Business intelligence in the access of Czech universities in the education market

J. Chromy, J. Šedivy, Čestmír Bárta

***Abstract*—**In a teaching, and in activities that relate to it, every teacher must have a certain amount of support. This support is characterized by being individualized, and must allow a relatively wide range of activities. In analyzing the functions this support should fulfill, it is necessary to begin with the main activities that make up the instructor's total teaching experience. Consequently, it is necessary to combine the various functions of support for the teacher's activities into one system that will be interactively available in all the required moments**.**

***Keywords*—** Business Intelligence, Computer Managed Instruction (CMI), data warehouse, On Line Analytical Processing (OLAP)

I. Introduction

THE teacher, in the context of this article, is seen as an personage who develops and prepares his (or her) product and offers it at a given place at a certain price (his salary). To achieve his objectives, he must communicate with his customers, his students for example, and keep necessary data on this communication and its results. The article introduces the possibility of using Business Intelligence, regularly used in the business environment, as a basic tool to support one's communication activities. In teaching, and in activities that relate to it, every teacher must have a certain amount of support. This support is characterized by being individualized, and must allow a relatively wide-range of activities. In analyzing the functions this support should fulfill, it is necessary to begin with the main activities that make up the instructor's total teaching experience. Consequently, it is necessary to combine the various functions of support for the teacher's activities into one system that will be interactively available in all the required moments. It is describes this as Computer Managed Instruction (CMI). See also for example [1]. In ending part of research, we hypothesized that the activities of the teacher are essentially analogous to business activities. The second hypothesis was that in this case usual business principles apply and it is possible to use knowledge and resources which support business and commercial activities. It is therefore also possible to use Business Intelligence for the activities of teachers.

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II. Theoretical Foundations of Business Intelligence

One of the key parts of the information system of the organization is business intelligence, which works with a variety of data, information and knowledge, processes and adjusts. Business Intelligence is understood as a system of tools, design solutions and organizational measures, which allows management of the organization based on the obtained knowledge [2]. This system tools are increasingly applied not only in manufacturing or commercial enterprises, but logically inroads into other institutions around the world. In specific applications, business intelligence specifically focused on support the needs of managers at all levels, see [2]. Characterize the processes taking place in the company. Process of collecting data primarily identify and locate specific events in the company. Then subsequent analysis is based on data obtained primarily, but also once in the past processed analyzes.

The staff of each organization in the interest of continuity, stored, recorded and further process. Processing data, obtain information from them and ultimately knowledge. To support of these activities, Business Intelligence system is linked with a wide range of operating systems, individual components, which together form a systematically created architecture. The basic management tasks include construction of an optimal customer-supplier partnerships, which leads to an effective customer satisfaction, as described for example in [3]. A satisfied customer will become permanent and regular. Another advantage is that it is a good experience hints to your friends and colleagues. Therefore, it is necessary that each company carefully kept track of their customers. Of course, the possibility that it is enables compliance with the statutory rules. It is advisable to record all necessary information, such as customer requirements, dealing with them, achievements, etc.

Data warehouse - A place where not only harbor such information is called data warehouse. The information collected, collated and maintained in data warehouses are not just customers. They contain an overview of the roles of all staff of the company, data on their performance and thus

support the management of the company. They can and usually also contain other, in terms of companies, the necessary data. All necessary information may be available within the company to all employees in real time. Building data warehouses deals such as [4]

According to [5] a data warehouse is a central repository of data of various companies, which contains data in the database, but also tools for data selecting and data filtering and analysis. All information obtained in the data warehouse can be necessary simple, user-friendly way to present. Sufficient appropriate information is one of the key success factors in most fields of human activity. Nevertheless, it must be good and reliable information, which must be current, reliable, complete, relevant and correct. [3].

This is one of the reasons why all of the data must be protected against misuse. One reason is the cost that companies create data warehouses to make. The cost to them later returns in the use of information obtained via the output data warehouses (data marts). To the firm is not desirable to have authorized the warehouse as the competitive firm. Another reason may be the validity of some laws, such as privacy, because the data warehouse can contain very sensitive data. Access to data in the data warehouse is dependent on need, which results from the need and the required reliability of specific employees. The entire process of creation and maintenance of data warehouses, but also their use is known as business intelligence [4]. Term *business intelligence* is the process of data transformation and transfer of such information to the knowledge, serving to support business (decision-making).

In a data warehouse is to store data and their subsequent processing. Filtering to remove redundant data, which sorts, verifies its accuracy and classified in storage needed by different criteria. This will reduce the amount of data, but the remaining information is much more informative value. They can be reversed through the data marts and thanks OLAP (On Line Analytical Processing - is a technology store data in a database that allows you to organize large amounts of data so that it can quickly realize the complex and multidimensional queries) analysis used in the management of the company, in business negotiations and marketing needs. Through analysis and data mining from the data warehouse can also get hidden information that can be used for specific purposes. For example, in marketing this way we can obtain the necessary documents to determine which customers should reach out with a new product. To the complex applications, called business intelligence, comprises all applications, which we have mentioned in this section:

- data warehouse,
- data marts,
- data mining,
- Executive Information Systems (EIS).

The above described complex applications support the analysis and planning activities. These technologies are based on robust relational database systems, each of which is successively stored the data. The content of relational database systems, although clearly arranged, but given the amount of stored data, their diversity and redundancy (redundancy), the orientation in these very complicated for the average user, and without some system support and quality impossible. Signs of the relational database is its orderliness according to strictly defined criteria, but it is inconvenient for analytical activities where contrast is required to assess the possibility of data from various (often unknown in advance) views and perspectives. The use of relational databases is not suitable for obtaining operational information that is used for daily processing of a wide range of jobs in various operational units of a particular company. These applications operate in real time, so they are referred to as OLTP systems - On Line Transaction Processing.

Architecture, business intelligence, i.e. the different contexts in the use of data warehousing Fig. 1 shows a basis of the collection and storage of vast amounts of data, such as obtained from commercial transactions, from work, accounting, etc. These input data are initially unsorted, unfiltered and unprocessed.

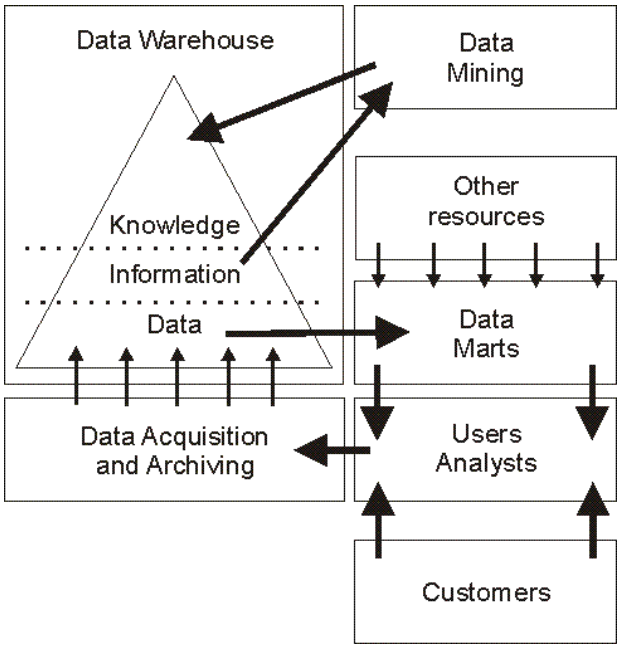

Fig. 1 Simple scheme of business intelligence [4].

Follow-group consists of systems that provide analytical information. Thus allow a more global view of the activities of the company, or its monitored areas. They exploit previously generated data in OLTP systems, which get rid of unnecessary data, groups them according to the current requirements, but they work with the time sequence of stored data. These systems are called OLAP - On Line Analytical Processing. As we mentioned above, for obtaining analytical information is not suitable relational database. Much more important is their multidimensionality databases. In the course of its activities must process often unimaginable amount of data required to make calculations, rearrange the data and then display them in the form of required tables, graphs, etc. Organizing data in a multidimensional OLAP database used by the system can be thought of as the equivalent of a Rubik's cube with more dimensions. According [5], we can introduce the principle of multidimensional databases by Fig. 2 This table is indicated by a multidimensional database that would contain the value

indicators (revenues, expenditures, prices, wages, profit) each day for several organizational units (indicated Branch). In a multidimensional database can perform various analyzes. For example, you can perform:

- Comparison of the values of any indicators of organizational units on a specific date,
- Share any organizational unit of the total value of the particular indicator on a particular date,
- Comparison of values during certain indicators for specific organizational units,
- Many other simple and complex comparisons and analyzes.

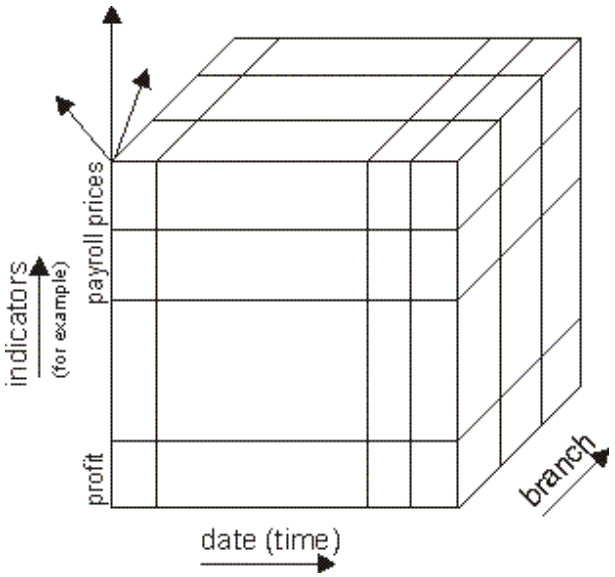

Fig. 2 Example of a multidimensional database

According [5] have business intelligence applications other characteristics of which are the following:

- Provide for the collection and processing of data according to various criteria,
- Allow continuous updating of the available internal and external data sources
- Ensure the identification of deviations and critical points for each management area,
- Are implemented with three basic tools:
- To define multidimensional databases
- To transform data from a database into a multidimensional database (data pump)
- For building applications based on multidimensional databases.

Industries dealing with multidimensional databases allow users the flexibility to handle different presentations or different views of the data stored. Multidimensional databases are usually implemented based on metadata enhancement of relational tables. Metadata assigned to the rows and columns of relational databases and individual dimensions of cells in multidimensional table. The metadata are also included rules aggregation of data at different levels of defined dimensions, see [6].

The main objective of the Business Intelligence is to provide professionals with the business skills needed to succeed in an increasingly competitive world and to teach them how to use the vast quantity of information that is continuously generated from different work processes in the most efficient way possible, in order to enhance the company's ICT strategies and make them beneficial for the company.

The strategic importance of information and communication technologies (ICT) has become increasingly visible with the advent of the internet, the convergence of technologies and the new generation of personal devices. This has created a growing demand for specialists who are able to understand the importance of information and communication technologies. For example the finance, energy, health and transport sectors are all extensive users of ICT and require well-trained professionals.

The use of information and communication technologies should be based on user needs, which adapts to the information requirements. Those requirements are then adjusted to the data from which the information is mined. Finally, choose a way to appropriate people at appropriate locations to deliver. Business Intelligence should find and process information, which is not visible at first glance. This means in practice apply to the possession of information (information material) genuine cleverness - trivial methods, processes and tools that not only "throw" data from one neat pile to another, but it really is analyzed. Business Intelligence should serve those who are able to properly dispose of advanced information - that is, those who understands the nature of their business. You can target a point on the basis of what they learned (and did not know before). Analytical Mining and extraction of information has something to do with espionage. Business intelligence used to intelligent people who want to do well and allows your business to drive it really intelligently. In practice, this all means go at it cleverly and systematically replace brute force wit and elegance that allows the user at the beginning of the information requirements well targeted. Targeting means effective analysis and resolution substantial. Therefore it is important to have it at the start of the opportunity to use experience (with the business) and procedures (with analytical methods), which combines the tools and solutions, called Business Analytics.

Tools and Business Intelligence applications have some character information system integration company. The integration of management processes - uniform data, reflecting the proceedings can be accessible to all levels of management in any timeframe. Basically, it depends on the user privileges of the organizational structure of the company.- Data integration - for managerial decision making at all levels are important to all data concerning all processes that ever took place in the company during its development, thus in history.- Integration of information technologies - in practice it is, that all means of information and communication technologies can be optimally linked into one efficient unit for the purpose of sharing data and the processes of the company.- Total system integration - Business Intelligence allow transfer of data and information between all levels of management in the company, regardless of the horizontal or vertical direction. These

applications rank among strategic because the correct choice and setting is the synergy of the processes in the company.
To conclude of this section it is necessary to draw attention to a very thin line when the company registers the personal data and classified information exceed various rules established laws of the country in which it operates. In the case of companies that, for example through the online store operate in several states, it is necessary to comply with the laws in force in all these states. In the event of the need for simplification and clarification, just follow the strictest regulations, exceeding the requirements of other states.

III. Tutors and Teachers Activities

In terms of the marketing mix, a teacher offers a specific product in a certain place. Along with this comes communication and promotion. The teacher is then rewarded or paid for providing his product. The 4Ps of marketing, as described in P. Kotler and G. Armstrong in 2010, are therefore valid here.

A study of the normal conditions for teacher activities and their expected results in no way refutes our initial hypothesis. The products are the teacher's knowledge and his ability to communicate it to students and other interested parties – the customers. He passes this on to them through direct and indirect instruction, prepared e-learning, through publications, through contributions at conferences, etc.

It is necessary for the teacher to properly develop and improve his product to a level that it will be demanded by the target market segment. We can consider students, other teachers, and professionals who want to increase their skills through the product to be the target market segment. The teacher, as with every entrepreneur, must know his target market segment and communicate with it - not only to offer his knowledge, but also to acquire and maintain an overview of its interests. Even then, the interests of the target market segment, to which the teacher will market his product, may not be, and often are not, identical. For example, a future car designer needs the genuine expertise necessary to design a quality car. Simply put, this knowledge is a product given to him by a teacher. The acquired knowledge is then used by the designer to design a car demanded by the target market segment. The teacher must also, however, anticipate the different possible characteristics of the designer's product, in our case a car. For simplicity's sake, we can compare the difference in design of a car with a combustion engine and an electric one. The teacher must therefore continue to develop his own knowledge, explore, search and find new paths.

The teacher must also communicate with his target market segment in a certain place and keep a record of this communication. In addition, he must offer and provide the product to his customers at an acceptable and competitive price. For these reasons, we can look at whether it would be possible to use certain forms of Business Intelligence which are used by ordinary companies. A teacher's main activities are not, always carried out uniformly and regularly. They can be divided into activities in which the teacher gets information from elsewhere, and needs to save or store it in his Business Intelligence for further use in the future, and for activities where he needs to use information that is already stored. Study - every teacher should constantly monitor and note the developments taking place in his field in order to gain material for teaching.

Preparation for teaching - the teacher prepares materials and aids for teaching. He does so with regard to teaching methods and resources that he intends to use to achieve his teaching goals. He can also, for example, prepare a mathematical simulation for teaching purposes.

- Teaching – the teacher records important information from the course of his instruction that he can use in the future to better organize and improve his teaching.
- Working with and evaluating students - a diverse activity in which the teacher keeps records of students, in different ways recording notes on the students' work and finally evaluating them.
- Research - Each university teacher should be a deeply involved in the research being carried out at his university, though this is not always necessarily the case. He may be involved only formally, without much interest, or he may organize research, submit applications for grants, etc.
- Publications – The teacher can publishes material for students (textbooks, supporting study materials, etc.) or publish the results of his research for use by experts.
- School obligations and other activities – the teacher requires some support from his institution. Unfortunately, at the present in some schools in the Czech Republic teachers are given many, often chaotic, and frequently unnecessary, tasks. Business Intelligence should provide the type of support that prevents the teacher from becoming a victim of excessive teacher workload, which would then be negatively reflected in his performance in other more important areas.

IV. Typical Tutors and Teachers Communication

In the learning process, each teacher in a similar manner (understood regardless of the content) store, collect and process the necessary data in terms of the educational process, but also in terms of their continuing professional development. It also processes certain data receives information from them and finally knowledge.

In this paper and the research will focus on whether it is important in the field of education to apply the principles of Business Intelligence, which are known in the field of electronic business (trading). Yet we must also look at the specific differences of business and education. In terms of the marketing mix, a teacher offers a specific product in a certain place. Along with this comes communication and promotion. The teacher is then rewarded or paid for providing his product.

The 4Ps of marketing, as described in [4], are therefore valid here. A study of the normal conditions for teacher activities and their expected results in no way refutes our initial hypothesis. The products are the teacher's knowledge and his ability to communicate it to students and other interested parties – the customers. He passes this on to them through direct and indirect instruction, prepared e-learning, through publications, through contributions at conferences, etc. It is necessary for the teacher to properly develop and improve his product to a level that it will be demanded by the target market segment. We can consider students, other teachers, and professionals who want to increase their skills through the product to be the target market segment. The teacher, as with every entrepreneur, must know his target market segment and communicate with it - not only to offer his knowledge, but also to acquire and maintain an overview of its interests. Even then, the interests of the target market segment, to which the teacher will market his product, may not be, and often are not, identical. For example, a future car designer needs the genuine expertise necessary to design a quality car. Simply put, this knowledge is a product given to him by a teacher. The acquired knowledge is then used by the designer to design a car demanded by the target market segment. The teacher must also, however, anticipate the different possible characteristics of the designer's product, in our case a car. For simplicity's sake, we can compare the difference in design of a car with a combustion engine and an electric one. The teacher must therefore continue to develop his own knowledge, explore, search and find new paths. The teacher must also communicate with his target market segment in a certain place and keep a record of this communication. In addition, he must offer and provide the product to his customers at an acceptable and competitive price. For these reasons, we can look at whether it would be possible to use certain forms of Business Intelligence which are used by ordinary companies. A teacher's main activities are not, always carried out uniformly and regularly. They can be divided into activities in which the teacher gets information from elsewhere, and needs to save or store it in his Business Intelligence for further use in the future, and for activities where he needs to use information that is already stored.

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V. Business Intelligence Using in the Educational Process

Based on our analysis of these activities, we concluded that a form of Business Intelligence, which is used mainly by large companies and businesses, can also be used to support teachers. , see for example [5]. According to [1] "the term Business Intelligence refers to the process of transforming data (data) and the transfer of this information to the knowledge used to support the business (decision making)." In our case, this can be used to support teaching. In the university environment there are high-quality information systems with a vast array of possible applications.

The basic of Business Intelligence is collecting and storing vast amounts of data, obtained for example through study, preparation for teaching, teaching, communication with students, doing research, publications, etc., into data warehouses. The input data is not always be initially sorted or filtered, i.e. processed. This happens in the data's subsequent processing. Filtering removes redundant data, which is sorted, checked for accuracy, then stored and classified according to various criteria. This reduces the amount of data, but the data, information and knowledge that remains has significantly higher information value. Building a data warehouse is dealt with in e.g. [6].

According to [3], a data warehouse is a central repository of diverse company data that contains not only the data in the database, but also tools for selecting, filtering and analyzing the data. The information in it is accessible to authorized users, and can be used to prepare presentations or be further processed. Data warehouses must also be protected against misuse, outlined in laws such as those on privacy protection of personal data (data about students). The entire process of creating and maintaining data warehouses, in addition to their usage, is denoted by the term Business Intelligence, see [8].

Data marts - warehouses are accessible according to specific rules for specific users. Data can be shared and used for various purposes. An example might be a list of enrolled students, created by the student affairs office, and a list of teachers created by the personnel department. The result is the possibility for teachers to record a student's results, while also

ensuring the student is authorized to be examined in the given subject. The data can then be returned to the central data warehouse based on the relevant authorizations.

Data Mining – through an analysis it is also possible to get hidden data from the data warehouse which can then be used for specific purposes. For example, from a list of students we can get the number of students who have not yet completed a specific exam, the statistics regarding the grades given by a specific teacher, etc. According [6] Business Intelligence applications have other characteristics, from which we select:- Ensuring selection and processing of data according to various criteria,- Allowing the permanent update of available internal and external data sources. A diagram of Business Intelligence for teachers is shown in Figure 1, and is based on the usual schemata of Business Intelligence, as presented in educational communication [4].

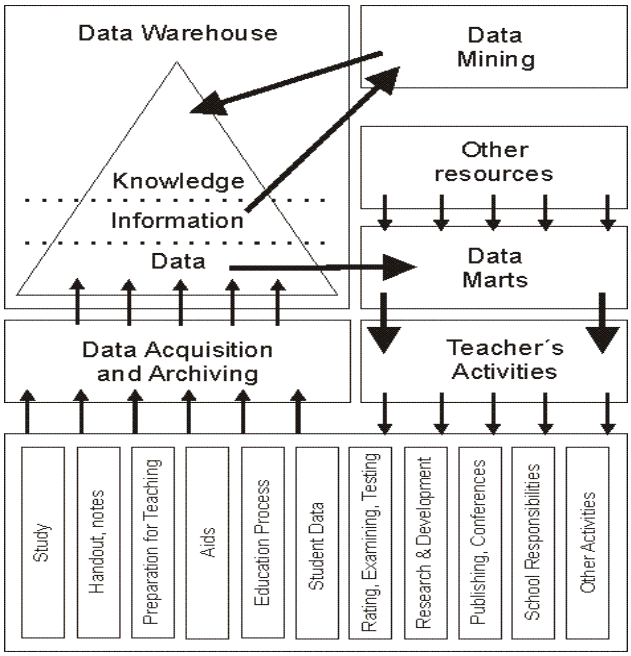

Fig. 3 Simplified schema of Business Intelligence modified for communication in education

VI. University Marketing Communications

Marketing mix forms one of the cornerstones of marketing. In practice, we must continue to build on the target market segment on which we focus. For this reason are using two types of marketing mix. They are called 4P, which is compiled from the perspective of the seller, and the 4C, which is compiled from a customer perspective (target market segment), see below. Marketing mix from the perspective of the seller consists of four main elements:

- Product - presents certain characteristics, range, quality, brand, product life cycle.
- Price - closely related to the utility value of the product, the product position in the market is related to the life cycle of a product.
- Place - expresses the availability of the product, sales opportunities, logistics and supplies.
- Promotion - is closely related not only with the other elements of the marketing mix, which provides for all necessary transfers of data and feedback from the target market.

If we have dealt only with the actual product, price, distribution and communication focused only towards the target market (e.g. advertising), we lacked the most basic information about whether one of our products (any tangible and intangible - a service) is not on the target market interest. Probably in this case we would not have the slightest idea who our target market is. In the best case we could somehow anticipate market oriented, but without proper quality assurance of the feedback received during our communication. Therefore, the marketing mix in the diagram in Fig. 1 completed target market, although it is not explicitly mentioned as part of the 4P. From obvious reasons it is at least implicitly. The target market is mainly related latter composition marketing mix - from the customer's perspective.

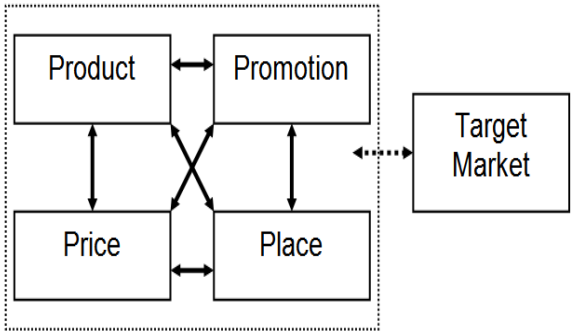

Fig. 4 Scheme of the marketing mix

Marketing mix is based on thorough knowledge of the market and good quality. Market knowledge is obtained only two-way marketing communications. The target market while we work available media resources. Given that we focus on research in the field of marketing communication universities, now let's look at individual components of the marketing mix [4].

First, from the perspective of high school, as seller (4P - Product, Price, Place, Promotion):

- Product is presented in the case of education as a service. The educational institution provides the target market segment (consumer). This service is characterized by a degree course, which offers educational institutions to study [5]. Field has its specific characteristics and properties, as approved in the case of universities the Accreditation Commission. It is usually determined by a particular market segment, which can be defined as an intersection of sets of the age, psychological characteristics, social capabilities, expertise in certain population groups. To some extent the product (service) associated with "corporate" identity,

educational institutions. A simple example might be a famous university, whose completion can play for example, introducing a greater role than specific subject studied (a graduate of Harvard or Oxford).

- Price - if education is to study the possibilities offered by field of study, especially as it is given its market position and product life cycle. For some fields for the customer price is quite difficult to quantify financially. The relevant school would cost relative to one student clearly knew how to calculate, but not publish it. These courses of study are offered exclusively by public universities. Due to the uniqueness of their menu is missing comparisons. Examples are some courses of medical faculties. Studying these subjects in public universities is then relatively free, but usually there is also seen significant excess of demand over supply. Cheaper product (service) will receive the customer (student) on non-economic basis of their ability (talent, long-term interest, knowledge, etc.) that in these difficult cases replaced definable way express the price in money. For fields that offer also (or only) private higher education services is the price expressed in money, and there is noticeable and the share of non-economic, which is given by the admission procedures, entry requirements for students, etc. While we are discussing whether price in terms of money is real or not, but we must realize that it is part of hard competition. If the relevant school requires a higher price, it should be supported by service levels, provided a certain luxury. The higher cost of services is justified. If the school your equipment, necessary for study, and providing other services comparable to others, should be comparable to the price of the courses offered. One can argue that in terms of equipping schools often offer studies at a substantially lower price. But it certainly not a dumping price. It is necessary to look at the marketing mix from a customer perspective, see the following section. Price studies usually also associated with the life cycle of a product. For studies of attractive fields of study have not yet reached maturity stage (in terms of product life cycles), will require a higher price than for the study of the very industry that is already on the contrary for the phase of maturity, and specialist market is saturated [6]. Of course, the information contained in this document may be interpreted dogmatically, we can admit that the significant differences.
- Place - The school allows students to study in a particular place. For example through distance learning using e-learning site reflects the availability of product (services). In the case of e-learning, etc. can be available studies, such as services, a way to characterize the distribution of study materials (Internet, sent by a carrier with recordings, etc.). Distribution is also related to other components of the marketing mix. For example school located in a remote village with transport and accommodation will be hampered by difficulties in the preparation of the product (for example, will choose e-learning) or will have to take into account its location with the price.
- Promotion (communications) provides all the necessary data transfers for all elements of marketing mix, including the transfer of feedback from the target market segment. This is an important example for understanding the target market segment response to other components of the marketing mix. Schools are also other important "ability" communication - ensuring promotion. We could here go into the analysis leading to the communication mix, and analyse its effectiveness. But that would have exceeded the scope of this article. Allow yourself to one comment. Private schools use the opportunity to advertise in a much larger scale than the public.

Marketing mix from a customer perspective: Without the customers (students) would be all the communication activities of each school unnecessary. It is therefore important that schools are trying to satisfy the customer, i.e. it gives him the maximum value you expect. At the same time schools must meet their basic communication objectives that are in the case of private schools are more commercial. Objectives but must be established as a responsible and compatible with the requirements of the Accreditation Commission. That logic is not interested in profit or school funding, but the quality of education. Marketing mix customer-oriented and thus communicate with it will therefore have some other form. Marketing mix oriented to the customer will include so-called 4C (Customer value, Cost, Convenience, communication). For the customer a high school student is a potential for a 4C marketing mix as follows:

- Customer value - a price that the study itself for the customer. It can also be expressed financially, such as the amount that a potential student willing to give their studies. The sums do not necessarily reflect tuition only. They also enumerate certain way such as lost wages for the period of study. High school student can calculate how much of the study period comes to wages and earnings compare with her after graduating from university. Even in the case of a public university can found a sort of equivalent amount of tuition to private schools at the actual tuition will increase. Much depends on the amount of expected earnings after graduation [7]. Mostly, in the case of public universities almost overwhelming, the value represented also acquired knowledge, skills and competencies, and professional opportunities for students. From the perspective of this school is included in the profile of a particular field of study, the profiles for the same fields of study at different

schools may vary slightly, as the focus of the field. For the student it is important that the profile is a graduate of the first criteria that Accreditation Commission assesses each application for accreditation. And it may also, if necessary, to return, if it finds any irregularities in the implementation study. You can argue about the quality of implementation of the study area, which until the seriousness of the external auditors is subject to educational institutions.

- Cost - These costs can include costs associated with commuting, accommodation at the school, etc. It also includes the cost of required equipment, such as computer, Internet connection, purchase textbooks, etc.
- Convenience - in the case of education in this folder are included in terms of availability of school transport, or accommodation options in its range. For combined or distance study especially the level of the study support the ability to access, textbooks, etc. can be crucial to consultation, testing, etc. at the time and ways of meeting the needs of the students
- Communications - the quality of communication today plays an important role. What is important is the possibility of using communication technologies, which prefers the customer, a student. Communication must be fast, high-quality two-way transmission model as defined in the phase of communication with the applicant for introductory information, a potential student [8]. This course is especially for private schools. It can be assumed that the potential student gets some idea of their potential during the study and decides that the educational institution ultimately chooses. In this context, we can use a wide range, all of which provide Internet services, the target market segment and provide continuous updates dynamically or statically presented. Suitable examples may include the study materials, eLearning, etc. However, it must be a demonstration implemented in full, not a single some educational institutions [9].

VII. Research into the frequency of teacher activities

In their research, the authors cooperated exclusively with Czech universities both public and private. These included Charles University in Prague, the Czech Agricultural University in Prague, the Faculty of Education at the University of Hradec Kralove, the University of Economics, the University of West Bohemia in Pilsen, the Institute of Hospitality Management in Prague, the College of Business in Prague, and Metropolitan University in Prague. The research conducted was on a small scale – fewer than 100 respondents in total (in this case 82). The reason was that the initial research is part of a larger project that is currently still being prepared. This research therefore was not, at the time it was being conducted, officially supported by any institution. The obtained values were statistically evaluated. See below. Table 1 shows the results of the survey including their statistical evaluation. The individual teacher activities were described in the section titled "Teacher activities". The table shows the percentage of teachers who regularly carry out the activity. The values for standard error are shown with 95% reliability. In addition, the table lists by percentage the average share of time spent by each teacher who performs this activity regularly. The total period of activity for each teacher for the activities mentioned above is 100%. Statistically, these calculations are verified using variable coefficients. Overview of the frequency of activities carried out by individual teachers in %, and an overview of the average % of the share in relation to other activities. All activities are always 100% of time spent by each teacher identified in the survey.

Table I Result of the survey including statistical evaluation.

Teacher activity	Teachers who perform this activity		Frequency of use in teacher activites	
	% teachers	Standard error	% Σ time	Variable coefficient
Study	85,4%	3,9%	9,7%	14,4%
Preparation for	89,0%	3,5%	9,6%	15,7%
Teaching	64,6%	5,3%	7,3%	14,9%
Work with students and evaluation	100%	0%	35,3%	10,3%
Research	26,9%	4,9%	6,4%	12,9%
Publication	35,4%	5,2%	8,3%	13,1%
School obligations and other activities	100%	0%	38,5%	10,1%

VIII. Evaluation of research results

Given the limited scope of the research standard errors can be considered acceptable for basic orientation. Coefficients of variation can be considered as indicative only. It is important to realize that times of digestion in its implementation are purely individual. It varies according to job responsibilities and interests of individual teachers. Orientation survey showed a relatively high load in CR school teachers (non-educational) obligations and other activities. It can be often regarded as unnecessary and bureaucratic. On the contrary, relatively little time is spent in preparing teachers to teach. We can assume that it is influenced by the one created by repeating the preparation with small modifications. Teaching in the survey does not direct their own learning, but activities that are associated with teaching such as student attendance, knowledge of teaching, etc. The low percentage is acceptable [7].

a) How many teachers perform concrete activity? This research serves to pave the way what proportion of teachers from the sample deals with certain activities. From this research it should be clear which activities are most common for teachers. The following chart shows an overview of the

values observed.

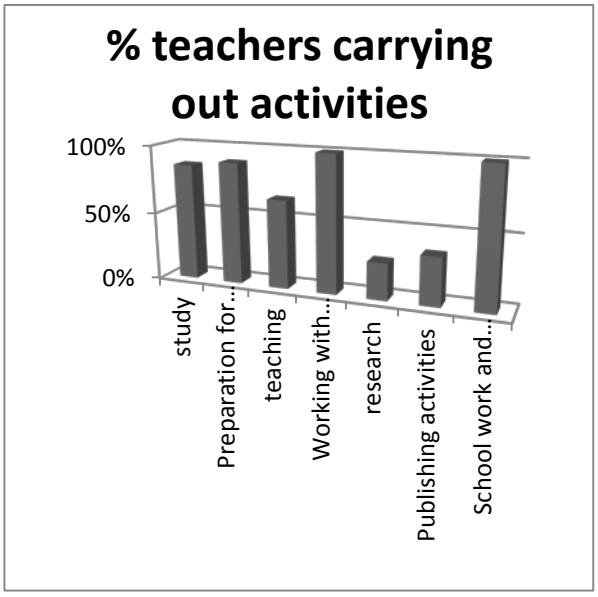

Fig. 5 presentation of the results of own research

b) How many% of the total working time of teachers takes appropriate action? This research serves to pave the way business is what over time the greatest burden for teachers. A following chart shows an overview of the values observed.

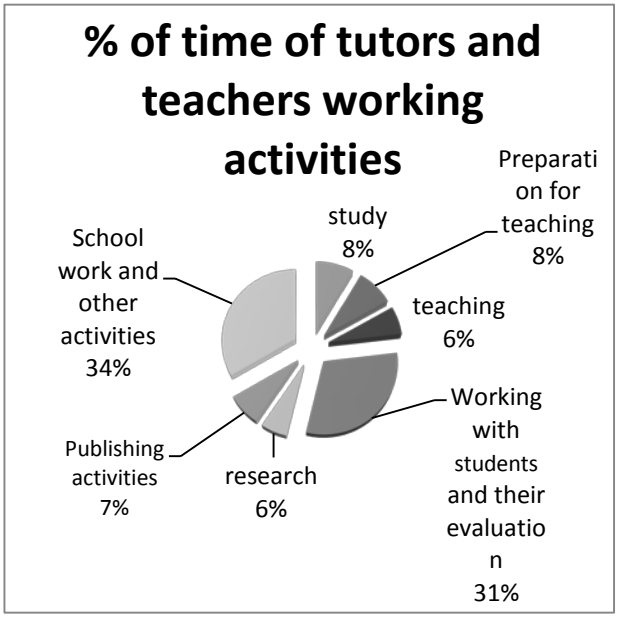

Fig. 6 Presentation of the results of own research

IX. Conclusion

Given the limited scope of the research, standard errors can be considered acceptable for gaining basic orientation [8]. Variable coefficients can be considered as approximate only. It is important to consider that the time spent on these activities is purely individual. Times vary according to job responsibilities and the interests of individual teachers. This initial survey showed a relatively heavy load in the Czech Republic for non-teaching obligations and other activities. These can be often regarded as unnecessary and bureaucratic. On the contrary, relatively little time is spent preparing for teaching by teachers. We can assume that it is influenced by the repeating material that has already been prepared, with only small modifications [9]. Teaching in the survey does mean only direct instruction, but also activities that are associated with teaching, such as student attendance, knowledge from teaching, etc. The low percentage is therefore acceptable. This paper, outlining how Business Intelligence can provide support for teachers, shows a modern way to apply research and development in the related areas of computer science and e-business in educational practice. We assume that in the future more attention will be paid to these issues in research supported by professional institutions.

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