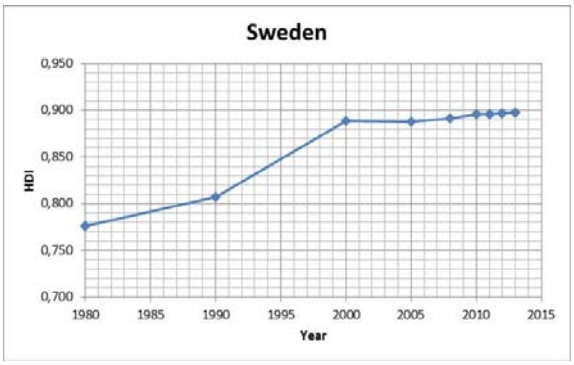

Figure 6: Human Development Index of Sweden, 1980-2013

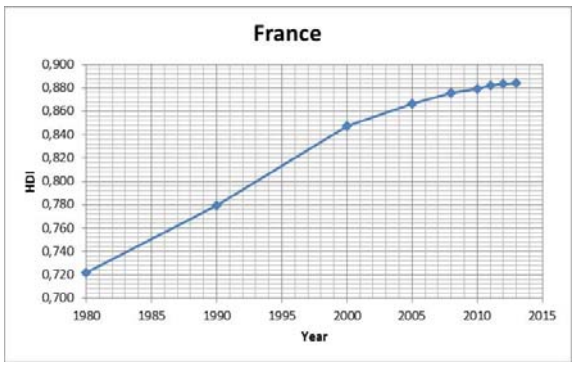

Figure 7: Human Development Index of France, 1980-2013

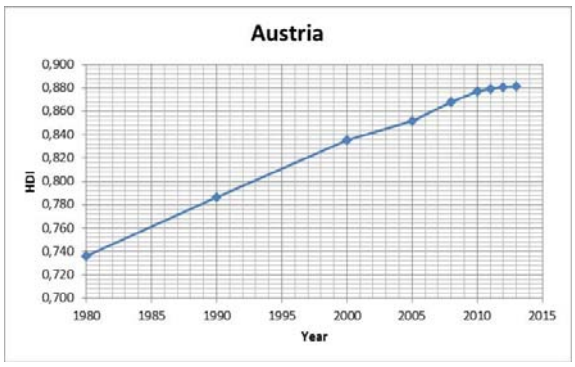

Figure 8: Human Development Index of Austria, 1980-2013

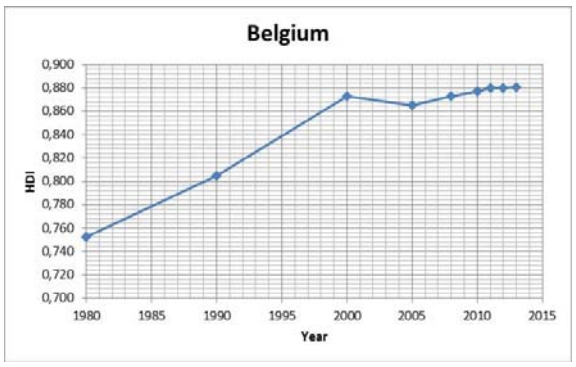

Figure 9: Human Development Index of Belgium, 1980-2013

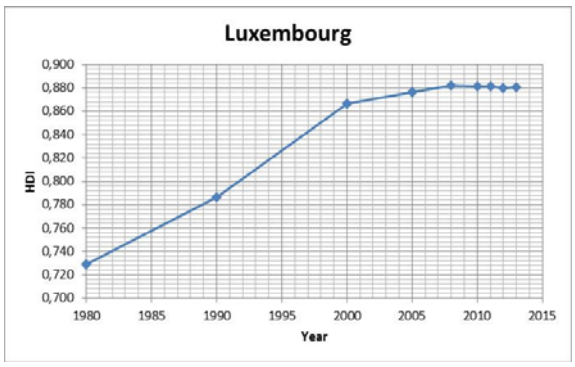

Figure 10: Human Development Index of Luxembourg, 1980-2013

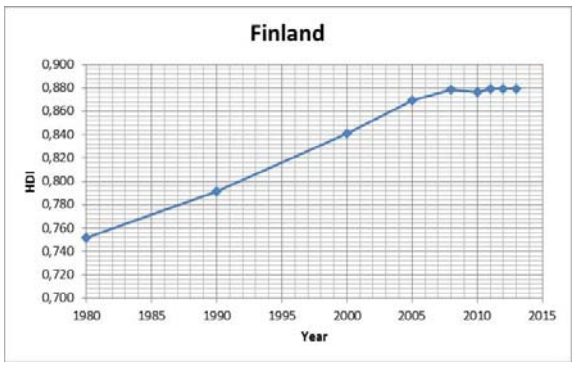

Figure 11: Human Development Index of Finland, 1980-2013

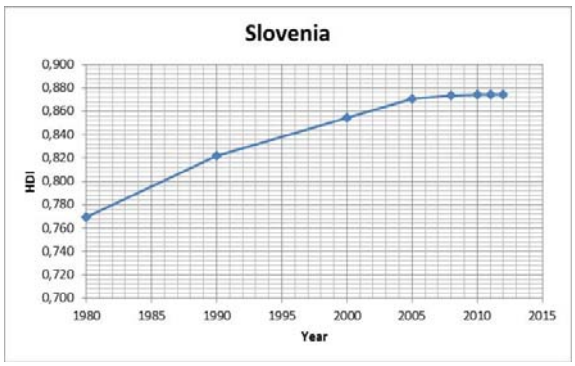

Figure 12: Human Development Index of Slovenia, 1980-2013

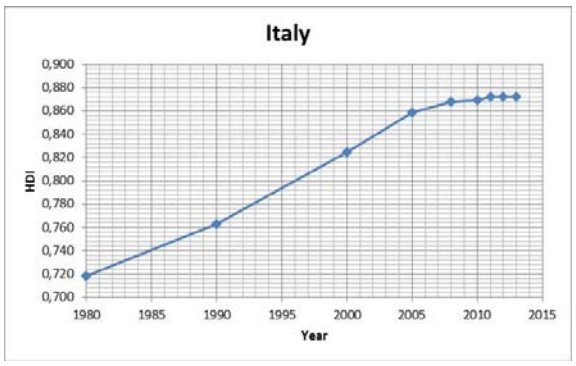

Figure 13: Human Development Index of Italy, 1980-2013

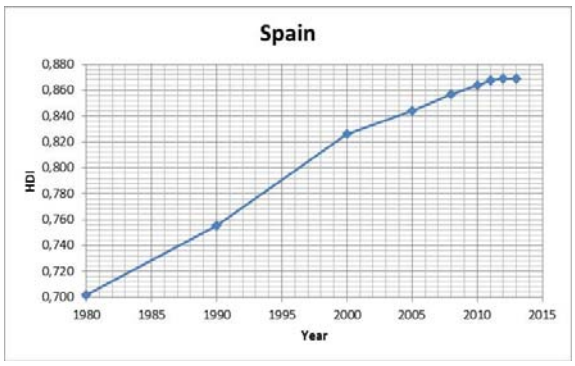

Figure 14: Human Development Index of Spain, 1980-2013

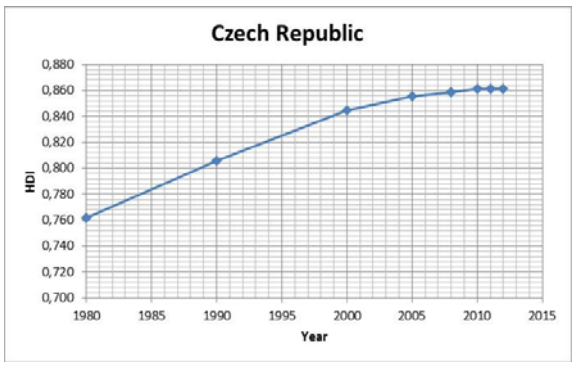

Figure 15: Human Development Index of Czech Rep., 1980-2013

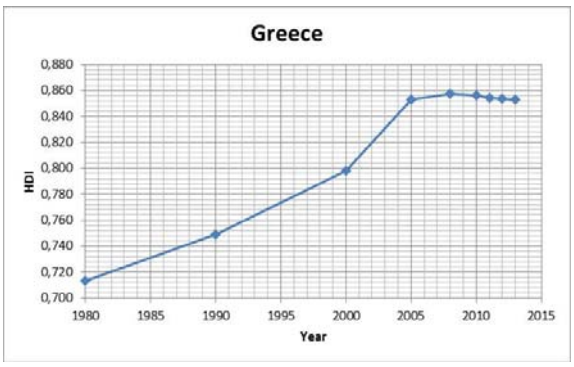

Figure 16: Human Development Index of Greece, 1980-2013

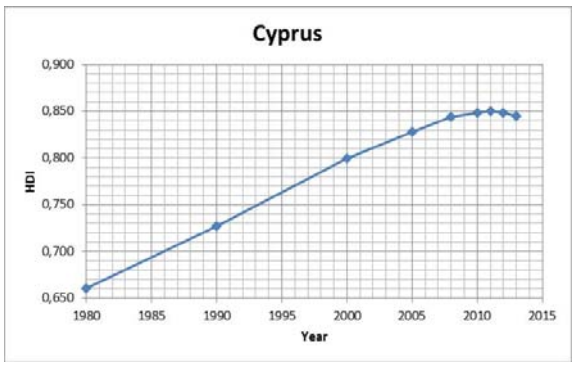

Figure 17: Human Development Index of Cyprus, 1980-2013

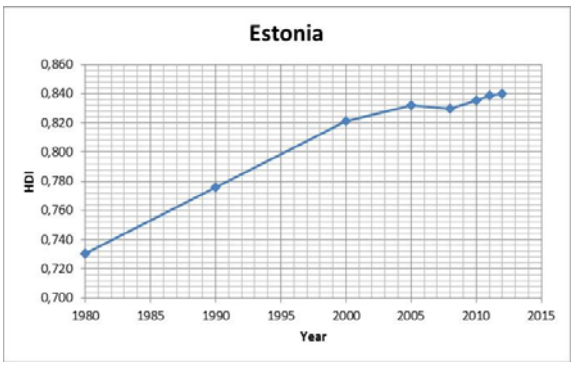

Figure 18: Human Development Index of Estonia, 1980-2013

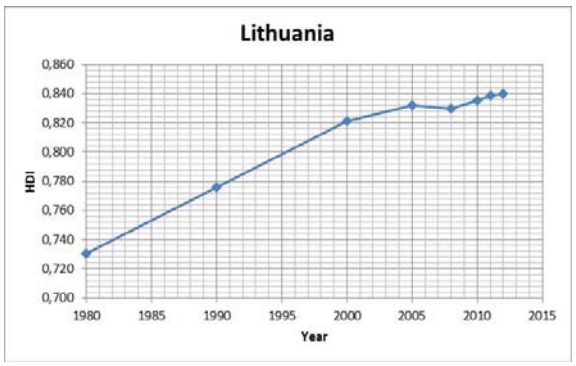

Figure 19: Human Development Index of Lithuania, 1980-2013

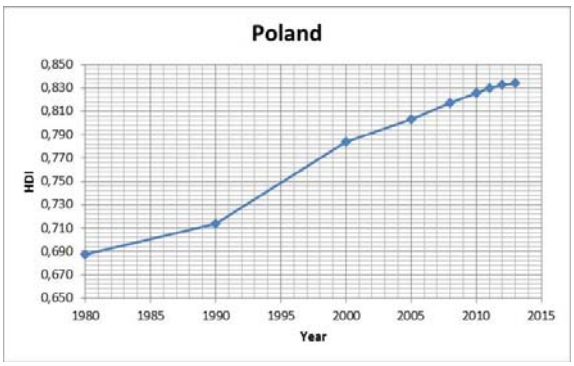

Figure 20: Human Development Index of Poland, 1980-2013

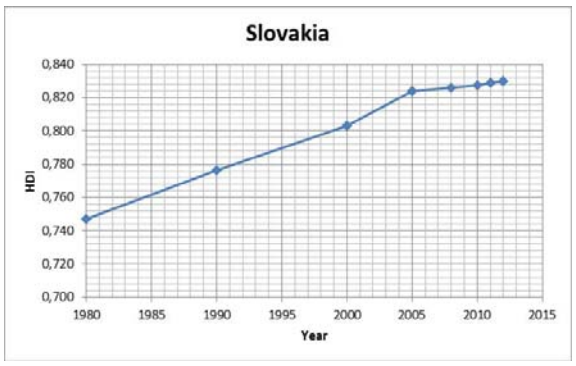

Figure 21: Human Development Index of Slovakia, 1980-2013

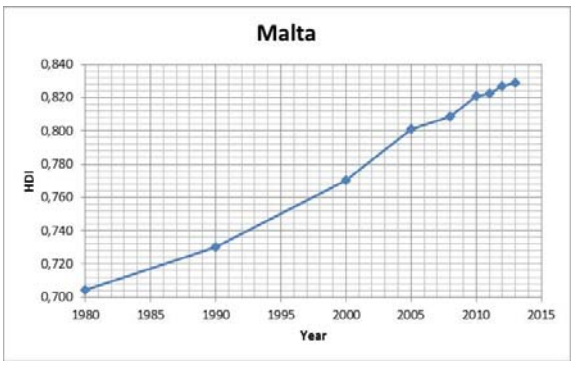

Figure 22: Human Development Index of Malta, 1980-2013

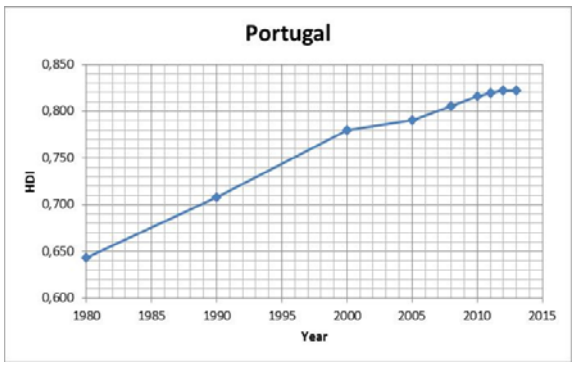

Figure 23: Human Development Index of Portugal, 1980-2013

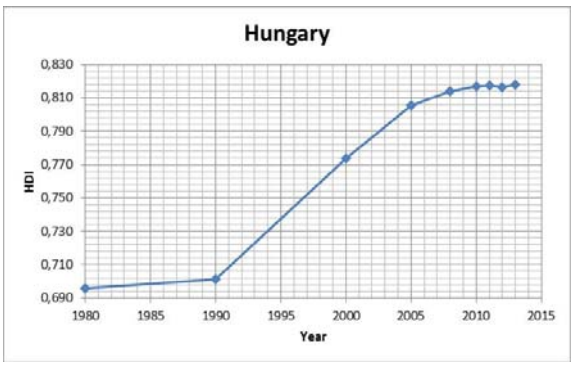

Figure 24: Human Development Index of Hungary, 1980-2013

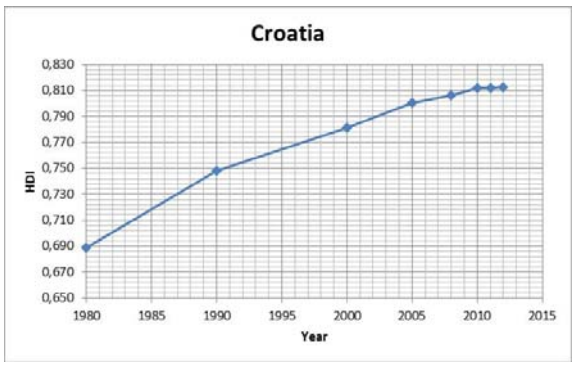

Figure 25: Human Development Index of Croatia, 1980-2013

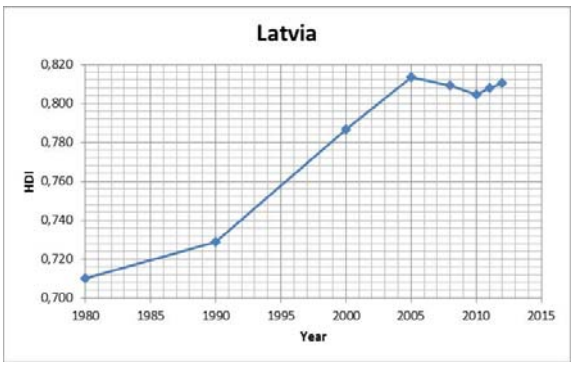

Figure 26: Human Development Index of Latvia, 1980-2013

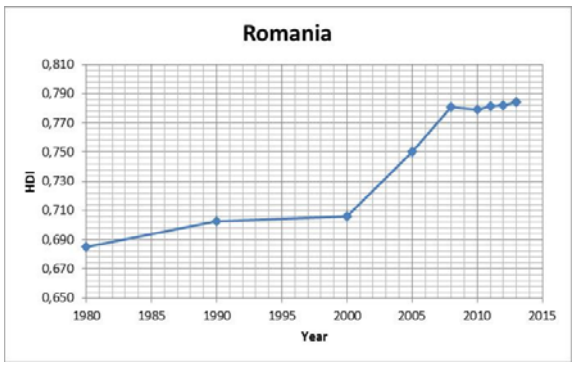

Figure 27: Human Development Index of Romania, 1980-2013

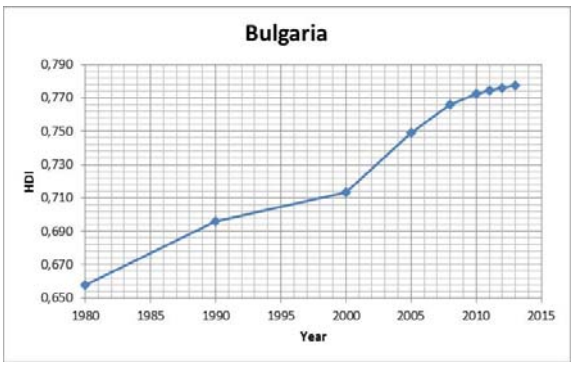

Figure 28: Human Development Index of Bulgaria, 1980-2013

The overall means by years along with their standard errors and 95% confidence interval are given in Table 2 and Figure 29 shows the trend by year. HDI has a steady upward trend after 2008. A sharp increase from 1980 to 2000 and a gradual increase after 2000 can be seen in Figure 3. For all countries except Cyprus, the HDI is the highest in 2013, even though the mean HDI for 2012 seems to equal with the HDI for 2013. Romania started to move up in 2000's. Latvia reached the peak in 2005. Long-term progress can be usefully assessed relative to other countries.

Table 3: Overall means by year

YEAR	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1980	0.719	0.009	0.702	0.737
1990	0.760	0.009	0.742	0.778
2000	0.821	0.011	0.798	0.844
2005	0.845	0.010	0.824	0.865
2008	0.856	0.009	0.837	0.875
2010	0.860	0.009	0.842	0.878
2011	0.862	0.009	0.844	0.880
2012	0.863	0.009	0.845	0.881
2013	0.863	0.009	0.845	0.881

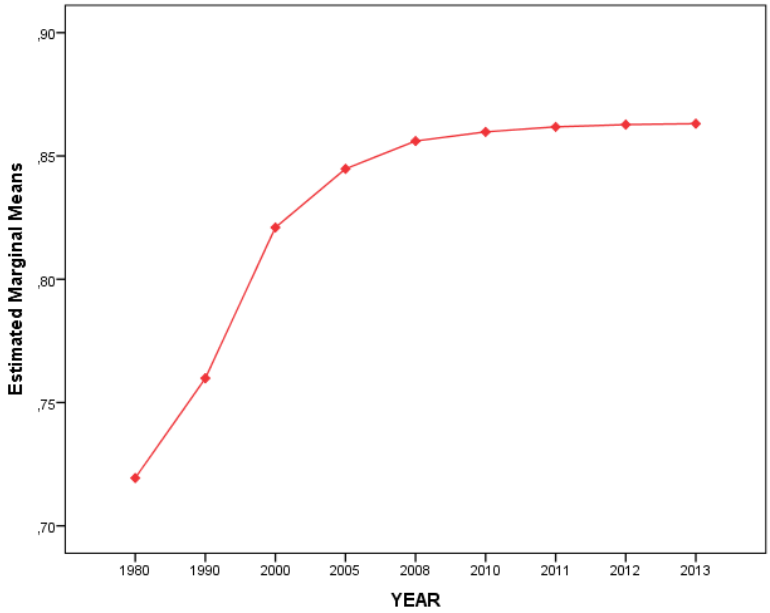

Figure 29: Marginal means of HDI by year

IBM SPSS 20 was used for the analysis. Generalized Linear Model menu includes techniques of Generalized Linear Models and Generalized Estimating Equations. Table 3 summaries the result of GEE analyses with an unstructures correlation structure. Test of model effects evaluates each of the model variables with the appropriate degrees of freedom. Intercept and year are statistically significant (P<0.01).

Table 4: Test of model effects

Source	Type III		
	Wald Chi-Square	df	Sig.
Intercept	1095.364	1	0.000
Year	37.905	1	0.000

Table 5 includes the regression coefficients for each of the variables along with standard errors, p-values and 95% confidence intervals for the coefficients and Exp(B). The coefficient for year is 0.024 .The model in Equation (1) can be represented by $\hat{Y}$= 0.705 + 0.024 Year.

This means that the expected change in HDI for a one-unit change in time is 0.024. In other words, the beta parameter can be interpreted as: 1-unit increase in year is associated with a 0.024 increase in HDI and a significant positive beta coefficient here would mean the change in year has changes in HDI correspondingly.

Table 5: Parameter estimates for GEE

Parameter	Beta	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)	
			Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper
Intercept	0.705	0.0213	0.663	0.747	1095.364	1	0.000	2.024	1.941	2.110
Year	0.024	0.0039	0.016	0.032	37.905	1	0.000	1.024	1.016	1.032
(Scale)	0.005									

Working correlation matrix across all nine time periods under unstractured covariance matrix assumption is given below (Table 6). A working correlation structure is a correlation matrix for repeated or clustered measurements from each individual. An unstructured working correlation matrix has no explicit pattern. In the GEE method, if the working correlation matrix is correctly specified, the parameter estimates become more reliable.

Table 6: Working correlation matrix

Measurement	Measurement								
	1	2	3	4	5	6	7	8	9
1	1	0.271	0.197	0.158	0.195	0.351	0.525	0.694	0.915
2	0.271	1	0.358	0.315	0.289	0.266	0.249	0.226	0.200
3	0.197	0.358	1	0.661	0.530	0.372	0.209	0.034	-0.134
4	0.158	0.315	0.661	1	0.504	0.348	0.189	0.022	-0.174
5	0.195	0.289	0.530	0.504	1	0.343	0.252	0.152	-0.053
6	0.351	0.266	0.372	0.348	0.343	1	0.343	0.342	0.189
7	0.525	0.249	0.209	0.189	0.252	0.343	1	0.548	0.462
8	0.694	0.226	0.034	0.022	0.152	0.342	0.548	1	0.742
9	0.915	0.200	-0.134	-0.174	-0.053	0.189	0.462	0.742	1

Conclusions

GEEs provide a practical method with good statistical properties to model data that exhibit association but cannot be modeled as multivariate normal. Ordinary linear regression ignores the correlation between subjects but GEE takes into account the dependency of observations by specifying a working correlation structure. The main advantage of GEEs resides in the robust estimation of parameters' standard errors, even when the correlation structure is misspecified.Therefore using GEE would be considered a better alternative for clustered data and outperforms the classical regression. It could be presumably misleading to compare the HDI rankings with those of previously published reports, because the calculation method has changed. United Nations Development Programe data ensure as much cross-country comparability as possible.

However a progress in the HDI can be observed for all countries. During the period between 1980 and 2013, countries experienced different degrees of progress in terms of their HDIs.

Results also suggest that changes in HDI over years are statistically significant. A significant positive coefficient for time would mean the change in year has changes in HDI correspondingly.

References

Diggle, P. J., Liang, K. Y., and Zeger, S. L. (1994), *Analysis of Longitudinal Data*, Oxford: Clarendon Press.

Diggle, P. J., Heagerty, P., Liang, K.-Y., & Zeger, S. L. (2002). *Longitudinal data analysis* (2nd ed.). Oxford, UK: Oxford University Press.

Liang, K.-Y., & Zeger, S. L. (1986). Longitudinal data analysis using Generalized Linear Models. Biometrika*, 73,* 13–22.

Hin, L.-Y., Wang, Y.-G. (2009). *Working Correlation Structure Identification in Generalized Estimating Equations*, Statistics in Medicine, 28, 642-658.

IBM Corp. Released 2011. *IBM SPSS Statistics for Windows,* Version 20.0. Armonk, NY: IBM Corp.

McCullagh, P., and Nelder, J. A. (1989), *Generalized Linear Models*, New York: Chapman and Hall.

Zeger, S. L., & Liang, K.-Y. (1986). Longitudinal data analysis for discrete and continuous outcomes. *Biometrics, 42,* 121–130.

United Nations Development Programme (UNDP) (2011). "Human Development Report 2011, Technical Notes."

Twisk, Jos W. R. (2003). Applied Longitudinal Data Analysis for Epidemiology: A Practical Guide. Cambridge University Press.

Under Graduate Teaching And Research Using Project-Oriented Approach with Matlab Environment

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Abstract : The role of universities cannot be overestimated in the training process of students of under-graduate and post-graduate studies that would eventually shape the world's technological and scientific progress. The past decade has seen many changes in the expectations of students in the field of education. For the students of under-graduate courses the goal has shifted to obtaining theoretical and practical knowledge in their chosen specialization. Some choose to continue their education for a career in post-graduation and then pursue research; others opt to elevate their professional competency, teamwork and leadership skills. Despite different learning expectations, instruction in universities continues to be based on traditional pedagogical methods, such as "face-to-face" studies, or "E-learning" training and communication, which are overwhelmingly teacher-led.

The purpose of this paper is to search for new methods of education that would permit gaining real and practical experience harnessed by seeking examples relevant to the curriculum outside the classroom that also enhance the professional competency of a graduate student, thus evolving into a more student-centric type of learning.

The main emphasis of this paper is the demonstration of the use of software packages and programs to solve problems in Mathematics, Physics and Engineering as a part of enhancing the comprehension of the student's learning curve. The formulation and analysis of complex problem solving techniques such as comprehensive grades of the students in a class in various subjects and application of differential equations has been taken as an example using the fundamental "if"…"Else" statement from MATLAB as an example. The paper consists of the introduction to scientific problem and its complete numerical solution along with a graphical analysis using one of the fourth generation programming languages i.e., MATLAB. The emphasis is on programming rather than problem solving.

Key words: Matlab, if-else statement, Numerical methods, Graphical Analysis, Student's Grades, Differential Equations.

Introduction

In recent years, demands from industrial employers on their professional workers have changed dramatically.

This is readily explained by the fact that the students are currently graduating with good knowledge in fundamental theoretical concepts and computer literacy, but they lack application of the subject in practice, and they do not possess strong teamwork and communication skills.

Many publications evidence that students and employers alike, are calling for significant changes in the delivery of under-graduate education. The critical issues that are reflected in these requests are summarized here (Mills,2003).

Under-graduate curricula are too focused on theoretical concepts in mathematics and Sciences without much practical application being taught. Sufficient integration methodology relating to these topics to industrial practices is not provided. And all the Programs are too content-driven. Current programs do not provide sufficient practical experience to the students. And they also lack communication skills and teamwork experience as such. The faculty too typically lack practical experience, hence they are not able to adequately relate theory to practice or provide practical experience. Therefore, it may be concluded that the existing teaching and learning strategies in under-graduate curricula are outdated. They need to be supplemented with more student-centric ones.

There exist many ways of resolving this problem, from the radical – redesigning of the under-graduate curricula – to the introduction of project based or project-oriented leaning modules in the framework of traditional curricula.

The article seeks examples from basic mathematical concepts of under-graduate curriculum such as 'students grading' and a 'basic solution of a differential equation' as sources of the project and their complete numerical solution along with a graphical analysis using one of the fourth generation programming languages

i.e., MATLAB has been sought. The emphasis on the student was more on conceptual understanding through the application of the project oriented method of problem solving rather than meagrely learning the concept conventionally hearing in the classroom.

The main emphasis of this paper is the demonstration of the use of software packages and programs to solve problems in under-graduate Mathematics course as a part of enhancing the comprehension of the student's learning curve.

The formulation and analysis of complex problem solving techniques such as comprehensive grades of the students in a class in various subjects and application of differential equations were given to the students as the conceptual tools for implementation of the "Project Oriented Learning Method" and use was made of the fundamental "if"…"Else" statement from MATLAB environment.

Problem-based learning (PBL) in under-graduate education

This learning method has been utilized successfully in the classroom. Generally, this is done through "class-room problems" that consist of completing exercises and assignments, or open-end problems, likewise within a particular course. All commence with the identification of the path to elucidating the given problem, which is itself selected by the course context.

Progress in resolving the problem depends solely on the level of knowledge (of the subject) attained by the student. Courses containing "open-end" problems, afford students opportunities to choose autonomously the route to the solution.

There are many examples of successful, optimal usage of PBL as a main component of engineering and under-graduate programs of varying levels. However, there are certain limitations to PBL, explained below (Perrenet,2000,PP.345-358) that discourage recommending PBL as an overall strategy for engineering and undergraduate education:

1. Problems that students encountered during their course cannot always be applied to real-life tasks, which they will certainly counter in their future careers;
2. Much of under-graduate curriculum has a hierarchical knowledge structure. Many topics must be learned in a certain order, because missing essential parts will result in failure to learn later concepts. The problem will be hard for a student to correct, because they probably cannot fully compensate for missed topics, by using only PBL.

It seems therefore that problem-based learning may be a partial answer for resolving the critical issues of engineering and under-graduate education, primarily to demonstrate the applicability of certain concepts in the early stages of an engineering curriculum. However, other active learning, student-centred methods are more appropriate and acceptable for engineering under-graduate education, and these form the basis of project-oriented learning.

Project-oriented learning(POL) in under-graduate education

The term "project" is universally used in under-graduation as a "unit of work". Almost every task undertaken in the academic pursuit by an under-graduate student will be a project. Project-oriented learning may be defined alternately by different education disciplines and levels, which makes it familiar to most students. The advantages of using POL, in comparison with PBL, is listed here (Perrenet,2000,PP.345-358), and involves the following:

1. Project tasks are closer to professional reality;
2. Project work is directed more **to the application of knowledge**, while PBL is more directed to the acquisition of knowledge;
3. POL is usually accompanied by subject courses (e.g. math, physics, software, &c), whereas PBL is not.
4. Management of time and resources by the students as well as task and role differentiation is very important in POL.
5. Independence of action is greater in project work, than in PBL.

POL may be applied either in particular courses, or through the entire curriculum.

According to Heitmann (Heitmann,1996,PP.121-131) POL involves the use of small projects within specific courses, which is usually combined with traditional, "face-to-face" methods, within a given course.

POL focuses on application and integration of previously acquired knowledge. The students work in small groups where teachers serve as advisors. The beneficial adaptation of the above approach, in several universities suggests its viability, and allows us to formulate recommendations for continuing progress towards the intended project-oriented curriculum, which revolve around continued training for both staff and students, in the skills needed to make learning effective, such as problem-solving, teamwork, as well as continued education for staff in implementation and assessment methodologies.

An overview of the literature did not evoke any examples of the aforementioned recommendations. Therefore, we find it necessary to offer our own approach, which is based on the development of our learning unit (module) in the context of POL. We designed the pedagogical aspects the of course based on this collaborative didactic technique (Martín, 2002,PP.17-29).

Definition and development of the problem

The main characteristics of the Differential Equations(DEs) course incorporated with the POL implementation is presented below:

I. General objectives.

The students must learn the basic concepts of DEs, firstly, through the conventional lectures. Throughout the course, the students understand, build and adapt POL method to enhance their comprehension which makes the learning of the basic concepts a must in order to implement it through a program. They have to assimilate, integrate and apply all these concepts. The desired abilities to develop in the course are: Self-motivation, Analytical capability, team work, honesty, leadership, self-directed learning, creativity, and the capacity to identify and solve problems.

II. ***Course contents.***

This basic DE Course syllabus for the students matches with the DE curriculum of the Under-graduate syllabus of the Universities in the Kingdom of Saudi Arabia

III. ***Learning Activities.***

In the first part of the course, the basic concepts of DE are covered in weekly lectures. During this period, the students learn and practice the basic concepts. During mid-way of the program, students form teams and start building and implementing the program using MATLAB Environment. Concurrently, advanced topics for syllabus completionare covered in the classroom as per schedule. In the last stage, the students incorporate these techniques in their understanding of the advanced topics and thus achieve their goals successfully.

IV: ***Course Project.***

The main focus of the course project was to design and build the application of loops and "if…else" statement in MATLAB. Students grade evaluation has been taken as a prelude example to the actual application to the course related problem of solution of ODEs.

V. ***Assessment process.***

A self-assessment method has been conducted through group discussions and presentations by each group and then the best program and its output have been included in this article.

Project Oriented Learning (POL) in the context

A learning-unit is a building-block of a course. Here, we define a learning-unit as a real-world example, an explanatory feature of a course, designed to test knowledge gained in the classroom. It serves as a real- life project, scaled to the course's topics and form. POL is one of several active learning methods, devised during last decade as a product of research at the under-graduate level. POL considers that student teams will work on a single guiding thread, or project, for an entire course (Espinosa,2004).

Implementation of the POL technique in the current curriculum involved in organizing the Student into teams, and play roles while delegating work amongst themselves, and while delivering feedback to their teams (Noguez,2004,PP.83-88). Overall success in these terms is not easily measurable. Since most of the learning process will take place outside the realm of the classroom, learning has to be assumed whenever there is evidence of its existence through visible actions (Espinosa,2004). Besides, it is hard to prove that students are motivated to learn when the instructor applies POL to their classroom activities. As stated by Johnson

(Johnson,2000,P.39)"… changing to a cooperative style is not simple. There is a big difference between putting students into groups to learn… and structuring your teaching so students learn cooperatively...".
The POL technique provided the following advantages as evidenced by Noguez *et al* :

a) It allows the students to learn problems solving techniques using relevant knowledge independently of the discipline source.

Example: Here we present an example from Ordinary Differential Equations(ODE) which was solved in the classroom using the conventional 'Euler's method'. The same problem has been given to different teams of students for solving with POL method using MATLAB/SIMULINK Environment

Euler's analytical methods for solving ODEs are presented before moving on to numerical methods. [http://mathworld.wolfram.com**]**

The first-order ordinary differential equation is given as

$$\frac{dy}{dx} = F(x, y), \tag{1}$$

if F(x,y)can be expressed using separation of variables as

$$F(x, y) = X(x)Y(y),$$

(2)

then the equation can be expressed as

$$\frac{dy}{Y(y)} = X(x)\,dx$$

(3)

and the equation can be solved by integrating both sides to obtain

$$\int \frac{dy}{Y(y)} = \int X(x)\,dx. \tag{4}$$

Any first-order ODE of the below form can be solved by finding an integrating factor $\mu = \mu(x)$ such that

$$\frac{dy}{dx} + p(x)y = q(x)$$

(5)

And this condition enables an explicit way to determine the appropriate μ for arbitrary $p$and q. To accomplish this, take

$$p(x) = \frac{1}{\mu}\frac{d\mu}{dx}$$

(6)

in the above equation, from which we recover the original equation (◇), as required, in the form

$$\frac{1}{y}\frac{dy}{dx} + p(x) = \frac{q(x)}{y}.$$

(7)

But we can integrate both sides of (9) to obtain

$$\int p(x)\,dx = \int \frac{d\mu}{\mu} = \ln\mu + c$$

(8)

$$\mu = e^{\int p(x)dx}.$$

(9)

Now integrating both sides of (◇) gives

$$\mu y = \int \mu q(x)\,dx + c$$

(10)

(with μnow a known function), which can be solved for $y$to obtain

$$y = \frac{\int \mu q(x)\,dx + c}{\mu} = \frac{\int e^{\int^x p(x')dx'} q(x)\,dx + c}{e^{\int^x p(x')dx'}}, \tag{11}$$

where c is an arbitrary constant of integration.

Initially the above theoretical concept leading to the n^{th} - order linear ODE with constant coefficients has been explained to the students and they were also equipped with the relevant method for obtaining the solution using MATLAB .

b) As a prelude to this project the students have first been given an assignment outside the curriculum to learn the usage of the 'if-else' statement in MATLAB environment

Prelude Problem: Generate a program using " if, else and elseif statements" to obtain the output for the grade of the students in an examination given the marks scored as the input.

Student Marks	**0-59**	**60-69**	**70-79**	**80-89**	**90-100**
Student Grade	**E**	**D**	**C**	**B**	**A**

Mat lab coding of student marks and Grading using if-else statement :

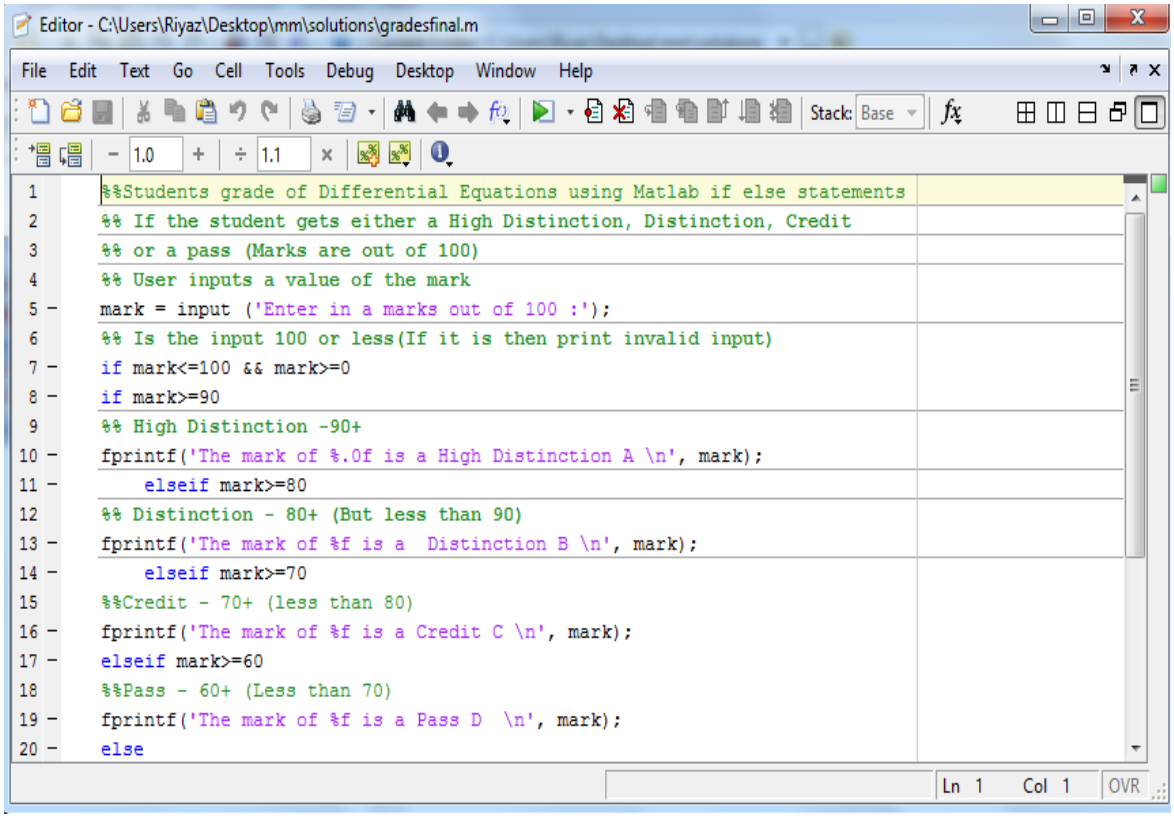

Figure 1: Matlab coding for Students Marks and Grading

Results in Differential Equations :

>> gradesfinal

Enter in a marks out of 100 :83

The mark of 83.000000 is a Distinction B

>> gradesfinal

Enter in a marks out of 100 :66

The mark of 66.000000 is a Pass D

>> gradesfinal

Enter in a marks out of 100 :96

The mark of 96 is a High Distinction A

>> gradesfinal

Enter in a marks out of 100 :85

The mark of 85.000000 is a Distinction B

>> gradesfinal

Enter in a marks out of 100 :80

The mark of 80.000000 is a Distinction B

>> gradesfinal

Enter in a marks out of 100 :80

The mark of 80.000000 is a Distinction B

>> gradesfinal

Enter in a marks out of 100 :80

The mark of 80.000000 is a Distinction B

>> gradesfinal

Enter in a marks out of 100 :71

The mark of 71.000000 is a Credit C

>> gradesfinal

Enter in a marks out of 100 :80

The mark of 80.000000 is a Distinction B

>> gradesfinal

Enter in a marks out of 100 :120

Not a valid input marks must be between 0-100 :>>

After the successful completion of this project by the students to begin with, different work groups of students have been assigned the problem from the curriculum and a space was provided for presentation of their project and its solution through a group discussion and presentation by each group self-evaluation.

c) The program and solution of the ODE after the self-evaluation process that was unanimously accepted by all the groups of students is presented below.

First Order Equations: $\frac{dy}{dx}(x) = xy$

Code:

```
>>y = dsolve('Dy = y*x','x')
>>y = dsolve(eqn1,'y(1)=1','x')
>>x = linspace(0,1,20);
>>z = eval(vectorize(y));
```

```
>>plot(x,z)
```

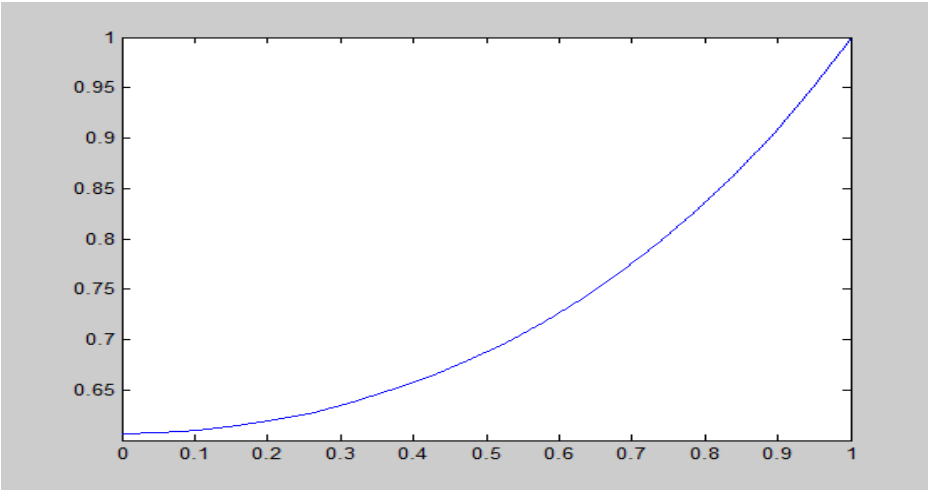

Figure 2: Plot of First Order Differential Equation

Second and Higher Order Equations:

$$\frac{d^2y}{dx^2}(x)+8y(x)+2y(x)=\cos(x) \qquad y(0)=0, \frac{dy}{dx}(0)=1$$

Code:

```
eqn2 = 'D2y + 8*Dy + 2*y = cos(x)';
inits2 = 'y(0)=0, Dy(0)=1';
y=dsolve(eqn2,inits2,'x')
z = eval(vectorize(y));
plot(x,z)
```

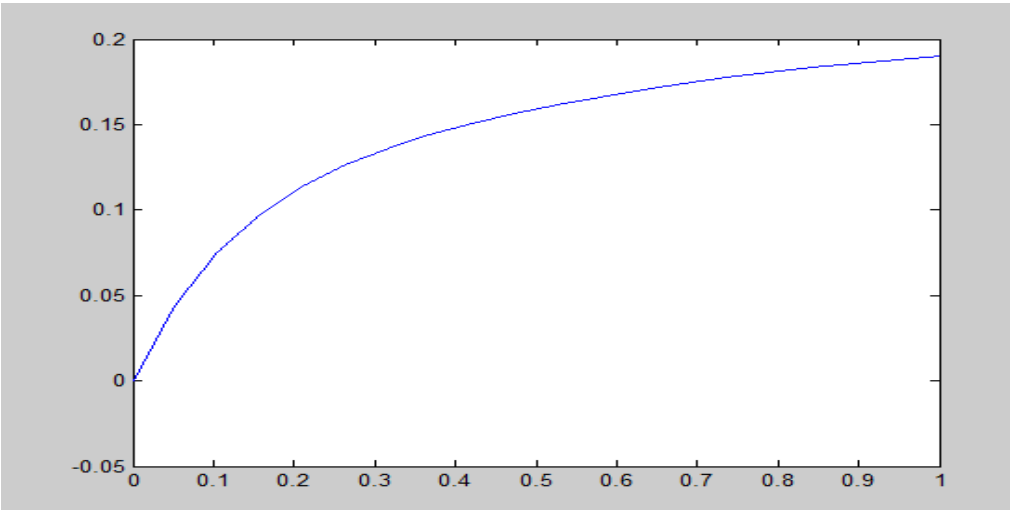

Figure 3: Plot for Second Order Differential Equation

Discussion

The activity was focused on exploring and working for the solution of the above problem leading to the n^{th} - order linear ODE with constant coefficients with an unknown solution.
Activities have been designed in such a way that they can involve several areas of the same discipline or the interaction of different disciplines.
POL method considers in the design the application of interdisciplinary knowledge so the students can appreciate the relationship between different disciplines in the development of a particular project.
The project assignment promotes the search of open solutions so students are free to create new knowledge.

Conclusions

Analysis of the results confirms that using real-world research or practical examples, in the framework of under-graduate courses, that are based on a project-oriented learning approach, may increase not only learning satisfaction for the students, but also boost their motivation at the entry level for the learners to continue their future studies. This could be further developed by the usage of "open-course" technology, which allows more effective, easily-changeable , up to date learning programs.

References

Mills J.E., Treagust F.(2003). *Engineering education –is problem-based or project-based learning the answer?.*, http://www.aaee.com.au/jornal/2003/mills_treagust03.pdf.

Perrenet J.C., Bouhuijs P.A, Smits J.C(2000,March 5). *The suitability of problem-based learning for engineering education: theory and practice* (pp.345-358), Teaching in higher Education,.

Heitmann G.(1996, Feb 21)*Project-oriented study and project oriented curricula: a brief review of intensions and solutions*(pp.121-131) European Journal of Engineering education .

Martín M. (2002)."El modelo educativo del Tecnológico de Monterrey". *Ed. Tecnológic de Monterrey* (pp. 17-29). Monterrey, Nuevo León. México.

Espinosa E., Noguez J.(2002). "Assisting Students with POL using XML- Aglet Federation. 47th ". *World Assembly. Teacher Education and the Achievement Agenda.* Amsterdam. Julio.

Noguez J., Espinosa E.(2004) . "Improving learning and soft skills using Project Oriented Learning in software engineering courses". *Proceedings of Designing Computational Models of Collaborative Learning Interaction Workshop(*pp. 83-88*).* 7th International Conference on Intelligent Tutoring System .

Espinosa E., Noguez J. (2004, September)"Project Oriented Tutoring on Milestone Behavior using Contract Management*. Proceedings of the IEEE". International Conference on Frontiers in Education (FIE2004).* Savanah, USA.

Johnson R.(2000, January) .*The science teacher(*p.39*)*. Vol 67. No. 1." How can we put cooperative learning into practice? ".