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Research Article

Designing Undergraduate Curriculum for Management Information Systems (MIS) Education: A Comparison of the MIS Programs of Turkish Universities with those of Global Universities

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Abstract

Competition in the global environment takes place among multinational corporations, which is directly linked to human resources and the quality of training and education they have. The competitive advantage of the businesses is associated with the excellence of human resources, which is measured by the education quality of the employees. Information systems have become an essential requirement for the businesses of today's digital age. Therefore, with this study, curricula of 90 universities' Management Information Systems (MIS) Undergraduate Programs, 57 of which are foreign and 33 are Turkish, were compared. The study methods include data mining approaches namely random clustering and making a text mining analysis. As the number and importance of the MIS programs are rapidly increasing, it is aimed with these approaches to contribute developing a world-class curriculum model to improve the quality of education of them. On that ground, the main purpose of this study is creating a framework that defines a world-class MIS curriculum model by presenting the current situation in Turkey.

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Introduction

Those, who are employed in service-intensive sectors in terms of information and services, such as MIS must be well equipped with information technologies. The link between MIS and many sectors made reconciliation in global fields obligatory. Therefore, programs such as MIS, which gain an increasing importance and number with each passing day, should have an up to date world-class curriculum. Since the methods for accessing information are taught at universities, giving an up to date world-class education provides a global competitive advantage both in private and public sectors in the digital age that we live

in. This is because the competition in the global world has shifted from business to fields of expertise. The human resources of companies are what make the fields of expertise meaningful. Consequently, in this study it is aimed at making a comparison of the curriculum of MIS programs, which are the reflections of the digital age in a global perspective.

Literature Review

While the number of people who received a university education in general across the globe was under 50 million in the 1970's, this rate is expected to exceed 250 million people in 2025. The number of international students has reached from 800 thousand to 4.1 million between 1975 and 2010 (Tremblay, Lalancette, & Roseveare, 2012, p. 1-54). Developing an up to date, world-class curriculum in order to keep up with this transformation in education is of great importance. Even though there is not much research conducted on curricula design, specifically for MIS, there are many studies made in a very wide range and scope in general terms. King has made a research on whether the geosciences subjects are compulsory throughout the World or not (King, 2015, p. 420-430). On the other hand, in 1986 ASH'S ERIC Higher Education Course conducted a study under the Syllables Project, which was named Management Information Systems and was related to the curriculum of MIS programs. This study revealed that students should focus on management, accounting, finance, leadership and techniques of statistical research methods regarding especially the administration of institutions, decision support systems and use of information systems for strategic purposes. (Cope, 1986). Wang and Wang have made the following table by analysing 62 of the best business faculties the Business Week magazine established that offer MIS courses (Wang & Wang, 2014, p. 30-39).

As it can be concluded from Table 1 given below; Introductory MIS, Database and Systems Analysis & Design are amongst the most offered courses. The main courses of this department are comprised of Database and Systems Analysis & Design courses except for Introductory MIS. In their study, Wang and Wang have suggested four main important education curricula for the related field. These are; modelling of the business processes per the data flow diagram, decision making process and tools for the integrated system, awareness analysis and backward design and also information systems and design analysis. The study brings forth the information systems and design analysis courses and emphasises

the great importance of using the information systems within the integrated system in fields, such as MIS (Wang & Wang, 2014).

Table 1. Comparison of MIS Courses Offered in Business Faculties that have MIS Departments and that do not

Courses offered at 39 Business Faculties that have MIS Departments	**Number**	**Courses offered at 23 Business faculties that do not have MIS departments**	**Number**
Introductory MIS	39	Introductory MIS	15
Database	39	Systems Analysis & Design	10
Systems Analysis & Design	36	Database	8
E-Commerce	19	E-Commerce	5
Information Security	12	Decision Support System	2
Decision Support System	9	Information Security	2
Business Intelligence	4	Business Intelligence	1
Knowledge Management	3	Knowledge Management	1

Source: Wang, S., & Wang, H. (2014). Redesigning the Information Systems Analysis and Design Course: Curriculum Renewal. Journal of Computer Information Systems, 30-39.

Limitations of the Research

The research was conducted only by comparing of the courses, which the universities announced on their websites. Better quality results will be reached if the comparison is made while considering the infrastructure and the superstructure of the universities that offer MIS education. Especially the number of students, laboratories, academic members and the quality of the studies conducted by the academic staff and graduated students finding jobs and their earnings can be compared. However, because of the current situation, the extent of research conducted regarding the social and economic conditions of the students unfortunately cannot exceed a few of universities. Thus, the missing data regarding the areas that are going to be compared compose one of the main limitations of this research. The results were obtained in this study only by taking the course names into consideration.

In addition, the data sets for the research were used in English. This is because the programs and methods used do not support Turkish characters. This situation constitutes another criterion of the research.

Purpose of the Research

The main features that separate the information societies from industrial societies are; competition reaching up to global levels and increasing immensely, demands of freedom and democracy are rising and centralisation decreasing. Since investments and commercial relations have a global extent in information societies, businesses must manage the information effectively, be agile and establish their networks very strongly in the global

scale. That is why most developed countries have stepped into a reforming process in order to establish infrastructures that are applicable to information societies (Splettstoesser, 2013, p. 304). What makes people superior than the other is the education and training they have gained. What makes information societies superior from the others is the number of quality people it raises. Creating a quality information society will make the created society more competitive in the global competition environment.

Rapidly evolving information communication services and supply chain systems, which accompany them, form proper grounds for the global and business competition environment (Carpenter & State, 2006, p. 23). The competition in the global competitive environment is mostly among international businesses. This competition is directly related to human resources who have received quality training and education. According to the European Union Industrial Research and Development Advisory Committee, education and training have a vital importance in industrial competition (Longworth & Davies, 2014, p. 26). Therefore, today's governments have focused their education programs on lifelong learning to sustain global competition (Dahlman, Zeng, & Wang, 2007, p. XV). Information loses its up-to-datedness very quickly especially in fields, such as MIS. When lifelong learning is supported by quality university education, it will provide important advantages in sectors which information loses its up-to-datedness very quickly.

The competitive superiority of the Corporation is directly related to the quality of man power in the digital age, which means the education quality of the employees. Therefore, the information systems have become an irreplaceable function for the digital age we live in. Along with the developing information technologies, MIS presents possibilities for entrepreneurs to improve their management skills in the global competition environment and to seize opportunities (Gan, 2010, p. 78). Businesses who wish to adapt themselves to the rapidly changing global conditions, must keep their information systems very strong and flexible. People should be as effective in the network economy as information. Because the people will transform the data into information and people segment of businesses is the one who is going to make efficient decisions with it. Even though the machines have taken the human's place in an age when businesses are becoming digitalized, human is still the main actor of all the information systems. Businesses being able to give momentary strategic decisions in their operational activities depend on the effective use of information and technology, which means the quality of the people they have (Jawadekar, 2009).

Therefore, within the context of this study, curricula of 90 universities' MIS Undergraduate Programs, 57 of which are foreign and 33 are Turkish, were compared. The study methods include data mining methods of random clustering and making a text mining analysis. With these methods, it is aimed to contribute to developing a world-standard education syllabus model to improve the quality of education of MIS departments, number and importance of which are rapidly increasing. Benefiting from the shared wisdom of scientist from world-class universities is the main purpose of this study. On that ground, the main purpose of this study is creating a framework that defines the world-standard MIS education syllabus by presenting the current situation in Turkey.

Data Used for the Research

Within the scope of this study, curricula of 90 universities' MIS Undergraduate Programs, 57 of which are foreign and 33 are Turkish, were collected to be compared. Table 2 below is a sample of the data set.

Table 2. Sample Data Set

University of Notre Dame	**Rochester Institute of Technology**
Advanced Corporate Finance	Building a Web Business
Android Application Development	Business Planning
Application Development	Technology Enabled Launch
Building Web Applications	Business Intelligence
Software Tutorial	Information Systems & Technology
Web Design	Database Management Systems

Source: http://www.qscourses.com/courses/UnderGrad/?q=Management%20Information%20Systems#!pn=5 (Access Date: 06.06.2016)

Method

The processes of taking courses in Foreign and Turkish universities that have MIS departments were compared by the text mining method, which is a data mining method.

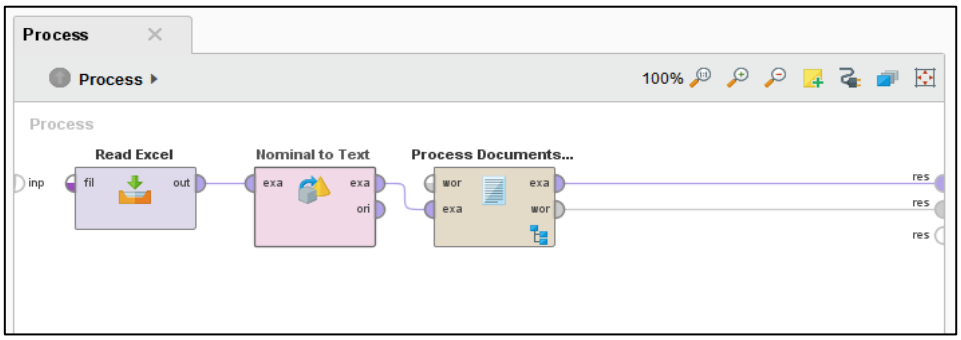

Figure 1. Operation of Course Substitution with RapidMiner which Uses Data Mining of the MIS

As it is clear from Figure 1, taking courses by using text mining in the field of MIS was done by the RapidMiner application (Lee & Mierswa, 2016).

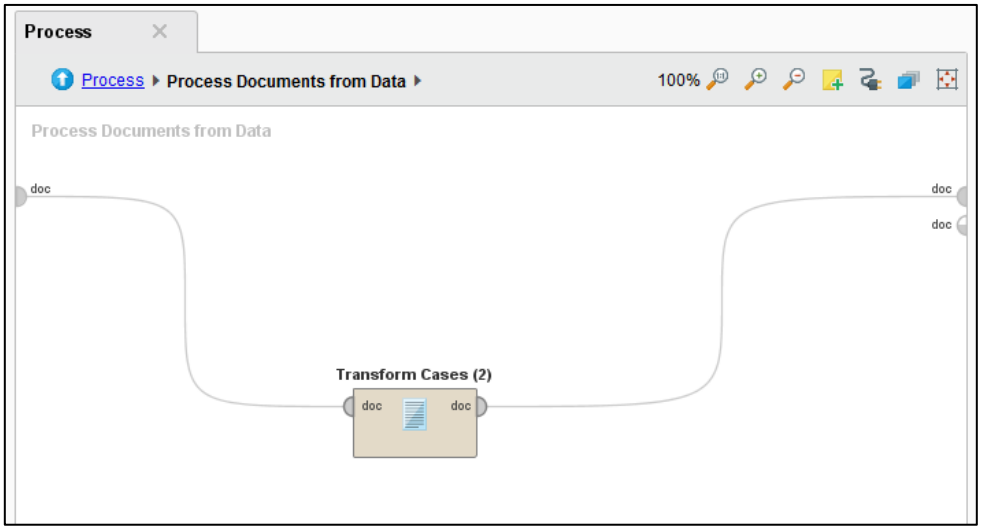

Figure 2. Screen Shot of Transform Cases which is the Internal Operator of Process Documents from Data

In order to do text mining in the RapidMiner application, the operator 'Process Documents from Data' is needed. This operator also requires 'Transform Cases' operator to function properly. Figure 2 is the screen shot of this operator. The operator 'Process Documents from Data' creates word vectors from word sequences. Thus, it carries out frequency analysis. The operator 'Transform Cases' helps the frequency analysis by unifying the characters of the words and eliminating differences. In other words, it makes transformations, such as the transformation of the upper-case letters to lower case letters (Lee & Mierswa, 2016).

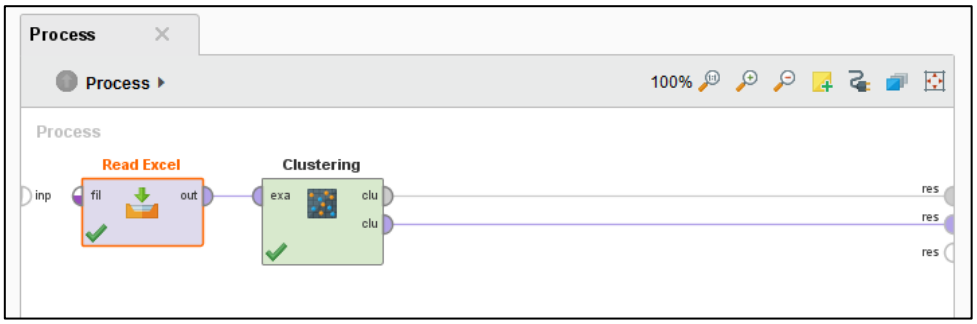

Figure 3. Screen Shot of RapidMiner Application: Clustering Analysis of Universities that Offer MIS Education

Turkish and global universities were clustered by random clustering method and the curricula of these universities, which are the most convenient ones for Turkey, were

determined. As it can be understood from Figure 3, the RapidMiner application was used in this operation (Lee & Mierswa, 2016).

Findings

The RapidMiner application formed 10 clusters in the random clustering analysis with the clustering algorithm. According to the clustering analysis results shown in Table 3 below, each cluster has several Turkish universities. Turkish universities take place in the clusters that are composed of the universities which are the closest ones to Turkey with respect to the given education curriculum.

Table 3. Clustering Analysis of Universities, which Offer MIS Education

Cluster	Universities
1	National University of Ireland, Galway Sheffield Hallam University, Dublin Institute of Technology, Loughborough University, King's College London, University of St Andrews, Beykent University, Mehmet Akif Ersoy University, Ufuk University, Bartın University
2	Santa Clara University, Leavey Royal Holloway, University of London, Universita Autònoma De Barcelona, Cork Institute of Technology, University of West London, Trinity College Dublin, University of Dublin, University of Wales Aberystwyth, Cumhuriyet University, Düzce University, Pamukkale University, İstanbul Bilgi University, Haliç University
3	Villanova University, University of Texas Austin, Birkbeck College - University of London, London South Bank University, Izhevsk State Technical University, Loughborough University, Bes La Salle Campus Barcelona Funitec, University of Edinburgh, Aston University, Saxion University of Applied Sciences
4	University of Illinois, Otto Von Guericke Universität Magdeburg, Yeditepe University (Business), Yeditepe University (MIS)
5	Brigham Young University, University of Georgia, University of Connecticut, Galway Mayo Institute of Technology, Hanzehogeschool Groningen, Cesine University Centre, Anadolu University, İstanbul Medipol University
6	University of Notre Dame, Heriot Watt University Edinburgh, Lancaster University, Bilecik Şeyh Edabali University, Özyeğin University, Atatürk University
7	Institute of Technology, Tralee Trinity College Dublin, University Of Dublin Institute of Public Administration, University of Manchester, Dokuz Eylül University, Işık University, Sabancı University, International Cyprus University
8	Rochester Institute of Technology, Duquesne University, Saint Petersburg State University, De Montfort University, Bradford University, Limerick Institute of Technology, Adana Bilim Teknik University, East Mediterranean University, Nişantaşı University, Osmaniye Korkut Ata University
9	University of Tulsa, De Montfort University, University College Cork, Brunel University, University of Southampton, Aksaray University, Sakarya University, Uludağ University, Yıldırım Beyazıt University
10	Universität Passau, Edinburgh Napier University, University of Bath, University of Ulster, University of Reading, University of Kent, Southampton Solent University, Lancaster University, Başkent University, Boğaziçi University, Girne American University, Hoca Ahmet Yesevi International Kazakh Turkish University, Marmara University

The point that needs to be paid attention is that universities which have one or few courses can take place in the same cluster. Therefore, it is not possible to obtain meaningful results solely from this result. As a result of this analysis, the foreign university cluster that the Turkish universities belong to was identified.

Table 4. Comparison of Courses Frequencies in Universities that Give Education in MIS

	Turkish Universities			Foreign Universities		
Number	**Course Name**	**Total Frequency**	**University Frequency**	**Course Name**	**Total Frequency**	**University Frequency**
1	Atatürk's Principles & History	49.0	21.0	Web Design	22.0	19.0
2	Turkish Language	45.0	31.0	Marketing	19.0	15.0
3	Economics	32.0	27.0	Programming	19.0	16.0
4	Web Design	30.0	22.0	Operations Management	15.0	12.0
5	English	25.0	22.0	Human Resource Management	13.0	11.0
6	Marketing	22.0	19.0	Systems Analysis & Design	13.0	11.0
7	Accounting	20.0	16.0	Databases	12.0	11.0
8	Business	18.0	17.0	Project Management	12.0	10.0
9	Database Management Systems	17.0	11.0	Accounting	11.0	8.0
10	Law	17.0	12.0	Management Accounting	10.0	8.0

As it is understood from Table 4, the courses that are offered mostly in the Turkish universities are Atatürk's Principles & the History of Turkish Revolution and Turkish Language. When these are excluded, Economy, Web Design, English, Marketing, Accounting, Business, Database Management System and Law are the most frequently offered courses in the Turkish universities. However, the most frequently offered courses in the foreign universities are as follows; Web Design, Marketing, Programming, Human Resources Management, System Analysis and Design, Project Management, Accounting and Management Accounting.

The most interesting elective course offered in MIS departments of the Turkish universities is "Sexuality and Reproductive Health". There is no such course or even similar elective courses in the foreign universities. Courses with interesting subjects for the MIS field, such as this one, is not offered in the state universities but offered in the private ones.

While the Turkish universities predominantly offer business courses, the foreign universities offer a more balanced schedule with engineering, computing and business courses. Wang and Wang revealed in their work that Database Management and System Analysis & Design was in top three, but this study concluded that in the foreign universities the System Analysis & Design course is number six and Database Management is number seven in ranking (Wang & Wang, 2014). However, in the Turkish Universities System Analysis & Design course even is not in top ten courses and the Database Management course is number nine in ranking.

Conclusion

Using and reproducing the information is of great importance for information societies in today's world when the concepts of 3rd generation university and entrepreneurial university are being discussed. It is inevitable that the universities, which are changing and transforming under the pressure of the global competition, and their departments should have world-class education curricula.

Disciplines that aim to use information according to the purposes of institutions, such as MIS, will play an important role and even become pioneers in forming the university that information societies need.

Therefore, the education curriculum of departments, such as MIS should be designed in a way that meets the world standards and that will educate man power that is going to provide advantage in global competition.

However, the standards trying to be met by getting involved in systems, such as the European Credit Transfer Accumulation System (ECTS) may cause waste of time and effort as the credits are trying to be completed with courses, such as the Atatürk's Principles & the History of Turkey's Revolution. Moreover, these courses are offered in primary and secondary levels. As retaking these courses in the university level result in neglecting other courses, this situation drives Turkish universities further away from world standards. These courses also do not have similar ones or substitutes in foreign universities that are included in systems, such as ECTS.

Finally, a successful MIS program was designed based on the analysis made by bringing together the Computing and Engineering Sciences of foreign universities. Some MIS programs can even offer flexible education by separating into the fields of expertise

according to the students' interests. The number of universities in Turkey offering this kind of flexible education is almost zero. Instead of a specialized MIS training, Turkey has a predominantly uniform MIS education. MIS departments offer education based mostly on the Business curriculum. Education and Training regarding Computing and Engineering Sciences unfortunately fall behind compared to Business education. That is why the Turkish universities should design world-class education curricula in the field of MIS and balance these curricula with not only the business but also with other disciplines. However, it is very important that the qualified academicians, who are going to give education regarding especially Computing and Engineering Sciences, should be employed in MIS departments and the curricula should be supported with applied lab courses.

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