

Employer satisfaction with IT graduate's skills

by

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NUGSE RESEARCH APPROVAL DECISION LETTER

The NUGSE Research Committee reviewed the project entitled “Employers’ satisfaction with the entry-level IT employer's skills” by Madina Jumabayeva and decided:

- To grant approval for this study
- To grant approval for this study subject to minor changes, to be signed off by supervisor
- To request additional information/clarification to determine approval
- To refer the application for IREC review

Approval: This approval is effective for the life of the study. However, any time you change any aspect of your project (e.g., recruitment process, administering materials, collecting data, gaining consent, changing participants) you will need to submit a request for modification to the NUGSE Research Committee. Make sure to address all of the information requested on the request for modification form(s). Please be advised that in some circumstances, changes to the protocol may disqualify the project from approval.

Sincerely,

NUGSE Research Committee

Abstract

Analysts in the field education state that Kazakhstani universities can't prepare graduates who would meet the expectations of job-market. An investigation into employers' opinions regarding the currently existing issues in IT university education in Kazakhstan, as well as their understanding about the role of university serving as a public good, reveals a mismatch between what is demanded in the job-market and what universities teach to students. The study's participants showed their interest towards vocationalism in higher education. At the same time, IT employers are not interested in participating in internship training programs, despite their desire to have graduates who would be fully prepared to start working in their companies. Furthermore, employers don't want to spend money on training entry-level employees. Regarding the role of university as a public good, the participants understand that university education should develop in IT graduates social skills like responsibility, self-learning and preparedness to do work. They claim that social skills and dispositions, like tolerance and humanity, should be taught to students by their parents and school teachers, and university coursework shouldn't be investing time in developing those skills.

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Chapter 1: Introduction

In this chapter, I will introduce to my Master's Thesis, which was aimed to understand the perspectives of the IT professionals involved in hiring process in Kazakhstan on the role of the university in preparing IT professionals for Kazakhstan, and the quality of IT education in Kazakhstani higher education. This research is from the higher education field on a topic of university IT education. In this chapter, I will present my the problem statement and the purpose statement of research, the research questions, my role as a researcher in this work,, and the research design. At the end, I will introduce the preview of my research.

Statement of the Research Problem

According to the report by OECD "Higher education in Kazakhstan", the linkage between the employers and university is not developed in Kazakhstan, and in order to meet the need of economy there is need to align university curriculum with the need of job market (OECD, 2007). The report states that "it is vital to national competitiveness that individual higher education institutions forge and develop relationships with employers in all their subject areas; that these relationships are used effectively to identify ways in which the institution's courses might better meet employers' needs; and that HEIs have the authority and autonomy to adjust course accordingly" (OECD, 2007, p.48). In that sense, another OECD document "Competitiveness and Private Sector Development: Kazakhstan (2010)" , which was released in 2011 reports that "technical, business and marketing curricula and specializations in higher education institutions are all very theoretical and a large part of them do not correspond to the present market requirements" (OECD, 2011,p. 231). All that information concludes that in the view of influential analytics Kazakhstani university education is not meeting the demands of job-market.

Considering the weak linkage analyzed above between the university industry relationship, it might be suggested to investigate how well university education is meeting the demand of particular type of industry. Since my background is in IT field, I found it interesting to investigate to what extent Kazakhstani universities meet the demands of the IT job-market. This type of research would be important to confirm whether there is a mismatch between what universities teach to students and what IT job-market demands.

Despite that it is believed that university curriculum should align with the industry demands, there are other purposes of higher education. Giroux (2005) argues that higher education is intended “to educate students for active and civic citizenship” (p. 193). In fact, critics of recent trends in higher education, away from these other purposes, negatively describe these emphasis on employability as ‘vocationalism’, aligning university curriculum with the needs of industry. Despite that researchers in educational field understand the role of education as a public good, it would be interesting to know what employers think regarding this issue. Investigating that type of problem would be beneficial for policy-makers in educational field and policy-makers involved in process of university curriculum design, and for employers who hire IT students.

Research Purpose Statement

The purpose of my mixed method research is to understand the perspectives of the IT professionals involved in hiring process in Kazakhstan on the role of the university in preparing IT professionals for Kazakhstan, and the quality of IT education in Kazakhstani higher education.

Research Questions

1) Which type of skills and knowledge are currently demanded in the IT job-market according to Kazakhstani IT employers?

(2) To what extent are IT employers satisfied with the skills, knowledge and capabilities of IT majors from Kazakhstani universities?

(3) What is the perceived effectiveness of internship programs for Kazakhstani university students in IT companies, and what are suggestions to improve it?

(4) How do Kazakhstani employers understand the purpose of higher education? For example, do they consider higher education to have a primarily vocational purpose, or do they interpret that university education also has national priority of educating active and informed citizens of Kazakhstani society?

Research Design

In order to investigate the purpose of this research, I conducted a mixed-method research. At the first stage, I distributed an online survey to 25 Kazakhstani IT employers. After analyzing the data, I derived several questions, which needed to be clarified, so as a complementing part of my research methods, I conducted four interviews with participants: an IT employer, an IT university teacher, a policy-maker and a university Career and Advising Center employee. Those participants were chosen because they were knowledgeable regarding the issues, which I investigated in qualitative part of the research. I consider that mixed-method research was the most appropriate method to collect information for this research as both data collection methodologies fruitfully contributed towards answering my research questions. The quantitative part of research was used to get the overall picture of my participants opinion. The qualitative was useful for clarifying the questions, which remained after I analyzed the survey results.

Research Role

Here, I want to discuss my “position” as a researcher in this study. I find it important to explain how my background experience brought me to investigate this topic.

This will help readers to understand the areas where I have worked diligently and to understand areas of my personal biases and perspectives.

My professional background is coming from IT field and prior to starting the Master of Educational Leadership program, I completed my bachelor degree in a US university. Since I also had experience of studying in one of the Kazakhstani universities, I always compared the quality of education in the US university and in local Kazakhstani universities. My opinion was that engineering and IT programs in local universities are outdated, and our universities are not meeting the demand of the job-market. I strongly believed that university education is aimed for educating the skills and knowledge, which is demanded by industry. In my understanding, university must serve the role of service provider, and teach students skills, which would help them to get successful employment after graduation. Once starting my research, my research supervisor asked me to add the fourth research question regarding the role of university as a public good. I found this question to be useless since I was not aware that university also serve the role of public good in society. After completing this work, I understood that university education has also the purpose of civic education. The results of my research analysis will be reflected in depth in discussion chapter.

Preview

Following this thesis introduction is Chapter 2: Literature Review. In this section, I will study the key issues and concepts presented in literature related to my study. Then comes Chapter 3: Methodology & Findings, where I will show the analysis of my research data and present the findings of the research. The next chapter is Chapter 4: Discussion of Findings, where I will develop the discussion regarding the findings and answer the research questions of this study. The last chapter is Chapter 5: Conclusion.

Chapter 2: Literature Review

In this chapter, I will show the relevance of my study to the key issues, debates, concepts and theories discussed in literature. The purpose of reviewing literature “is to look at how other writers and researchers discuss, debate and use existing literature to contextualise the work they present” (Wellington, Bathmaker, Hunt, McCulloh & Sikes, 2005, p.73). Bloomberg and Volpe (2008) state that “a review of literature allows you to get a grip on what is known and to learn where the “holes” are in the current body of knowledge” (p. 49). The purpose of my mixed method research is to understand the perspectives of the IT professionals involved in hiring process in Kazakhstan on the role of the university in preparing IT professionals for Kazakhstan, and the quality of IT education in Kazakhstani higher education.

My research questions are the following: 1) Which type of skills and knowledge are currently demanded in the IT job-market according to Kazakhstani IT employers? (2) To what extent are IT employers satisfied with the skills, knowledge and capabilities of IT majors from Kazakhstani universities? (3) What is the perceived effectiveness of internship programs for Kazakhstani university students in IT companies, and what are suggestions to improve it? (4) How do Kazakhstani employers understand the purpose of higher education? For example, do they consider higher education to have a primarily vocational purpose, or do they interpret that university education also has national priority of educating active and informed citizens of Kazakhstani society?

In the first part of this chapter, I will talk about higher education serving role as a public good. Here, I will explain how the purpose of higher education is shifting from developing civic, intellectual and moral goals to more vocational purposes. The second part will be about the industry-university collaboration in educational purposes. I will talk specifically about project-based learning model and co-operative model of education. In

the third part, I will touch upon the employability skills which are demanded in job-market. The fourth section will be about the skill gap problem existing in IT industry. The literature will talk about the mismatch between the skills demanded in the job-market and the skills provided by universities. Lastly, I will bring together the key concepts explored in this discussion into a Conceptual Framework that will become “a repository for the findings as well as a tool for analysis” (Bloomberg & Volpe, 2008, p. 52) of my research.

Higher Education as Public Good

The discussion in this section is connected to a larger discussion of changing the purpose of higher education from serving as a public good into becoming more vocationalised institute which primary purpose is training a workforce for job-market needs. Here, I will summarize the ideas about the purpose of higher education and how it is shifting from its original purpose of developing civic culture towards becoming an institute for vocationalised training.

Considering the current trends in higher education which were created by the High-Tech Revolution, the literature talks about the purpose of higher education to serve for the “benefits to the nation’s economy, protection of the national defense, the creation of new knowledge, and the promise of equality of educational opportunity - and its private benefits in giving individuals access to income and professional status” (Grubb & Lazerson, 2005, p.2). The authors state that higher education is changing its purpose from being a public good/civic culture towards the workforce training institution. Thus, the purpose of higher education is shifting from the traditional liberal higher education to professional education with “more utilitarian, vocational and functional curricula” (Peach, 2010, p. 449).

Grubb & Lazerson (2005) argue that considering the fast changing nature of technology, it is possible that individuals with higher education “are likely to find their specific work skill obsolete” (Grubb & Lazerson, 2005, p.1), so that higher education should primarily prepare the graduates to “keep up with advances in technology and expect to change their employment often as firms and industries compete globally, adopt new technologies and new forms of work organization, and individuals must be able to engage in “life-long” learning” (Grubb & Lazerson, 2005, p.2).

The nature of professional education distinguishes it from the vocational education in terms that higher education has a “responsibility to instil and preserve a set of shared societal and civic values as well as addressing social mobility and educating the next generation who are most likely to hold positions of responsibility in civil society” (Peach, 2010, p. 456). Peach (2010) here adds that “higher education also plays a critical role in sustaining a competitive, productive economy and building a flexible workforce by providing vocational training for many professional domains on which society depends” (Peach, 2010, p.456). Thus, some authors claim that higher education should serve the role of both educating the civic citizenship as well as providing training for the job-market needs.

On the other hand, other authors critically talk about vocationalisation of higher education. In that sense, Mangan (as cited by Giroux, 2005) develops the following opinion

what was once part of the hidden curriculum of higher education – the creeping vocationalization and subordination of learning to the dictates of the market – has become an open, and defining, principle of education at all levels of learning.

(p.185)

Giroux (2005) critiques the role of higher education serving as part of training institute of job-market needs, saying that “education must not be confused with training, suggesting all the more that educators resist allowing commercial values to shape the purpose and mission of higher education” (Giroux, 2005, p. 184). Author argues that “education is a moral and political practice and always presupposes an introduction to and preparation for particular forms of social life, a particular rendering of what community is, and what the future might hold” (Giroux, 2005, p.188). So this argument leads to discussion whether higher education should train the workforce for the job-market needs, where the main value is placed upon developing individuals who would be able to sell their skills to employers or university should educate people with social values who would serve the needs of society.

The role of higher education serving as an institute of civic and moral responsibility has been developed by Ehrlich (2000). In his book “Civic Responsibility and Higher Education”, author comprises the following idea,

Within domains of individual integrity, social responsibility, civic responsibility, and constructive political participation, a fully developed individual must have the ability to think clearly and in an appropriate complex and sophisticated way about moral and civic issues; the moral commitment and sense of personal responsibility to act, which can also include moral commitment and sense of personal responsibility to act, which can also include moral emotions such as empathy and concern for others; moral and civic values, interests, and habits; and knowledge and experience in the relevant domains of life. (p.30)

The literature on the role of higher education as a public good talks about the process of changing the purpose of higher education from being a public good towards

becoming a private good. Giroux (2005) and Ehrlich (2000) argue that while making the role of higher education to be a private good, universities and government might educate citizens who would only be concerned about their personal needs. Giroux (2005) explains that the purpose of higher education is “to educate students for active and civic citizenship” (p.193), and nowadays the role of higher education is understood as a part of training industry which supports the development of individualism and trains the workforce for the needs of businesses. Primarily, I find this discussion to be important in my research as one of my research questions investigates how employers understand the role of university for educating civic and moral responsibility.

Industry and University Collaboration

In the section above, I explained how the purpose of higher education is shifting from serving as a public good towards becoming more vocationalised educational institute. Below, I explain how industry and university can collaborate together in educational processes.

Experts in educational field suggest many ways how industry and university can better collaborate in educational processes (Cerych, 1985; Radermacher et.al, 2014; Detmer, Li, Dong & Hankins, 2010).The general description on how university and industry can collaborate in educational processes was described by Ceryh (1985) .The author defines several possible ways how industry and university can collaborate better in preparing university graduates:

- (i) co-operation in research (joint research projects, specific goal-oriented research contracts awarded by industry to universities, general industrial grants to universities for purposes such as the setting up of a chair or the provision of facilities for general research activity);

- (ii) university lecturers and researchers acting as industrial consultants;
- (iii) industrial executives, engineers and researchers acting as part-time university lecturers;
- (iv) work placement of students in industry. The aims of this may vary from simple initiation into industrial life to the preparation of doctoral theses based on research projects carried out in firms;
- (v) different types of lifelong or adult education organised by higher education institutions for industrial personnel;
- (vi) the reduced-price sale or donation of equipment by industry to universities;
- (vii) regular mutual visits;
- (viii) jointly organised meetings, conferences and seminars;
- (ix) joint publications;
- (x) joint participation in exhibitions or fairs;
- (xi) industrial support for student associations or activities like sport or travel;
- (xii) industrial representation on the governing and consultative boards of higher education establishments. (Cerych, 1985, p.8)

Cerych (1985) describes several ways how industry and university can better collaborate on preparing university graduates with the skills required at the job-market. I found it important to talk specifically about the co-operation in research and work placement of student in industry, which was mentioned above.

Co-operation in Research.

In this subsection, I will present information about one of the ways for teaching university graduates the skill required at the job-market. In the classification list by Cerych (1985), presented above this model would be called as “co-operation in research.» Literature on this topic talks about the benefits of using a Project-Based Learning model, which is aimed for teaching students to work on projects in collaboration with employers. Fernandez & Williamson (2003) define project-based model as following:

“an instructional method that uses complex, real-life projects to motivate learning and provide learning experiences; the projects are authentic, yet adhere to a curricular framework" (p.37).

Detmer, Li, Dong & Hankins (2010) further define the Project-Based Learning as an educational model, where university instructors, industry representatives and students are engaged in doing a “real-world” type of project. Instructors and industry representatives in this model play the role of those who advise students how to complete the work and provide the feedback. Students work on the project, which later would be used to the in in real-industry production. Authors argue that traditional - organized lectures are less beneficial because “traditional computer science curriculums emphasize lecture-based classroom teaching with limited exposure to real-world problems and projects” (Detmer et al., 2010, p.1), adding that “many class projects are contrived small, well defined “toy” projects” (Detmer et al., 2010, p.1). Detmer et al. (2010) emphasize the importance of doing real-life projects in computer science programs as following,

when students see how course materials are directly related to a project to be developed for a real-world problem, and that the completion of the project makes a

difference in the real world, they are more motivated to learn. (Detmer et al., 2010, p.1).

Fernandez and Williamson (2003) state that in order to implement the Project-Based Learning in university coursework, they developed a two-course sequence, where as a learning outcome students were expected to “engage in collaborative, project-based activities to learn about project management, requirement analysis, modeling, and prototyping, design specifications and application implementation” (Fernandez & Williamson, 2003, p.37), which are essentially all the skills used during various stages of software development life-cycle - a “conceptual framework or process that considers the structure of the stages involved in the development of an application from its initial feasibility study through to its deployment in the field and maintenance” (Ruparelia, 2010, p. 8). Fernandez and Williamson (2003) add that project-based learning model also beneficial for development of problem-solving skills and building teamwork among group members.

Detmer et.al (2010) say that the challenges of using this model involves several issues, such as not enough technical background of students to work on project, problems with completing the project on-time, problems with not meeting the quality standards, legal issues of project ownership. Fernandez & Williamson (2003) emphasize that dealing with group communication and conflict resolution is one of the main challenges in implementing that model, so they recommend to “make time in the course to teach process skills such as effective communication, teamwork, and conflict management” (p.38).

Above I talked about the project-based learning model, which is used to teach students to do “real-life” projects, which is one of the ways to teach students the skills

needed in the job-market. Next, I will describe the cooperative education model, which is one of the on-job training models used in university education.

Work Placement of Student in Industry.

In this subcategory, I will talk about the model for improving industry and university collaboration which was defined by Cerych (1985) as work placement of student in industry. Today, this model would include on-job trainings which student do during university studies. Surakka and Malmi (2002) classify three type of on-job trainings: work experience programs, internship program and co-operative education. I found it important to talk specifically about co-operative education model and its benefits, as this information will be useful in my discussion chapter.

The term co-operative education implies “work and university experiences under the direction of teacher co-ordinator, arranged between the university and the employer in such a way to complement each other in progressing towards an occupational goal” (Surakka & Malmi, 2002, p.44). Fried (as cited in Huggins, 2009) gives more definitive description of co-operative education:

Cooperative education is traditionally structured with alternating periods of work and study. Some institutions require all of a student’s work experiences to be conducted with the same employer; others allow for multiple employers per student. Some institutions begin work experiences in the first year; others delay them until later. Some institutions conduct work and study at the same time (e.g. day/evening programs); others separate work and study into separate periods. Work experiences can be paid or unpaid. Most institutions have an optional cooperative program available; a small number of institutions require cooperative education for selected majors, and a few require it of all majors. (p.90)

In terms of the benefits of co-operative education, Huggins (2009) says that co-operative education have the benefits of applicability as employers expect students “to put principles learned in the classroom to practical use, in furtherance of employer’s activities”, adding that since “since employers are paying salaries to these students, employers expect students to produce valuable results in return” (p.90).

Above, I gave the general definition of what is co-operative education and the benefits of this model. In the section below, I will talk about the requirements of Canadian co-operative education model. As a part of my research, the model of co-operative education was introduced to my interview participants. This was done in order to understand my participants opinion about the co-operative model applicability in Kazakhstani higher educational system. Thus, in the section below, I will describe the Canadian model in more detail in order to provide readers better understanding about the concepts which I discussed with my interview participants.

Canadian Association for Co-operative Education defines co-operative education as following, “a program which alternates periods of academic study with periods of work experience in appropriate fields of business, industry, government, social services and the professions”, defining the following requirements

- each work situation is developed and/or approved by the co-operative educational institution as a suitable learning situation;
- the co-operative student is engaged in productive work rather than merely observing;
- the co-operative student receives remuneration for the work performed;

- the co-operative student's progress on the job is monitored by the co-operative educational institution;
- the co-operative student's performance on the job is supervised and evaluated by the student's co-operative employer;
- the time spent in periods of work experience must be at least thirty per cent of the time spent in academic study. (Canadian Association for Co-operative Education, 2014)

It is important to notice that co-operative education provides several benefits to employers. One of such benefits which are given for employers who participate in co one of which allows employers to claim tax credit, “an amount of money that taxpayer is able to subtract from the amount of tax that they owe to the government” (Investopedia, 2014). Ontario Ministry of Finance states that the co-operative education tax credit is refundable tax credit which is given to employers to hire students who are participating in co-operative education, and the tax credit “is based on salaries and wages paid to a student” (Ontario Ministry of Finance, 2014).

In the section above, I talked about two different aspects: project-based learning and co-operative education model, which are used in educational systems of Western countries. Those two aspects were covered in my literature review because I have discussed these concepts with my interview participants, and I have found it important informing about these concepts prior developing the discussion in the next chapters.

Employability skills.

In the first two sections, I explained how the shift in the purpose of higher education to prepare the workforce is changing the nature of higher education. Next, I explained how university and industry can collaborate together in the process of preparing

specialists for job-market. In this section, I will talk about the employability skills in job-market, and develop the general discussion about what type of skills are demanded in IT job-market. I will present the results from different studies, which identified what type of knowledge and skills are demanded in IT graduates according to employers' opinion.

Definition of Employability Skills.

The change described by Grubb and Lazerson (2005) as “vocationalism” intersects with the idea of “employability, “ which is defined in Bologna Process documents as “a set of achievements – skills, understandings and personal attributes – that make graduates more likely to gain employment and be successful in their chosen occupations, which benefits themselves, the workforce, the community and the economy” (EHEA, 2004, par. 2). The value of developing employability skills in university graduates was discussed by the researchers in higher education field (Benamati et al., 2010; Yorke, 2011; Aring, 2012). Benamati et al. (2010) emphasize the importance of teaching the employability skills to university graduates explaining that “the supply-demand gap, troubling on its face, may be even more problematic if the IS graduates do not possess the skills that are being demanded by industry” (p.153).

Various authors categorize the employability skills into several categories (Aring, 2012; McLaughlin, 1992). For the purpose of developing my research instruments, I found it important to explain how employability skills are categorized. Aring (2012) defines four types of employability skills: cultural skills, interpersonal skills, intra-personal skills and technical or job specific skills. McLaughlin (1992) defines more categories of employability skills, which are academic skills, personal management skills, positive attitudes and behaviors, responsibility, adaptability, teamwork skills. Despite that there are various names and categories of employability skills, they all incorporate the set of disciplinary and generic skills necessary for university graduates to get employed.

Yorke (2011) states employers might argue that the employability skills learning often occurs at workplace, and not at higher education institutions. As a solution to increase the role of higher education in educating the employability skills, Yorke (2011) suggests to increase the collaboration of employers and higher education by offering “sandwich programmes and periods of work experience” (p.11). However, all these approaches will work only when both employers and higher education will be engaged in this process, which may not be really achieved in reality. Adding to that point, Yorke (2011) argues that “the best that can be realistically be achieved may be for higher education “to facilitate the development in students of the understandings, skills and attributes that will help them to make success in their careers” (p.11), and “employer has to expect that the graduate will need to be inducted into the particular organizational culture and given the support to succeed” (p.11).

Above, I defined the term employability skills, and how those skills can be developed in university students. The subcategory below will explain what type of skills and knowledge is demanded specifically in IT industry.

Skills and Knowledge Demanded in IT Job-market.

There has been a significant amount of research recently establishing the importance of certain knowledge and skills that are needed by IT industry (Radermacher, Walia and Knudson, 2014; Scott, Alger, Pequeno & Sessions, 2002; Hagan, 2004; Lee, D., M., Trauth, E., M., Farwell, D., 1995).

The first study I am presenting was done by Radermacher, Walia and Knudson (2014). In their study they conducted 23 semi-structured interviews with managers or hiring personnel from small and large size companies from US and some European countries in order to understand what type of skills and abilities are lacking in the recent

Information Systems (IS) university graduates. According to the results of the research, it was identified that the recent IS graduates have challenges with “project experience, difficulties using or unfamiliarity with configuration management tools, and problems communicating effectively” (p.295). The interview participants stated that IS graduates lack the programming skills in areas of using different software tools: configuration management, testing tools, integrated development environment, debugging tools, issue tracking tools, code analysis tools and database management tools. Over half of respondents agreed that the fresh Information Systems graduates are not familiar with the usage of configuration tools. Also, it was identified that IS graduates lack experience with “setting-up and using tools in a manner similar to an industry production environment” (Radermacher, Walia & Knudson, 2014, p,295). Some participants stated that graduates lack the programming knowledge in mobile development and databases.

The list of non-programming skills which are not developed in IS graduates include the following: project experience, oral communication, problem-solving, passion for technology or job, ability to see big picture, teamwork, continuous learning, outgoing personality, proactive self-management and testing (Radermacher, Walia and Knudson, 2014). From this we can see that employers expect the recent IS graduates to have experience of working with particular type of technologies, such as configuration management and testing tools. On the other hand, we can see that employers emphasize the importance of soft skills, such as oral communication, proactive self-management, passion for technology or job and etc, as well the importance of practical experience working in teams: project experience, teamwork and others.

The second study that researchers the topic of skill gap by Hagan (2004) surveyed employers in regards of their satisfaction level with the graduates’ skills and interviewing graduates about the knowledge received during university studies in 2001. Researcher sent

out 3500 surveys to employers and received 14% response rate. In her findings, she indicates that according to her vast majority of respondents Australian ICT graduates have non-programming knowledge/skill gap in areas of project management and understanding of business processes, and a smaller number of respondents indicated that there is some level of dissatisfaction with graduates' ability to communicate with clients, as well as written communication skills. Here, it is important to state that communication skills are highly valued among employers. At this point McBrierty (as cited in Jashim, 2008) emphasizes the importance of communication skills in order to transmit knowledge among employees, saying that "communication skills must be developed among higher education, industry, and the greater society in order to transmit information" (p.6).

The third study by Lee et.al. (1995) investigates what type of changes were expected to appear in the IS systems profession back in 1990s. The study investigated opinion of 50 IT representative from various industries and universities regarding what type of IS human capital would be needed in industry and what type of curriculum changes should be made to meet the changing needs of industry. As the result, Lee et.al. (1995) defined that there are "two different patterns of knowledge/skills requirements, and perhaps two distinct career tracks" (p. 331) in the IS university education. The first career track should target for "effective application of IS to meet business needs.» Here, graduates should "possess in-depth knowledge of business skills and excellent interpersonal skills" (p.331). The second career track is focused on "integration of the organization's technological infrastructure", (Lee et.al., 1995, p.331), where must be competent in technical field. As a recommendation, Lee et.al. (1995) indicate that IS curriculum makers should pay attention on developing behavioral and management skills in university graduates. I find that despite this study represents the results, which are more

than 10 years old, still the same type of recommendations appear across other studies, which were presented above.

As we can see from the three studies shown above, the results from various studies appear to be similar that employer value the importance of both programming and non-programming skills. Also, it is true that current Information Systems graduates lack skills in non-programming area like oral and written communication, project management, outgoing personality, proactive self-management (Radermacher, Walia & Knudson, 2014; Hagan, 2004). In the area of programming skills, Information Systems graduates are not skilled in working with specific technologies or not capable to “setting-up and using tools in a manner similar to an industry production environment” (Radermacher, Walia & Knudson, 2014, p. 295).

In the first study that I described by Radermacher et al. (2014), the author compared the results from various studies which investigated the topic similar to theirs, and made an interesting finding that the deficiency in the same areas of knowledge and skills were repeated across several studies. The list of skills is the following (in descending order of importance): oral communication, written communication, testing, project management, software tools, programming, requirements, teamwork, problem solving, personal and professional skills. So, here we can see that employers find the largest gap to be in non-programming skills area, where oral and written communication being the most problematic skill among the IS university graduates.

The debate of importance of non-programming skills for IT graduates. In this subsection, I will talk about the rising importance of non-programming skills for IT graduates due to the changing nature of IT job-market. This distinction is important in my study because similar type of results will appear as the result of my data analysis.

The rising importance of non-programming skills for IT graduates occurred in US job-market due programming job outsourcing in US job-market. Benamati et al. (2010) state that the programming work in the US market will be likely outsourced overseas, and it is becoming more obvious that in the future the US the programming and other technical work will be outsourced overseas. So, the value of technical skills alone is becoming less important. Experts in IT industry indicate that “new hires are expected to perform at a higher level of complexity, quickly understanding the business domain and driving projects to completion” (Benamati, 2010, p. 152). According to the opinion of IT employers, the importance of managerial and other non-technical skills is highly rising due to the current job market needs.

Stephen Andriole, Professor of Business at Villanova University, US emphasizes the rising need of teaching more practitioner knowledge and skills, such as “analytics, supply-chain optimization, technology performance management, business process modeling, full-view business intelligence, sourcing, and large amount of technology management skills” (Andriole & Roberts, 2008, p.30). Andriole states that “hardly anyone needs to know how to program in multiple languages or craft complex, elegant algorithms that demonstrate alternative paths to the same computational objective. .. This is the effect of standards and commoditization have on an industry” (Andriole & Roberts, 2008, p.30)

Andriole interprets that American job market no longer needs the graduates with pure programming skills because all programming job and customer support services is being outsourced to other countries. Andriole states that today more Fortune 1000 companies in the US prefer hiring programmers due to the rise of “packaged applications and the labor-rate-driven sourcing options” (Andriole & Roberts, 2008, p.30).

Benamati et al. (2010) also emphasize the rising importance of non-technical skills in IS programs, and recommends that IS curriculum would put more emphasis on developing managerial and organization skills. Authors recommend to reformat the IS curriculum, so that students would develop “a functional level of key technical literacy-including enough programming experience so that graduates have “felt the pain” of programming”, and further on students would develop their project management and organization skills as a part of their IS studies.

The opposing idea was developed by Eric Roberts, Computer Science Professor from Stanford University, USA, who said that “there is no evidence that the demand for highly skilled software developers is declining” (Andriole & Roberts, 2008, p. 31), and argues that besides there is rising need in enterprise software industry for specialists with business-technical skills, there always will be demand for university graduates with strong programming skills,

Faced with a shortfall in the pipeline, it is perhaps natural to argue that educational institutions should stop wasting time on other aspects of the discipline and focus of the skills that are just right for one particular environment. That argument would have merit if there were an imbalance between supply and demand, with too many degree recipients trained for some occupations while other jobs went begging. That situation, however, does not exist in the computing industry today. There is a shortfall across the board, with not enough graduates to supply any of the major subdisciplines. (Andriole & Roberts, 2008, p. 31)

To prove the point that computing industry needs graduates with strong programming skills, Roberts talks about the value of strong programming skills in game industry. According to his point of view, computing industry is widely used in various

fields like education, healthcare, engineering, economics and other fields, not only in enterprise architecture, so the value of qualified graduates with solid programming skills is essential (Andriole & Roberts, 2008).

Thus, the debate whether programming skills are becoming less important, and organizational and managerial skills are becoming more valued has been discussed in literature among the experts in IT education. Besides that researchers and experts in IT field always debate about this issue, there is still no clear point, whether the value of pure programming skills is declining, and the mix type of knowledge of technical and business skills is becoming more valuable. In my discussion chapter, I will try to explore this topic further considering the ideas presented by my research participants.

Above, I talked about the skills and knowledge demanded by the job-market in IT sector, as well as I in general what type of skills are considered necessary to get employment. Also, I find it important to develop discussion about what type of skills necessary in the era of post-capitalist era. Drucker (1993) states that in post-capitalist era, the leading part of society will be knowledge workers, “knowledge executives who know how to allocate knowledge to productive use; knowledge professionals; knowledge employees” (Drucker, 1993, p7), adding that the “social challenge of the post-capitalist society will, however, be the dignity of the second class in post-capitalist society: the service workers” (Drucker, 1993, p7). Here, Drucker talks about the class of intellectuals and managers class. Drucker (1999) lists several categories which define the productivity of knowledge workers. They are the following:

- Knowledge-worker productivity demands that we ask the question: “What is the task?”

- It demands that we impose the responsibility for their productivity on the individual knowledge workers themselves. Knowledge Workers have to manage themselves. They have to have autonomy.
- Continuing innovation has to be part of the work, the task and the responsibility of knowledge workers.
- Knowledge work requires continuous learning on the part of the knowledge worker, but equally continuous teaching on the part of the knowledge worker.
- Productivity of the knowledge worker is not—at least not primarily—a matter of the quantity of output. Quality is at least as important.
- Finally, knowledge-worker productivity requires that the knowledge worker is both seen and treated as an “asset” rather than a “cost.” It requires that knowledge workers want to work for the organization in preference to all other opportunities. (Drucker, 1999, p.83)

So, above I talked about the employability skills and defined the list of characteristics, which define knowledgeable worker productivity. This information should be useful while discussing my findings.

Skill Gap

In this section, I will explore arguments that propose the existence of what is called the “skills gap,” the mismatch of skills that university provides and what is needed in the job market. This issue is important for my study because the situation around IT graduates competency to meet job-market needs will be discussed further in my data analysis and discussion sections.

One influential argument for the existence of the skills gap comes from McKinsey & Company, a global management consulting firm headquartered in the United States. According to data presented by McKinsey & Company, half of unemployed youth around

the world are not confident that their post-secondary education improved their chances to find a job, and only 42% of employers worldwide consider that fresh-graduates are prepared enough to enter job field (Mourshed, Farrell & Barton, 2012). At the same time the value of university education is becoming less valuable, as around 60% of students surveyed by the McKinsey&Company researchers stated that they learned the required skills during the “on the job training”, and around 72% of managers confirmed the same idea (Bersin, 2012). The difference between which skills university educates to students and what is needed in industry leads to the situation when employers have to additionally invest in at-job training, and according to the results of McKinsey & Company research, the training industry has grown up to 12% in 2012. Compared to previous nine years, this number is the biggest one (Bersin, 2012). This shows that the skill gap is common around the world, and both university graduates and employers find that university education is not capable of equipping graduates with the required skills.

The importance of skill gap problem has been discussed during the 2010 World Economic Forum, where it was stated that “world is facing a global demographic shock – a skills gap” (Aring, 2012, p.4). The report delivered from the 2010 World Economic Forum stated the following,

global challenge is so great that no single stakeholder can solve it alone. Unless companies, policymakers and academic institutions join forces to design inclusive modern human capital strategies, we might in less than one decade face a real talent crisis, becoming a barrier to sustainable growth and post crisis recovery. (Aring, 2012, p.4)

According to the studies conducted by different organizations, like the World Bank, the World Economic Forum, the Conference Board and other multiple studies indicate that

employers around the world find the skill gap issue “as one of their top five concerns” (Aring, 2012, p.4).

UNESCO Global Monitoring report claims that not all countries struggle with skill gap problem at the same level. For example, in India 67% of employers and in Brazil 57% of employers outlined the problem with graduates skills gap. Comparing to European countries, in UK only 15%, Italy 20% and Germany 40% of employers find that the skill gap creates a problem to find right candidates to perform job (Aring, 2012). This shows that there are countries around the world, where skill gap issue is less problematic than in other countries, and one of the conclusions that we can make out of this information is that in those countries industry and university collaboration is somehow better organized for solving the skill gap problem.

The situation around low-employability in countries like India is becoming a big issue. According to the report by “Higher Education in India: Vision 2030” (2014), the unemployment rate of IT graduates in India is around 75%; 55% in healthcare and manufacturing industry, and 50% in banking system and health-insurance field graduates can’t find jobs. Despite that India has a large and young population of workers, Indian employers feel the shortage of employees who have the necessary skills and knowledge. The statistical results show that around 40% of India is under 25, and only 5% of that population is skilled (Aring, 2012). According to Mishra (2014), the low-employability rate of Indian university graduates lays behind the disconnection of the skills required at the job market and the skills provided in universities. Indian universities, on the other hand, argue that higher education don’t have to align their curricula to the needs of industry and employers “want everyone to come prepared and ready” (Mishra, 2014,par.24).

The reason behind low-employability of Indian students is explained by insufficient amount of practical experience and knowledge of English, and according to employers those skills should be provided by universities. To clarify the picture around the practical experience of university graduates, only 2% of Indian graduates received the formal vocational training and other 8% received a non-formal vocational training (Aring, 2012). This shows that employers want university graduates to have practical experience at universities, but vocational training is not developed well as such a low percent of graduates get opportunity to do vocational training.

The skill gap issue is common around all countries, but the list of skills which are making the skills gap is different from country-to-country. In China, employers consider that Chinese IT graduates have a skill gap in foreign language skills, teamwork and entrepreneurialism skills. In African countries, employers find the skill gap in basic skills and entrepreneurial skills. Aring (2012) explain that the situation around skill gap enforces employers to attract talents from outside to African countries, despite that there are so many unemployed people in the above mentioned countries.

Talking specifically about the ICT skill gap in African countries, in South African the shortage of skilled ICT workers is estimated to be as high as 70,000 practitioners, which is more than quarter of the currently available ICT workforce in South Africa. The shortage of skilled ICT workers lies behind not only in low , but in problem with the low enrollment in university ICT programs. Douglas Cohen, a specialists in economic development and ICN from the South African Local Government Association says that “the number of students who pass mathematics and science sufficiently well to get into university is too low, resulting in universities not being able to take students in to do computer science, electronics and engineering degrees and ultimately resulting in not enough ICT professionals joining the industry in the next five years” (Cohen, 2012). Thus,

it can be concluded that in some countries skill gap can occur due to the shortage of university to fill the job-placements like in the case of South Africa. In other countries like India the shortage of university is not problematic, as there are too many unemployed university graduates who can't find job because they don't possess the required job-qualifications.

As my work is about the IT education, I found it necessary to explain what causes the skill mismatch to occur. There are two primary reasons that causes the skill gap in IT industry. Milton (as cited in Scott, Alger, Pequeno & Sessions, 2014) states that the first reason is “discordance between industry and academic universities and lack of consensus concerning industry skill requirements” (p. 1404), and the second reason is “the dynamic nature of the IT industry creates a set of circumstances that make it extremely difficult to obtain this level of experience before the technology becomes outdated” (Scott, Alger, Pequeno & Sessions, 2014, p .1404).

The skill gap issue is an issue in Kazakhstan as well. OECD in Central Asia reports that the development of IT sector in Kazakhstan is “nurtured by domestic demand and global requirements” (OECD, 2011, p.23), but can't fully develop due to low human capital capabilities. There are four main challenges exist in the area of developing IT sector in Kazakhstan: “limited public - private dialogue”, “lack of soft skills among employees”, “limited human capital capabilities” and “low level of innovation”, where the lack of soft skills among employees and other soft skills is described with the problem of low cultural understanding, despite that employees communicate in unified language, in Russian, and despite that Kazakhstani youth have numerous opportunities to study abroad (OECD, 2011, p.23).

The ICT skill gap issue was identified in the OECD Country Capability Survey, which was conducted in 2010 among 150 firms from IT sector and another 150 business service sector in Kazakhstan. From the results of the survey it was identified that “40% of IT employers surveyed reported a lack of formal qualifications and 33% noted gaps in product knowledge. Concerning “soft” skills, communication (100%), problem solving (47%) and understanding customer needs (45%) were the improvement areas most cited by employers” (OECD, 2013, p.28). The results of OECD Capability Survey states that

While only a few firms reported a major gap in technical expertise, less than one third of respondents reported minor gaps in technical skills. The IT companies seem quite satisfied with existing skills in user interface/multimedia designers/developers and system/network engineers. In fact, 86 and 75% of the interviewed companies mentioned respectively that they do not experience any skill gap for the two occupations (OECD, 2011, p.231),

adding that “companies reported that significant gaps exist in employees’ overall skills and abilities to meet business objectives of IT firm” (OECD, 2011, p.231). Also, 48.2% of the research respondents stated that “that the hardest-to-fill vacancy they have is for ICT professional, i.e. Chief Technical Officer, Project Manager, Presales, Service and Maintenance Specialist, or Customer Support” (OECD, 2011, p.233), as well as application and database developers being the second in that category (43%).

So, from the information we can see that the skill gap is a big issue for intergovernmental organizations, national policymakers, academics and employers, which, they argue, leads to the unemployment rate facing countries around the world. Also, the skill gap issue appears in educational system of all countries. In countries like India and Brazil the number of employers who face the skill gap problem is larger compared to other

countries, and the type of skills which are lacking in IT graduates also varies from country to country. In this section, I presented information about the skill gap in Kazakhstani IT field. Here, IT employers consider that local IT employees lack the culture of communication. The information presented in this section is important for my study, as in my discussion chapter I will discuss the skill gap issue in Kazakhstani context.

Conceptual framework.

In the discussion above, I presented the key ideas from the literature which created the basis of my research. In this section, I will present my conceptual framework that summarizes the main key points presented in the literature review section. Bloomberg and Volpe (2008) explain that conceptual “framework provides an organizing structure both for reporting this study's findings as well as the analysis, interpretation, and synthesis of these findings. In this way, the CF is essentially a “working tool.”” (Bllomberg & Volpe, 2008, p. 61). In my literature review chapter the following descriptors were presented:

Higher Education as Public Good.

This descriptor implies how higher education is shifting its value from being a public good towards vocationalism, where the primary purpose is training workforce. Here, experts in education field critically talk about the purpose the hidden curriculum of higher education, which implies training the skills required at the job-market and skipping the development of social skills in university students.

Industry and University Collaboration.

In this category, I explain how industry and university can collaborate in educational processes. This section talks about Canadian co-operative education and project-based learning model in detail. I bringing this information in my literature review because the same type of discussion will appear in the next chapters.

Employability Skills.

This category presents information about employability skills and the importance why employability skills should be developed in university graduates. This section deploys information about skills and knowledge demanded in IT job-market. Next, I talk about the existing debate whether teaching non-programming skills is becoming more important than teaching programming skills to IT graduates. At the end, I define categories which define the productivity of knowledge-worker.

Skill gap.

This category implies the set of skills, which are currently lacking in IT graduates. Key idea is that according to employers, policy makers and academics, the skill gap issue is a common issue in all countries around the world (Mourshed, Farrell & Barton, 2012). Here, I present the results of OECD Capability Survey, which talks about the skill gap issue in Kazakhstani IT sector.

The purpose of this chapter was to introduce the ideas presented in literature regarding the topic of this research. As we saw above, the chapter discussed the ideas on literature on topic of university as a public good, university and industry collaboration, employability skills and skill gap issue. The final section presented the conceptual framework of this study. The topics discussed above and conceptual framework formed the basis of the methodological instruments for this study. Those will be described in the next chapter, Methodology and Methods.

Chapter 3: Methodology & Methods

In the previous chapter, I presented the issues which arose in the literature in the context of the study I am researching. In this chapter, I will present the design of my study and I will explain why I selected my research methodology. According to Bloomberg and Volpe (2008), the purpose of methodology chapter is “to show reader that you have an understanding of the methodological implications of the choices you made and, in particular, that you have thought carefully about the links between your study’s purpose and research questions and the research approach and research methods that you have selected” (p. 66). The discussion that follows will explain why the mixed methods was chosen to investigate the purpose of this research and how the two methodologies, quantitative and qualitative, were related for deriving the results of this research.

The purpose of my research is to understand the perspectives of the IT professionals involved in hiring process in Kazakhstan on the role of the university in preparing IT professionals for Kazakhstan, and the quality of IT education in Kazakhstani higher education.

My research questions are the following: 1) Which type of skills and knowledge are currently demanded in the IT job-market according to Kazakhstani IT employers? (2) To what extent are IT employers satisfied with the skills, knowledge and capabilities of IT majors from Kazakhstani universities? (3) What is the perceived effectiveness of internship programs for Kazakhstani university students in IT companies, and what are suggestions to improve it? (4) How do Kazakhstani employers understand the purpose of higher education? For example, do they consider higher education to have a primarily vocational purpose, or do they interpret that university education has national priority of educating active and informed citizens of Kazakhstani society?

In the discussion below, I will describe and justify the choices I have made in developing a mixed method study. The chapter will include the following sections: research design, research methods, sample, data analysis approach, ethical considerations, reflections on my research process and conclusion.

Research Design

In this section, I will describe what type of ‘approach’ I used to design my study for my research purposes and explain the reason why I selected this particular type of research approach. This study is a mixed-methods design, combining quantitative and qualitative dimensions. Creswell and Plano-Clark explain that mixed method

focuses on collecting, analyzing, and mixing both quantitative and qualitative data in a single study or series of studies. Its central premise is that the use of quantitative and qualitative approaches in combination provides a better understanding of research problems than either approach alone (Creswell & Plano-Clark, 2007, p.5).

I understand my research being mixed because, as Creswell and Plano-Clark defined, it uses both quantitative and qualitative methods for the purpose of better understanding the answer to research problem. Consistent with the mixed method approach of this study, the quantitative part included an online survey (survey in Appendix B), and qualitative part included four one-on-one interviews, which I conducted after analyzing the results from survey (protocol in Appendix D). Hammond and Wellington (2013) define that quantitative method includes “methods and approaches that deal with numeric data, amounts or measurable quantities, i.e. numbers” (p.173), and qualitative method involves “methods and approaches that deal with non-numeric data rather than numbers” (p.173). Considering these definitions, I consider the first part of my research to be quantitative as my survey had questions where I had to deal with statistical data

analysis. The second part of my research has qualitative nature because I dealing with analyzing non-numeric data, specifically data derived from interviews.

I chose the mixed method research because I needed to gather a large number of opinions of IT employers, and distributing the survey was the most convenient approach to do this. The qualitative part was used as a complementary part of the research, where I derived information to clarify my answers to the research questions. In other words, both, the quantitative and qualitative part of my research analysis, were used for the purpose of “complementarity”, where the results from both methods were used “to elaborate, enhance, deepen, and broaden the overall interpretations and inferences from the study” (Green, 2007, p.101). In my case, both quantitative and qualitative dimension of this mixed method research were used complementary to develop answers to research questions.

This research began when I investigated the problem with Kazakhstani employers dissatisfaction with IT graduates’ skills and knowledge, and the employment problems of IT university graduates. I developed the research purpose and four research questions which aimed to investigate IT employers’ opinion on the role of the university in preparing IT professionals for Kazakhstan, and the quality of IT education in Kazakhstani higher education. Then, I developed my survey instrument with semi-closed-ended and closed-ended questions (total 8 questions). I came up with the semi-closed-ended questions myself, and the content of closed-ended survey questions (Q3 and Q6) was adopted from the employer satisfaction survey, which was designed by Vladimir State University in Russia (Vladimir State University, 2010). The survey was pilot tested on two people, who currently work in IT company. Considering their recommendations, I made the required changes and distributed my survey using SurveyMonkey online survey tool. The survey answers were collected and analyzed within two weeks. The results of the survey developed additional questions, which were later clarified during my interviews. The

results derived from the survey and from the interviews were analyzed to answer the research questions. Both of the data collection methods and instruments will be further described and justified below in the discussion of research methods.

Sample

In this section, I explain how and why I selected my sample for the quantitative part and participants for my interviews. The survey and interview participants were selected among those who had experience of working in IT industry and employing university IT graduates. I designed the survey questions and distributed the link to the online survey among IT employers via email, social networks and during a job-fair organized in one of the universities in Astana. The link to online survey was distributed to 135 participants, who were allocated in Astana and Almaty cities. These cities were selected because major IT companies were located in those two cities, and I had access to distribute the survey in those two cities. From this, I can say that my selection of participants had a non-probability sampling strategy since my selection of participants aligns with the definition of non-probability sampling which is defined as “selectivity which is built into a non-probability sample derives from the researcher targeting a particular group, in the full knowledge that it does not represent the wider population; it simply represents itself” (Cohen, Manion and Morrison as cited in Plowright, 2011, p.42).

My survey was distributed according to the convenience sampling strategy. Plowright (2011) explains that this type of sampling strategy is widely used since it “allows access to participants who are conveniently located” (p.43). I was distributing the survey among those participants who were available to me, specifically among my co-workers, my email contacts and contacts in social networks. Also, my survey was distributed among the IT employers, who participated in job-fair which was organized in one of the universities in Astana. To guarantee that I was selecting eligible survey

participants, I kindly asked to fill-out the survey only those who were knowledgeable about the issues in IT education and had experience of hiring IT graduates. This was reflected in the consent form.

For the qualitative part of the research, I also used non-probability sampling with convenience sampling strategy. I selected only those participants who either had expertise in IT internship programs or involved in IT university education. As the result, my list of participants included one IT employer, one IT university teacher, one policy-maker in higher education, and one university Career and Advising Center employee. I will refer to these participants using these descriptors in subsequent chapters. A description of my interview participants is provided in Appendix A, in which I detail the occupation of participants and their relevance to IT industry. Three face-to-face interviews were conducted with participants in Astana and an interview with IT university teacher was conducted via Skype since the participant was located in another city. The face-to-face interviews were conducted in quiet and convenient locations chosen by my participants. The Skype interview was conducted with the participant while the person was sitting at home. The interview was recorded and saved in mp3 format on my computer.

Research Methods

Here, I will describe and justify my research methods used to collect data for my data analysis. As discussed above, this study uses a mixed-method design in which I mix quantitative and qualitative dimensions of this research. First, I present how I designed the research method for the quantitative dimension of the study and then for the qualitative dimension .

Quantitative Dimension

As described above, this is mixed method research, where my quantitative and qualitative methods were mixed for the purpose of complementing results from both

methods. In my mixed method research, I administered an online survey among 135 participants and additional four interviews. Hammond and Wellington (2013) explain that “the survey typically ‘goes wide’, while interview data ‘goes deep’” (p.141). In that sense, my surveys were distributed for the purpose of gathering IT employers’ perception about the issues in IT university education. Here, the main point was collecting opinion from a “wide” large number of participants. The survey instrument included both closed-end and semi-closed-ended questions on the topics of employers satisfaction with IT graduates skills, their recommendations how to improve university education and the list of social skills which should be developed in universities. The closed-end questions were rating and ranking type survey questions. I decided to include both type of questions as they have the following benefits: closed-end questions “can net useful information to support theories and concepts in literature”, and semi-closed-ended questions help to “identify any comments people might have that are beyond the responses to the closed-ended questions” (Creswell, 2002, p. 220). The survey instrument consisted of the consent form, which was the first survey question. Once my participants accessed the Survey Monkey website which I linked them to, they read and signed the consent form, and then they were navigated to the second web-page with seven other survey questions. The survey questions are presented in Appendix B.

Qualitative Dimension

In analysis of the survey results several questions emerged to me about the internship programs and the social skills which should be developed at university level. In order to answer those questions, I decided to conduct interviews. Interviews have more advantages over surveys in terms that interviews allowed me to be more interactive with participants, “allowing for clarification of questions and identification of unexpected themes ” (Hammond & Wellington, 2013, p. 91). Thus, in order to answer my questions

which appeared from analyzing the survey answers, conducting individual interviews was the best approach. I did semi-structured interviews of some number of questions with four participants, where the interview questions were derived from my interview protocol on the issues of internship programs, social skills which should be developed during university studies and problems in IT university education (see Appendix D). The interviews lasted between 30 to 40 minutes. Each interview began with my explanation of the study and my presentation of the Consent Form (See Appendix C). Once the form was signed, I requested permission to record my participants' answers and then began the interviews. During the interviews, I was recording my participants answers on smartphone. As my interviews were semi-structured, I was asking questions whereas there was a need to clarify something or whenever my participants explored some new interesting topics, which potentially might be used as answers to my research questions.

Data Analysis Approach

In this section, I will present how I managed, organized and analyzed the analysis of data and findings. Important also for a mixed-methods study, I will explain and justify the manner in which I brought together in “complementarity” (Greene, 2007) the different data sources, both qualitative and quantitative. First, I will explain how I analyzed the data and findings from survey, and then from the interviews, and then how they were combined as findings.

Analysis of Quantitative Data

Since, I conducted my online survey using SurveyMonkey online survey tool, the work of analyzing the quantitative data (counting the ranking and rating of particular items in survey) was already done for me. My survey consisted three closed-end questions (Q2, Q6, Q8), the results of which were presented in Survey Monkey in table form as a summary of collected responses. In order to better visualize the results of quantitative data,

I transferred the results into Excel and presented them in form of a diagram. Also, I produced statistical analysis of the mean value and standard deviation of quantitative data. After analyzing the results from Q8, I derived the question regarding the social skills that should be developed at university level, the effectiveness of internship programs and solutions to improve it and other questions. The question was addressed during the interviews to four participants. See Appendix D for interview questions.

Analysis of Qualitative Data from Surveys

The survey consisted three semi-closed-end (Q7) and open-ended questions (Q4, Q5), where respondents were typing their own answers (see Appendix). The results from those questions were analyzed as qualitative data analysis. The coding process started from looking for themes related to categories which already existed in my research questions, but also those which emerged as a result of analysing data. These existing categories were “skills and knowledge demanded”, “effectiveness of internship programs”, “existing problems in IT education”, “recommendations”, “knowledge at university.» Categories that emerged from data analysis include “narrow specialization in IT”, “practical experience”, “employers’ low motivation”, “project management” and other. Once I analyzed the data and derived the emerging themes, I integrated them into analysis with other data sources and developed the findings. The results of qualitative data analysis from surveys derived the questions regarding the effectiveness of internship programs, the demand of project management skills in IT industry, university and industry collaboration. The list of interview questions are provided in Appendix D.

Analysis of Qualitative Data from Interviews

The 40-minute interviews were recorded on my smartphone. I transferred the file to mp3 format and uploaded it on my computer. Later, I played back the mp3 file and transcribed each of the interviews (see Appendix F for example) . The Skype interview

with IT university teacher was saved in mp3 format and transcribed. After transcribing each of the interviews, I read through each of the transcripts and started the coding process. I looked for themes already existing in my research questions, but also themes which emerged during the interview data analysis.

Below I will show how I analyzed and interpreted one finding through the process of coding data as themes, developing categories based on those themes and interpreting the finding. This discussion refers to the table below.

As the table indicates, I am referring to the finding “Employers want IT graduates to have more practical experience, which should be delivered through the internship programs, however, employers themselves are not interested in teaching the internship students how to do work because it is too costly for companies as they don’t want to allocate time and resources for internship students.»

This finding was derived from two data source: open-ended survey answers and from interview answers. The first part of finding, which says “Employers want IT graduates to have more practical experience, which should be delivered through the internship programs” was derived from the open-ended survey answers. Table 1 and Table 2 show the categories and quotes of participants:

Table [1]

Data Analysis Example Chart Part 1

Employers want IT graduates to have more practical experience, which should be delivered through the internship programs, however, employers themselves are not interested in teaching the internship students how to do work because it is too costly for companies as they don't want to allocate time and resources for internship students.				
Category descriptor		Survey respondents' answer		
Answers from open-ended survey question #4 about employer recommendations to improve the process of educating university IT graduates.	Employer recommendations	"Improving the internship programs; organizing more summer internship programs. Internships improve theoretical knowledge."	Provide opportunity for doing paid internships till the graduation from university. Most Kazakhstanin universities are not ready to hire students to work on paid jobs, thus most students are not motivated to show their capabilities during the internships	"Developing agreements [between universities and industries]. Internship in companies. Developing university curriculum according to the needs of job-market."

The second part of the finding is coming from the interview data analysis (See Table 2).

Table [2]

Data Analysis Example Chart Part 2

		IT employer	Policy-maker	University Career and Advising Center employee
Interview data	Category1: Low motivation of employers to participate in educational processes	"it is not profitable for employers to teach internships skills just for one summer, show them how to do something."	"employers themselves are not interested in providing practical knowledge to students"	"it costs money for companies to have the interns. They have to provide a supervisor, they have to provide that supervisor's time and resources to basically teach the students."

Analyzing the results from both data sources helped me to develop the finding presented above. Above, I showed how I was combining the data from the open-ended survey answers and from the interviews.

Ethical Considerations

My research went through the NUGSE approval form. The process started when I developed the proposal of my research, which was prepared according to the requirements of NUGSE Ethics Form (please see Appendix E). On this form, I described the purpose and research questions of my research, data collection methods and examples of questions for the survey, anonymity and confidentiality procedures, risks and benefits of the research. The NUGSE ethics form was approved on February 28, 2014 by the NUGSE Research Committee, which is attached in this thesis before the table of contents. Important to this ethics review process was my Consent Form (see Appendix C), on which I described the purpose of my research, research participants rights, risks and benefits and my contact information.

To ensure the anonymity of research participants, I asked my survey participants not to provide their names and contact information while filling out the survey on Survey Monkey. This information was presented in survey consent form, which was the first survey question. The identity of my interview participants was also disclosed in my data analysis. I was only disclosing the job-titles of my participants. During the interviews, participants were mentioning the name of their workplaces and other personal information. This information was not presented in my data analysis, as I was concealing the name of their workplaces with acronyms and other personal information was also not mentioned. The consent forms and other documents related to the study were kept in a safe place, in a locked drawer. I notified my participants that participation in this study was voluntary and I will not disclose their identities while presenting the results of the study.

Reflections on My Research Process

Here, I would like to share some of the reflections on this research. I want to explain the difficulty of designing the survey and collecting the answers. I find that one of the most challenging part was designing the survey. The problem was that since my research purpose and questions were designed in English, I found it hard to design a survey, which would accurately help to answer my research questions. Designing the survey in English was less challengeable to me since there are plenty of resources in Internet which would could have been easily used for my research. I found it hard to design a survey, which would be easily understood by Kazakhstani employers due to problem with translating definitions. In the end, this difficulty was resolved because I found a survey in Russian which had the questions related to evaluating employer satisfaction with graduates skills. For this reason, some of the survey questions were adopted from an existing survey of Vladimir State University.

The next challenge was the response rate. I sent 135 invitations to fill out the survey, and only 25 respondents filled the survey. I was expecting a higher response rate since I was asking people who know me to fill the survey. I found hard to attract participants to fill the survey despite that some of them were my acquaintances. Perhaps, people didn't want to waste their time as they were not taking seriously the fact that I was doing research in educational field. In my understanding, this may result from the problem that research work was not considered as something serious among most of the people who were asked to fill the survey.

Conclusion

The purpose of this chapter was to explain and justify why I selected the mixed methods approach for my research. Above, I presented the design of my research, how I analyzed the data, ethical considerations and my personal reflections of my research process. In the next section, I will present my data analysis and findings.

Chapter 4: Data Analysis & Findings

In this chapter, I will analyze and interpret the data from a survey and interviews that I conducted for this study. The purpose of my mixed method research is to understand the perspectives of the IT professionals involved in hiring process in Kazakhstan on the role of the university in preparing IT professionals for Kazakhstan, and the quality of IT education in Kazakhstani higher education.

My research questions are the following: 1) Which type of skills and knowledge are currently demanded in the IT job-market according to Kazakhstani IT employers? (2) To what extent are IT employers satisfied with the skills, knowledge and capabilities of IT majors from Kazakhstani universities? (3) What is the perceived effectiveness of internship programs for Kazakhstani university students in IT companies, and what are suggestions to improve it? (4) How do Kazakhstani employers understand the purpose of higher education? For example, do they consider higher education to have a primarily vocational purpose, or do they interpret that university education also has national priority of educating active and informed citizens of Kazakhstani society?

In order to answer those questions, I did mixed method research which includes quantitative and qualitative methods. My data analysis comes from three different data sources: questionnaire, open-ended survey questions, and interviews. The main portion of my research findings were derived from the descriptive research which includes the online survey that I conducted with 25 IT employers. The online survey included open-ended and semi open-ended questions, where respondents were able to type their own answers or select the ones I provided to them (see Appendix B). Among the 25 respondents, 16 respondents' occupations were in the area of IT professionals (engineer-specialist, IT experts, analysts, etc). Other nine respondents' were involved in managerial work (managers, directors and etc) in IT companies. After getting the survey results, as a

researcher I ended-up with having several questions regarding the survey results. In order to answer my questions, I conducted four interviews with different interview respondents: IT employer, policy-maker, Career and Advising Center employee in university and IT teacher from university. More description regarding the occupation of my participants and their experience in the field of IT education is provided in Appendix A.

The data analysis in this chapter will be organized according to the descriptors defined in my conceptual framework. The descriptors are the following:

- Higher education as a public good
- Industry and university collaboration
- Employability skills
- Skill gap

Higher Education as a Public Good

In this section, I will show my research participants perspective about the social skills which should develop universities and describe their preference towards the vocationalisation of higher education. This category includes the following subcategories:

- University role on developing social skills
- Narrow specialization
- Teaching the theoretical concepts vs training how to use software

applications.

The data for each of three categories is presented below.

University Role in Developing Social Skills

This category implies my respondents' opinion whether university should teach social skills to students. The data for this research question comes survey question number eight, where my research participants stated what type of social skills should be developed

in IT students at university level. After reviewing the results, I derived a couple new questions regarding the role of university in developing social skills, which were answered during interviews by IT employer.

My survey respondents stated that the top three skills, which should be developed during universities studies are responsibility, preparedness to do work individually, and capability for self-learning. Among the list of three least necessary social skills the following social skills were mentioned: humanity, cosmopolitanism and sense of duty. These answers were provided as response for question eight.

From the derived information, I understood that employers are less concerned about developing the social skills in entry-level employers, but rather they more concerned with the skills which would ensure that employees are capable to do work assignments individually, responsible for the work done and if necessary to do self-learning. Thus, capability to perform work individually and capability for self-learning are considered to be among the most valued skills in IT graduates.

After reviewing the results of my survey, I decided to ask my interview participants where IT students should learn the social skills such as humanity, cosmopolitanism and sense of duty. IT employer answered the following, "I think that social skills should be given to students at all stages' of person's development. Starting from kindergartens, secondary school and in universities. However, not only educational institutes should be involved in that, but parents and peer-groups should be involved too."

Here I derived the conclusion that in the process of giving social skills to students, the role of family institute and communication with peers plays an important role in teaching the social skills to students. Then, I asked IT employer's opinion whether students should be obtaining social skills like tolerance and humanity at university level, and the

respondent stated that “at university level more importance should be paid to the skills of communication. Tolerance and other social skills should be given by parents and at school level. As on stages of person’s development, the person obtains all required skills for socialization.”

The answer that IT employer provided above shows that Kazakhstani society consider that family institute and school teachers play the important function in giving kids social skills, like tolerance, humanity and cosmopolitanism to name a few, and universities should be more involved in teaching the skills which would be necessary during work.

Narrow Specialization in IT

This category explains in which way my participants want the higher education to shift towards being vocational. Here, my participants explained their preference of narrow specialization, which was suggested by open-ended survey question respondents. In open-ended survey question seven, I asked employers opinion to select one of the statements statement regarding the knowledge that should be developed in university students. Here, 13 out of 25 participants agreed that university IT education give the fundamental technical knowledge and skills, like solving algorithmic problems, understanding the fundamentals of IT system development life-cycle, and etc. They believe that universities shouldn’t prepare graduates who can work with specific type of IT tools, which are currently in demand at the job market. On the other hand, there were 4 participants out of 25 who agreed that due to the high demand of specialists with narrow specialization, there is need to prepare specialist who can work with specific type of tools only.

Also, eight out of 25 survey respondents stated that university education should teach both the fundamental skills and prepare graduates with narrow specialization. In response to question seven, one survey respondent said “there should be general universal preparation and preparation for narrow specialization.” Here, the responded confirms that

universities should develop both the fundamental knowledge and skills in IT field, as well as provide narrow specialization in IT towards the end of studying.

One survey respondent explained that providing narrow specialization at universities “will allow knowing specific area more deeply and be more demanded [at the job-market] compared to those who know a little bit of everything.” This again shows employers’ desire to have IT graduates who should be fully prepared to take-on professional responsibilities right upon graduation, and employers don’t want to spend time and resources on additional training.

From the data above, I concluded that IT employers understand that university education is not for the purpose of preparing graduates who should possess the knowledge and skills currently needed at the job market. However, five out of 25 survey respondents developed their idea about the narrow specialization, which implies that employers want universities to prepare IT graduates who would be competent and prepared enough to ‘jump into production line’ right after graduation. This was interpreted through the idea that employers value more the IT graduates who are specialized to work in one field of IT industry. The need for narrow specialization specialists shows that IT industry is diverse, and the idea of developing narrow specialization is needed nowadays.

Teaching the Theoretical Concepts vs Training How to Use Software Applications

The category above presented idea about narrow specialization in universities. Next, I will talk about teaching the theoretical concepts versus training how to work with tools.

This category talks about the type of knowledge and skills universities teach to IT graduates. During the interview with the university IT teacher, I asked the respondent about the difference between the Kazakhstani university education versus the Western university education. Since the interview participant previously had the experience of

studying in one of Western universities, the person explained the difference between the two systems. This interview respondent's answer helped me to understand whether Kazakhstani universities primarily prepare IT graduates for the job-market needs or they teach the fundamental concepts. Respondent said that "we prepare students for the industry needs, for specific specializations; teach them particular things, which will be needed in production. In the West, they mostly teach the theory, you understand this theory, understand how it works, and then you go deeper [in learning processes]."

Here, the respondent explained that Kazakhstani universities prepare students to work with particular type of software, and the person comparing this educational approach to the Western universities, where students learn theoretical fundamentals. The IT university teacher further explained this idea, "I took computer graphics courses. I didn't learn how to work with specific type of applications Photoshop or Adobe Illustrator. I learned how computer graphics from inside. If it was some sort of animation, then how this animation looks in mathematical form, and describe her using formulas. After learn all that, it is easier to work with applications."

The interview participant said that during his/her studying in the West, the process of learning computer graphics meant understanding how computer graphics operates using the mathematical approach and understanding the theoretical part of it. The person explained that learner who understands the theoretical part of computer graphics can easily learn how to work with any type of computer graphics software applications.

Also, the interview participant said that in Kazakhstani universities, IT students are educated to work with specific type of applications rather than educating students the mathematical concepts of applications' operation:

"When I came here [to the university, where the person currently works], I started teaching this course computer graphics, but everyone expected that I would teach

how to work with Photoshop and 3DMax, in other words everyone was surprised when I started them teaching the mathematics and algebra.”

Here, I can conclude that in Kazakhstani universities students are taught how to work with the particular type of software applications rather than understanding the theoretical concepts of the IT field.

From the category above I came to the conclusion that Kazakhstani IT universities educate IT students to work with particular type of applications, the concept of teaching the theoretical fundamentals is not popular in educational processes.

Higher Education and Industry Collaboration

In the section above, I developed the idea that my participants prefer the shift of higher education towards teaching the skills demanded at the job-market. In this section, I will talk how industry and universities can collaborate together in educational processes.

This category includes the following subcategories:

- Suggestions for improving practical experience
- Effectiveness of internship programs

Suggestions for Improving Practical Experience

In this subcategory, I will talk about IT employers' suggestion for improving the practical experience of university students. The data is primarily coming from the open-ended survey answers for question four. Here, my participants offered idea to develop better collaboration between universities and industry. The following answer confirms the statement, “There is need to provide more practical experience to students. Probably attracting them to work in particular projects, even probably in collaboration with some companies”. The quotes below describe the suggestions which were provided by employers:

“More practical experience working on different cycles of IT system development. For example, to have experience in direction of programming, doing analytics, project work, IT-infrastructure etc.”

“Improving the internship programs; organizing more summer internship programs. Internships improve theoretical knowledge.”

“Doing more real-life projects which can be used in industry”

“Provide opportunity for doing paid internships till the graduation from university. Most Kazakhstani companies are not ready to hire students to work on paid jobs, thus most students are not motivated to show their capabilities during the internships”

“Developing more practical experience in universities’ laboratories. Employers should collaborate with universities in the process of organizing research clusters at universities.”

“Updating the IT programs’ curriculum considering the needs of the job-market. Curriculums should be updated considering the qualification frameworks, which are identified by industries.”

So, employers say that universities should provide more practical experience through the internships and project assignments. My survey respondents recommended developing assignments similar to what people do in real work environment.

Effectiveness of Internship Programs

In this section, I will talk about the effectiveness of currently organized internships and employers’ suggestions how to improve them. The data for this subcategory is coming from the interviews which I conducted with four participants: university teacher, IT

employer, policy-maker, university Career and Advising Center employee (description of participants in Appendix A).

The answers provided by four respondents helped me to generate the idea about the effectiveness of local university internship programs and participants' recommendations to improve internship programs. In this research question five subcategories has emerged:

1. Effectiveness of currently organized internships
2. Low motivation of employers to participate in educational processes
3. Problems with providing practical experience
4. Solution to improve the internship programs at Kazakhstani universities
5. Difference between internship programs organized in the US and in Kazakhstan

Below, I will describe each of the subcategories, and try to provide the answer about the effectiveness of internship programs.

Effectiveness of currently organized internships. This category talks about the effectiveness of internship programs organized in Kazakhstani universities. Here, the IT employer shared the opinion the effectiveness of internship programs, saying that “as for today internships in companies are organized poorly, in a way that students serve the role of person who is used to bring something or take over something”. The person implied that internship students are not involved in any productive work of the company and they are not learning professional skills during internships. IT employer mentioned that “80% of all internships are organized in such way” that students are not being involved in any work related to their professional skills, and employers mostly use the internship students to bring tea or bottle of water, but not work related to their professional work.

In regarding the reasons why the IT employer believes that internships are so poorly organized, the person mentioned that “it is not profitable for employers to teach internships skills just for one summer, show them how to do something”. Here comes the situation that employers use internships to do some routine work not related to work assignments. This is happening because employers don’t want investing their time and resources for training a person, who will eventually leave in a short period of time. This concludes that Kazakhstani employers have a low motivation to train the internship students because internship students are treated as temporary workers. Next category “Low motivation of employers to participate in educational processes” explains why employers are not motivated to train the internship students.

Low motivation of employers to participate in educational processes. To understand why employers are not interested to accept the internship students to work, I asked one of my interview respondents around the issue why employers use internship students to do some unrelated assignments. Career and Advising Center employee provided the following answer, “it costs money for companies to have the interns. They have to provide a supervisor, they have to provide that supervisor’s time and resources to basically teach the students” (The full description of the interview with Career and Advising Center employee is in Appendix F).

Problems with providing practical experience. This category combines the ideas, which explain the current problems with providing practical experience in universities. Here, practical experience implies the type of work, where students apply their learned material in practice, like solving applied problems or designing a software. From my data analysis, I identified whether there is a real need for universities to organize the internship programs. The policy maker stated that internships are important for employers and universities as there is need for employers “to work on preparing students because not all

universities have the required supply and not all universities can afford building themselves training/production areas or have such areas for agricultural specialties.” Here the policy-maker implies that in order to provide the required amount of technical training, there is a need for students to have access to work on special type of equipment or special practical field, and to gain access can be possible only with the help of employers. Thus, universities can provide the necessary practical experience through sending the internship students to work in the field. The policy-maker explained that universities

“simply don’t have opportunities to buy the [required] type of equipment. Not all universities have that opportunity. Well, they can afford creating laboratories for scientific purposes. But when it comes to production work, let’s say where there is a need to create metal products, they [universities] can’t bring the required equipment, and to organize the whole manufacture.”

Here the interviewee implies that currently Kazakhstani universities can’t provide students with the required amount of equipment to have good practical experience, and universities should collaborate with employers.

The policy maker said that there is another problem around the internship experience in universities. Besides that universities don’t have opportunity to buy the required equipment to provide the required level of practical training in to students, policy maker told that “employers themselves are not interested in providing practical knowledge to students.” This defines that universities face the problem with having not enough training equipment to provide students practical knowledge. Employers on their side are interested in helping universities to give practical experience to students and train the internship students.

Solution to improve the internship programs at Kazakhstani universities. My participants suggested to provide benefits to employers for participating in internship programs. I asked their opinion regarding giving tax reduction to employers for participating in internships training. Giving tax reduction is practiced in Canadian model of co-operative education and I talked about this model in literature review section. I wanted to find out what my participants think in regards of giving tax reduction benefit to employers who participate in internship programs.

In order to understand whether the concepts of cooperative education would be applicable in Kazakhstani universities, I asked the opinion of my interview participants. None of them fully knew about the cooperative education, so I had to explain all of them how this model works and who are the main stakeholders of that system. Then, I asked them whether this model would have any obstacles to be implemented in Kazakhstan. Regarding the tax clearance for employers, the policy maker agreed that this model might be a good solution to involve employers in internship programs, adding that in order to implement this model “there is a need to make changes in tax code in order to provide the tax reduction or other preferences.” Policy maker implied that there is a need to make systematic changes in the whole juridical system, which would be the biggest obstacle to implement this change.

I explained the same idea of providing benefits for employers in order to motivate them to participate in internship programs to Career and Advising center employee. The respondent developed the idea that universities should seek internship students for the purpose of screening future employees, and providing the tax reduction might not be a necessary action. Respondent stated the following, “Employers get benefits: future employees. They can also say about the social contribution to society.” The same type of conversation was developed with university teacher and policy-maker, and they also

accepted that this model might be beneficial to improve the effectiveness of internship programs.

Difference between internship programs organized in the US and in Kazakhstan. During the interviews, I found that internships are organized differently in Kazakhstan and in the US. The Career and Advising center employee tried to explain the main differences how internships are organized in Kazakhstan and in the US (Transcribed interview with participant is in Appendix F). The person stated that in Kazakhstani situation “every company we [University Career and Advising Center] deal wants to have some sort of interaction with the career advising center”. Here the person implies that in order to organize internship companies in Kazakhstani companies, there is a need to organize collaborative work between the university administration and the employers. In the US, the internships are organized differently. Participant explained the main difference with the following statement, “in the US, it is more like a job-board when the organization puts the internship on the job-board and usually university intervention is really minor. It is usually directly between the student and the organization.” So Kazakhstani universities play the role of inter-player, who is supposed to make the communication between the employers and internship students. In the US case, employers and internship students work directly, and universities play a minor role in the organizational part of it. Career and Advising Center employee said “internships mean something different here.» I interpreted that internship programs in the US work more like job search mechanism, whether in Kazakhstan internships are viewed as educational processes, where students are expected just to familiarize themselves with the function of company and they are not expected to participate in the production workflow of the company.

My participants stated that internship programs are serving the purpose of providing students practical experience in work-field as employers don't want to spend

their resources on training university students. They explained that employers have no motivation to train students for free. As a recommendation to motivate employers, I asked my participants whether adopting co-operative education model would be suitable. Here, three participants agreed that the model would be beneficial to improve the effectiveness of internship programs. Also, one interview participants explained the difference between the organizational side of internship programs in Kazakhstani and in the US universities.

Employability Skills

Above, I talked about the industry and university collaboration. In this section, I will explain what type of skills are demanded in job-market. In my study, those skills are categorized as employability skills. The following subcategories emerged in this section:

1. Industry demand
2. Employers' recommendations on how to improve the process educating IT university graduates

Industry Demand

Survey Q5 asked employers' opinion about the type of skills and knowledge that should be additionally taught at Kazakhstani universities. Survey and interview participants provided suggestions about what type of skills and knowledge is demanded at the job-market.

The following subcategories emerged as a result of my data analysis:

- Teaching students the concepts of software development life cycle
- Project management skills.

Each subcategory will be described below.

Teaching students the concepts of software development life cycle. This category describes the knowledge of software development life cycle which should be developed in IT graduates according to the employers' opinion. The following response

was provided by one of the employers, which suggested that universities should develop in IT graduates not only language programming skills but develop the skills necessary during various stages of software development life-cycle. Participant recommended the document which should be used for those practical skills:

“There is a need for specialization called Software Engineer. The core of this program should be based on Software Engineering Body of Knowledge (SWEBOK). IT covers all requirements for software development – organizing software requirements (the basics for analysts), project management processes (mainly for project managers), software architectural design (for programmers), Software detailed design (for programmers), [software] testing, quality assurance (for testers).”

Employer emphasized the necessity for students to fully grasp all skills involved in each stage of software development cycle from initial design to end product. From the quote presented above those skills are IT analytics, project management, software architecture, coding, software testing and IT system support.

Several times, the software development life-cycle skills emerged as critical knowledge to master. One employer suggested that there is a need to “direction in analytics: [understanding] what is requirement, what are the types [of requirements], how to document correctly [the software requirements], what type of analysis exists, and etc.” The same idea was repeated in the next response: “For Kazakhstani Higher education Establishments it is necessary to consider the following fields: IT analytics; IT Architecture, Software testing, Project management.” Also, employers suggest that IT graduates need to have the knowledge in the field of managing the work during the implementation stage of IT system.

Above I talked about the suggestion which was provided by employers in the open-ended survey question for teaching students the concepts of software development life cycle. In the next section, I will talk in detail about the suggestion of developing project management skills in IT graduates.

Project Management skills. This category refers to the suggestion of developing project management skills in IT graduates. This suggestion has been repeated five times in the open-ended survey responses. Respondents recommended teaching students how to handle the project management processes according to the International Project Management standards such as IPMA or PMI.

After conducting the survey, I asked the IT employer the same question what type of skills and knowledge should universities provide for the IT graduates, and the IT employer repeated the idea IT graduates need to know how to handle managing projects. The person explained that skills of managing projects at work is necessary for IT graduates “for the purpose of delivering projects correctly, particularly saying in the frame of given budget, in the frame of given deadline and with consideration of required quality, people need to understand how to develop the project and how to work in it.”

The same person stated the importance of teaching the project management skills at university level, explaining that

“the fundamentals should be given in universities. Companies have to spend tremendous efforts and resources to teach [the project management skills]. This is building the employees skills from the beginning. Not all companies are interested in that cause it requires too much of resources, so companies have to “hunt” for employees who have those skills.”

From this we can clearly see two things. First of all, this interviewee strongly believes that universities should be developing project management skills in prospective employees. We also see that for this participant, IT employer, the rationale for asking to teach project management skills in universities is in externalizing the costs of training to universities.

The interviewee stated that in the Western universities, “the concept of leading a project is given at university level through the course works”. Thus, students obtain the skills of working in teams and leading the projects in universities. This develops the idea that Kazakhstani universities are not fully integrating into their course offerings essential skills and learning outcomes which ICT students need to have upon graduation in order to be successful in their careers.

The section above concluded the type of knowledge and skills which should be provided in universities according to IT employers’ opinion. As we saw, employers suggest developing project management skills in IT graduates, and the section above explained the reason why employers want that type of skills to be developed in IT graduates. In the section below, I will talk employers recommendations on how to improve the process for educating IT graduates.

Employers’ Recommendations on How to Improve the Process for Educating IT Graduates.

The surveyed employers identified several solutions of how the process of preparing IT graduates at Kazakhstani universities can be improved. The following are the suggestions:

- developing narrow specialization for IT students

Developing narrow specialization for IT students. Employers recommended the development of IT programs with narrow specialization in a particular fields. For

example, one of the survey respondents stated that, “It is necessary not only to teach about the generic concept of IT technologies, but also to include narrow specializations, such as IT Accounting, IT Banking, IT and Oil & Gas, etc”. Another survey respondent supported this idea, and stated,

“there is a need for specialization according to different fields [of use]. In such way it is done in Economics majors. IT-specialists need to know the processes and data of the field in which they are working on automating systems. In order to do this, students need to take course lectures of additional specialization. For example, IT specialist in accounting need to take courses in IT accounting, IT specialist in transportation needs to learn about logistics, machinery building, traffic code, etc”.

The contradicting idea that universities don’t really need a specialization, but employers themselves should develop the additional knowledge and skills in students was stated by another survey respondent. One survey respondent stated,

“For today, there are two of scenarios for preparing good specialists, and it all depends on the field where company operates: the first type needs absolutely prepared specialists, as they don’t have time to prepare a young specialist (it might depend on economical situation of organization or time limits for project realization)...The second type of companies needs students, who have just the fundamental knowledge and competencies. For those companies building long relationship with employees, it is more important considering that the field of their company’s operation is really narrow (developing informational systems for air/ship transportation).”

Considering the two opinions of the survey respondents, I concluded that Kazakhstani educational system needs to work in collaboration with Kazakhstani

employers in order to meet the expectations and prepare competent graduates. It leads to the discussion whether universities should prepare graduates with narrow specialization, which can be utilized in specific type of industry or whether universities should prepare graduates who should have the knowledge and skills in order to easily learn any narrow specialization of any company easily.

The category explored the idea of providing narrow skills and specialization to university graduates. As we can see, employers consider that university graduates should have narrow specialization, such as getting knowledge both in IT field and in Banking. So, double degrees are preferable to employers. On the other hand, other employer states that there are companies, which don't need fully-trained specialists, as their companies operation requires specific type of skills, and companies are interested in teaching those skills and knowledge to new coming university graduates.

Skill Gap

This category presents my research participants opinion in regards of how university education is meeting the demands of the job-market. Here my participants showed that there is skill gap problem by underlying the existing problems in IT education and low qualification of university teachers. Also, they showed their level of satisfaction with IT university graduates skills. This category involves data derived from the questionnaire answers and from the interviews. The following subcategories emerged in skill gap category:

- Qualification level of university teachers
- Existing problems in IT education
- Employers satisfaction

Qualification Level of University Teachers

This category described the suggestion, which was provided by the IT employer in order to improve the quality of educational system. Three of my survey respondents stated that there is need for university IT teachers to work on improving their qualification levels and to learn the modern technologies. One survey respondent stated the following,

“It is necessary for teachers themselves to know something new. Unfortunately, not all [university] teachers are willing to professionally develop: the more experienced teachers don’t want to learn something new, the new teachers are lazy and don’t want to work.”

This idea leads to the point that employers consider that teachers at universities are not qualified enough to teach the up-to-date knowledge, which would suggest one of the reasons why universities are not preparing the IT graduates which would meet the demands of the job market. The IT field is one of the most rapidly-developing fields and technologies tend to change very frequently. Thus, the importance of ongoing teacher professional development is considered essential to keep up with advancements in the IT field.

The same idea that teacher professional development is important in IT field was developed by university teacher (see Appendix A for the description of the interview respondent), who said “University teachers also need to constantly improve their qualification level. For example, most teachers still teach Pascal and Basic [programming languages], though programming field changes so fast. University teachers need to improve their qualification level every time.”

This idea emphasizes further the point that there is a weak relationship between what type of knowledge universities should teach and what is needed in the job market. It is implied that university teachers do not keep up with current trends in the IT field and therefore, are lacking in knowledge as to current demands of the job market and essential skill sets required.

Existing Problems in IT Education

This subcategory describes the types of problems, of which there are many currently existing in IT university education in Kazakhstan. One the main problems is the outdated curriculum problem. Survey respondent on open-ended question four said the following, “I think that the current Kazakhstani university curriculum is outdated. Considering that IT field develops fast, there is a need to renew the educational curriculums every year. Thus, in universities students are still learning the analog communication systems, though those technologies are no longer current”. This statement leads to the conclusion that university IT students are actually being disadvantaged by outdated technologies presented at university.

In order to update the educational curriculums, the open-ended survey participants stated the importance of “updating the curriculums with consideration of the tendencies of other universities in the world.» This concludes to the opinion that Kazakhstani universities are still using the outdated curriculums which were developed during the Soviet time and employers suggest to update the curriculums content following the experience of the Western universities.

The statement that Kazakhstani IT education is not meeting the demand of job market can't be applied to all Kazakhstani universities. There are several universities which are providing a high quality knowledge in IT field. However the problems which I identified in the findings can be applicable to the vast majority of Kazakhstani universities.

Employer Satisfaction

According to my survey results, I asked employers to rate the level of importance (from scale 1 to 5, where 1 least important) of particular skills specifically to their company's industry operation and then asked the employers to rate their level of satisfaction on a scale from 1 to 5, where

- 1- Completely dissatisfied,
- 2- Dissatisfied
- 3- Neutral (Neither satisfied nor dissatisfied)
- 4- Satisfied
- 5- Completely satisfied (See Appendix B, Q3 and Q6).

The results of skills/traits importance rate and satisfaction rate presented in the following diagram (see Figure 1).

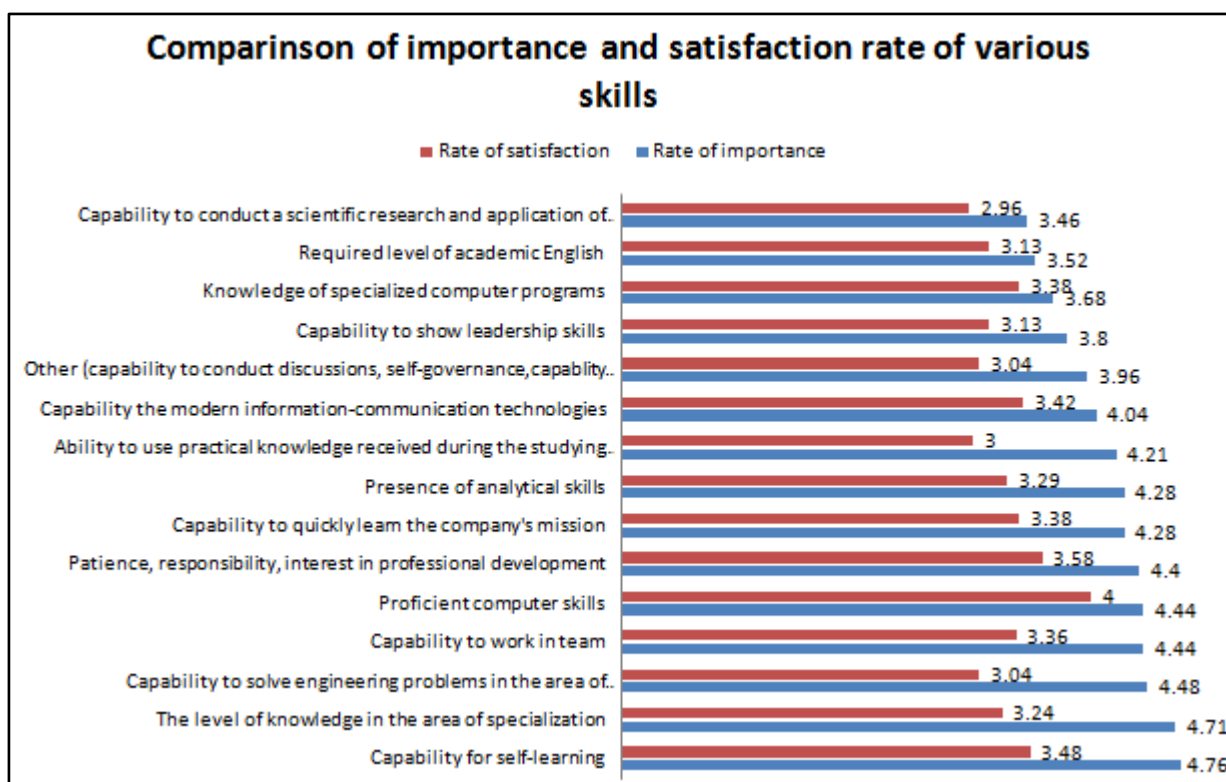


Figure 1. Comparison of importance and satisfaction rate of various skills.

To analyze the data I obtained the mean value of the rate of importance and the rate of employers' satisfaction. The following results were obtained:

The mean value of rate of importance of the skills/traits is 4.14.

The mean value of rate of satisfaction of skills/traits is 3.29.

Relying on the results of the mean values employers consider the traits/skills which were asked in the survey are considered to be important (scale 4.14 out of 5). The level of employers satisfaction shows that employers has a medium level of satisfaction with the IT graduates' skills (scale 3.29 out of 5).

Among the skills and traits which I asked employers to rate as the most important and rate the level of satisfaction, I came to conclusion that top three skills which had the highest rank of importance also had a low level of satisfaction. Survey respondents stated that the trait of capability of self-learning, the level of knowledge in the area of specialization, and capability to solve engineering problems in the area of specialization are considered among the most valued skills. However, there appeared to be a big gap among the level of importance and the level of employers' satisfaction among those three traits. Table 3 depicts the difference among the rank of importance and level of employers satisfaction of the mentioned three skills:

Table [3]

The difference between the rank of importance and the level of satisfaction of the three most important skills/traits

Name of skill/trait	Rank of importance	Rank of satisfaction	Difference
Capability for self-learning	4.76	3.48	1.28
The level of knowledge in the area of specialization	4.71	3.24	1.47
Capability to solve engineering problems in the area of specialization	4.48	3.04	1.44

As I have found out, employers level of satisfaction with the 15 skills/traits that I asked them from the survey has the value of 3.29, which means that employers have a medium level of satisfaction with the IT graduates' skills. So what we see above shows that IT employers find more value in employees who are capable of doing self-learning and are capable to solve problems by themselves. This probably can say that currently each company's operation and business processes are unique, so what employers value the most in IT graduates is the capability to quickly get the specifics of companies' job operation and start bringing revenue to companies' production flow.

Interestingly, when we compare these questionnaire responses and the open-ended responses from the same survey described above, we can clearly see that there is relationship between the results from research question one and the results presented for research question in Table 3. In the table, employers state the level of knowledge in the area of specialization is the second most important skill, and employers seem to be the least satisfied with the current level of knowledge of IT graduates in the area of specialization. This, again, confirms that the results from research question one relates to the results from research question two, as in research question one employers suggested that there is need to improve the "out-dated" curriculum, provide better teacher qualification training and provide more practical training. Both results confirm can confirm

the statement that my interview respondents think that there is knowledge and skills gap between what universities teach to IT students and what type of knowledge and skills employers want, so that currently employers are not satisfied with the level of knowledge of IT graduates in the area of specialization.

The next interesting thing which I derived from comparing the results from RQ1 and RQ2 show that employers value the non-technical skills like capability for self-learning equally important as the level of knowledge in the area of specialization and capability to solve engineering problems in the area of specialization. This idea also was confirmed in the findings in the first research question. Employers suggested that students need to develop their technical skills in the area of software development lifecycle and the trends in IT technologies.

Findings

In the chapter above, I analyzed my research data in terms of categories consistent with the concepts and issues relevant to my four research questions. My data analysis derived nine findings which would depict the current situation around the higher education in Kazakhstan, specifically the existing problems, solutions for improvement, the role of university in teaching social skills to students. So, here are my findings:

1. There is a gap between what is demanded in industry and what universities teach to students. This finding is primarily supported by the results from category 'Skill gap', where employers talked about the existing problems in IT education, low level of qualification of university teachers. The skill gap issue was derived from the questionnaire resultsof employers satisfaction with IT graduates skills.
2. Kazakhstani universities are mostly concentrated on teaching only one stage(programming languages) as opposed to all stages of software development life cycle (including the skills in the area of designing software, developing the product, and

delivering it to customer). This finding is coming from category 'Knowledge and skills.' This shows that there is need to revise the syllabus and curriculum for the IT majors, where the focus extends beyond just programming.

3. The job market requires university graduates who are competent not only in the IT field, but also in non-IT fields as well. The following open-ended survey answer confirms this idea, "It is necessary not only to teach about the generic concept of IT technologies, but also to include narrow specializations, such as IT Accounting, IT Banking, IT and Oil & Gas, etc." This finding is primarily showed in data analysis from category 'Knowledge and skills', in subcategory 'Employers recommendations.'

4. There is high demand for IT specialists who are competent in the area of project management. Survey respondents claimed that the skills and knowledge for managing projects is becoming essential for the IT industry, and it is one of the skills which should be developed in future IT graduates. This finding is coming from the data analysis from category 'Knowledge and skills', in subcategory ' Industry demand.'

5. According to the IT university teacher in my interview, Kazakhstani universities are too focused on teaching IT students how to work with particular software applications in practical contexts, as opposed to developing understanding of fundamental principles and methods of IT systems operation. This finding is coming from category 'Purpose of higher education' in sub category 'teaching theoretical concepts versus training how to use software applications.'

6. Employers in this study want universities to prepare graduates who would be fully prepared to start work without training. This finding was concluded as a result from the data analysis in categories 'Industry demand', in subcategory 'Employers recommendations.'

7. Employers consider that universities should be more targeted at providing social skills which would be helpful at the job-market, like responsibility, preparedness to do work individually, and capability for self-learning. Surprisingly, my research participants claimed that social skills and dispositions like tolerance and humanity should be taught to students by their parents and school teachers, and universities coursework shouldn't be investing time in that work. This finding was derived from category 'University as a public good', subcategory 'University role on developing social skills.'
8. Internship in Kazakhstani universities are not organized effectively as internship students are not learning any professional skills, and employers use internship students as "extra-workers" to do some routine work, like copying papers. This finding was developed in category 'university and industry collaboration', subcategory 'Effectiveness of internship programs.'
9. Employers want IT graduates to have more practical experience, which should be delivered through the internship programs, however, employers themselves are not interested in teaching the internship students how to do work because it is too costly for companies as they don't want to allocate time and resources for internship students. This finding is coming from category 'Industry and university collaboration', subcategory 'Effectiveness of internship programs.'
10. According to the university Career and Advising Center employee, the organization structure of internship programs is done differently in the US and in Kazakhstani universities. In the US, the internship programs are organized mostly as job search mechanisms, where students are expected to find their employers and to participate in companies' production workflow. In Kazakhstani context, internship programs are mostly considered as a part of educational process, where students are expected to get familiar with the operation of company and they are not expected to do work, similar to 'job-

shadowing' which is done to familiarize students with company's workflow. This finding is coming from category 'Industry and university collaboration', subcategory 'Effectiveness of internship programs.'

So, this is a list of my nine findings which I found as a result of answering to my four research questions. In my Data Analysis/Findings chapter I analyzed the answers that I received from my mixed method research and derived nine findings. In the next chapter, I will discuss my findings using my literature review.

Chapter 5: Discussion of Findings

In the previous chapter, I presented the data analysis of my research. In this chapter, I will answer the research questions using the findings and ideas presented in literature review. The purpose of my mixed method research was to understand the perspectives of the IT professionals involved in the hiring process in Kazakhstan on the role of the university in preparing IT professionals for Kazakhstan, and on the quality of IT education in Kazakhstani higher education.

I used a mixed method for my research which included a quantitative and qualitative part. This research derives data from three data sources: quantitative survey questions, qualitative open-ended survey questions and four interviews. This research will be organized around research questions. I will answer the research questions using the findings of this research and the ideas reflected in literature review section. It is important to emphasize here that findings are not intended to be generalizable to all employers in Kazakhstan, but instead reflect the perspectives and interpretations of my participants.

RQ1: Which Type of Skills and Knowledge Are Currently Demanded in the IT Job-Market According to Kazakhstani IT Employers?

The purpose of this research question was to investigate what type of skills and knowledge is in current demand in IT job-market according to my mixed-method research participants. The answer for this research question was derived from the open-ended survey answers and from the interviews. In that sense, the first finding that corresponds to this research question is following:

Finding 1: Kazakhstani universities are mostly concentrated on teaching only one stage (programming languages) as opposed to all stages of software development life cycle (including the skills in the area of designing IT systems, developing the product, and delivering it to customer). This finding states that industry needs university

graduates, who would have the skills at various stages of software development life-cycle. Here the software development lifecycle refers to the description from literature review section, which defines it as a “conceptual framework or process that considers the structure of the stages involved in the development of an application from its initial feasibility study through to its deployment in the field and maintenance” (Ruparelia, 2010, p. 8). Thus, my research participants stated that Kazakhstani IT job-market needs graduates who possess various practical skills, such as designing IT systems, testing the quality of product, delivering it to customer, documenting technical requirements for IT system, and other practical skills. The finding has a high significance because it shows that there are IT practical skills, which are demanded among IT employers, and possibly universities should consider changing the teaching methodology for IT majors.

Reasons for this single-minded focus on the one cycle stage was reported by my participants several times in their answers to the open-ended question “Which new IT directions should be adopted in educational process of Kazakhstani universities?”. Here, my respondents said that they need graduates who would have the following skills: “direction in analytics: [understanding] what is requirement, what are the types [of requirements], how to document correctly [the software requirements], what type of analysis exists, and etc.” This idea was repeated over in several recommendations, where participants said that “for Kazakhstani Higher education establishments it is necessary to consider the following fields: IT analytics; IT Architecture, Software testing, Project management.” The recommendations of the survey participants confirms that industry wants universities to teach both programming skills and other practical skills, like developing design specifications, testing software and other practical skills. Clearly, there is a demand for graduates who would possess all those skills required at various stages of software development life-cycle.

As a recommendation, the use of project-based learning in university education might solve this issue. The numerous benefits of this educational model has been discussed by Detmer et. al (2010) and Fernandez & Williamson (2003), who stated that this model allows students to “engage in collaborative, project-based activities, to learn about project management, requirement analysis, modeling, and prototyping, design specifications and application implementation” (p.37). Adopting this model in IT education might be helpful to teach students the practical skills required at different stages of software development lifecycle.

So, the first finding of the research suggests that IT industry needs graduates with practical skills required at various stages of software development life-cycle. The next finding which delivers the answer to RQ1 states the following:

Finding 2: The job market requires university graduates who competent not only in IT field, but also in non-IT fields as well. This finding means that IT industry needs graduates who would be not only competent to do programming, but also understand the concepts in other non-programming areas. As an example, one open-ended survey respondent stated that “It is necessary not only to teach about the generic concept of IT technologies, but also to include narrow specializations, such as IT Accounting, IT Banking, IT and Oil & Gas, etc.” This interprets that currently demanded IT specialists work in various fields, such banking or oil and gas industry. IT specialists in those field, besides knowing how to handle the technical side of their work, are required to understand the non-IT field, where they are working. This idea was explained in detail in one of the open-ended survey answers, which recommends that

there is a need for specialization according to different fields [of use]. In such way it is done in Economics majors. IT-specialists need to know the processes and data of the field in which they are working on automating systems. In order to do this,

students need to take course lectures of additional specialization. For example, IT specialist in accounting need to take courses in IT accounting, IT specialist in transportation needs to learn about logistics, machinery building, traffic code, etc.

The literature on this topic talks about the benefits of developing IT programs, where students would get the knowledge in various fields. Lee et.al. (1995) says that the changing nature of IT industry requires universities to develop programs, where “co-operative efforts and multidisciplinary approaches that cut across university department or even colleges” (p. 334). Yorke (2011) on that sense talks about developing joint-degree programs or so called “sandwich programs”, where students would get courses from various fields.

The idea of offering joint-degree programs leads to discussion whether those programs should focus more on teaching programming skills or more emphasis should be placed on teaching market-demanded non-programming skills. In the article by Andriole and Roberts (2008), Andriole states that due to outsourcing of programming and other technical works to countries outside the US, American software industry no longer needs graduates who would be competent only in programming areas. The author claims that the importance of programming skills are becoming obsolete for IT graduates, and university should focus on teaching business skills. Though, Andriole develops a convincing argument, and my research participants also confirmed his point of view that IT industry needs graduates who have knowledge and skills in different fields besides programming, I strongly agree with the argument of Roberts (Andriole & Roberts, 2008), who says that there always going to be a demand for university graduates with strong programming skills and knowledge. He adds that software industry is used in different sectors, such as science, engineering, economics and other, so developing new IT products in those other fields depends on graduates with strong programming skills.

I would conclude this point with idea that besides industry asks to design IT programs where students would acquire knowledge and skills from other non-programming skills, I agree with point of Roberts (Andriole & Roberts, 2008) that the core competency of IT specialist would be strong programming skills. Besides that, there are various non-IT field and developing IT programs with different 'flavors' would be too costly and inefficient for universities.

Above, I explained the two findings of this research regarding the skills and knowledge which is currently demanded in IT-job market. My third finding on this issue states that

Finding 3: There is high demand for IT specialists who are competent in the area of project management. This finding implies that Kazakhstani IT industry demands employees who would be competent in IT field and capable of to managing projects. This finding was supported by the suggestions of my open-ended survey question five and my interviews participants in which I asked participants about what type of knowledge and skills should be developed in IT graduates. The IT employer stated that IT companies currently have to invest in training employees in project management skills, which is not beneficial for companies. Companies have to "hunt" the employees who would be competent in project management area. Here the quote from IT employer, which states this idea:

"As for today considering the experience of our company, the project management is being developed [among employees], and we are developing that skill really well, employees are being certified. However, the fundamentals should be given in universities. Companies have to spend tremendous efforts and resources to teach [the project management skills]. This is building the employees skills from the

beginning. Not all companies are interested in that cause it requires too much of resources, so companies have to “hunt” for employees who have those skills.”

Here, I understand that companies are not trying to avoid investing resources in training employees, but rather suggest that the fundamental knowledge of managing should be provided to IT graduates at university level. IT employers explains that IT companies need project managers “for the purpose of delivering projects correctly, particularly saying in the frame of given budget, in the frame of given deadline and with consideration of required quality, people need to understand how to develop the project and how to work in it.” So, the current IT job-market demands people who would be capable of doing managerial work and successfully lead the IT projects.

Another proof that IT industry needs graduates who are have the skills of managing projects was reflected in the OECD Country Capability Survey (OECD, 2010). The results of the survey claims that project manager is considered among the hardest-to-fill vacancies in Kazakhstani job-market. Also, the result from studies from other countries suggest that project management skill is becoming essential in IT industry. Such as in the studies by Hagan (2004) and by Radermacher et al. (2014), the authors suggest that employers want IT graduates to have project experience skills and project management skills. Also, as a result of comparing the results from 10 various studies about the skill gap issue, Radermacher et al. (2014) identified that project management is the fourth most demanded skill by IT employers. This also proves that project management is highly demanded in IT industry.

In summary, the project management skill is becoming essential in IT industry and it can be implied that the concepts of having project experience should be given to students during university level. The demand for project management skilled IT workers appears not only in Kazakhstani IT industry, but in other countries as well.

So, my findings for research question one were presented above. Next are the findings for RQ2.

RQ2: To What Extent are IT Employers Satisfied With the Skills, Knowledge and Capabilities of IT Majors from Kazakhstani Universities?

This question investigates to which extent IT employers are satisfied with knowledge and skills of Kazakhstani IT university graduates. The first finding for this RQ states the following:

Finding 4: There is a gap between what is demanded in industry and what universities teach to students. This finding implies that there is a mismatch between the skills demanded in Kazakhstani job market and what is provided to IT graduates by universities. The finding is primarily supported by my three research participants' opinion which states that university teachers are not qualified enough to teach students knowledge and skills which are up-to-date. The example of quote from open-ended survey answer is presented below:

“It is necessary for teachers themselves to know something new. Unfortunately, not all [university] teachers are willing to professionally develop: the more experienced teachers don't want to learn something new, the new teachers are lazy and don't want to work.”

During interviews, university teacher repeated the same point of view, saying that

“University teachers also need to constantly improve their qualification level. For example, most teachers still teach Pascal and Basic [programming languages], though programming field changes so fast. University teachers need to improve their qualification level every time.”

Also, my three survey participants stated that the university IT curriculum is outdated and students learn how to work with technologies which are no longer used in industry. The quote from the open-ended survey answer supports this ideas:

“I think that the current Kazakhstani university curriculum is outdated. Considering that IT field develops fast, there is a need to renew the educational curriculums every year. Thus, in universities students are still learning the analog communication systems, though those technologies are no longer current.”

Another point, which led me to the conclusion that there is a skill gap problem in Kazakhstan was the results of employer satisfaction survey, where I asked employers to rate the importance of particular skills and employers' level of satisfaction with those skills. Here, I found out that employers value 'capability for self-learning', 'the level of knowledge in area of specialization' and 'ability to solve engineering problems in the area of specialization' to be the most valued skills, though, their level of satisfaction with those skills is rated as somewhere between 'neither satisfied nor dissatisfied' and 'satisfied'. Among the mentioned three skills, employers were least satisfied with graduates' capability to solve engineering problems in the area of specialization. This can be explained by the reason that IT students don't receive the required level of practical experience in universities in a form of doing projects, where students would be able to learn how to solve 'real-life' engineering problems.

The research by McKinsey & Company (Mourshed, Farrell & Barton, 2012) and the UNESCO Monitoring Report (Aring, 2012) state that a skill gap exists in most countries around the world. The fact that there is a skill gap problem signals suggests the possibility that there are not enough qualified specialists in Kazakhstani job-market, and all Kazakhstani IT graduates face the problem of finding jobs according to their specialties. This fact was confirmed by the National Agency results, which states that among 1500

surveyed participants only half work according to their specialities (Rating.kz Research Agency, 2012). This situation is similar to situation in Indian job-market where unemployment rate of university IT graduates is around 75% (Aring, 2012). The low-employability rate of Indian university graduates is explained by the disconnection of the skills required at the job market and the skills provided in universities (Mishra, 2014), and the same type of explanation can be applied to Kazakhstani job-market situation. So, in Kazakhstan the situation seems to be similar to Indian situation, when universities produce too many graduates, who can't find employment after graduation.

There is an interesting fact of the results presented by the OECD Country Capability Survey from 2010, which states that Kazakhstani employers find that “while only a few firms reported a major gap in technical expertise, less than one third of respondents reported minor gaps in technical skills” (OECD, 2011, p.231). This statement contradicts the results of my research, as the respondents of my employer satisfaction survey showed their dissatisfaction with IT graduates' level of knowledge in the area of specialization. Also, the results of the open-ended survey showed that employers consider the skills and knowledge that students receive at university level is outdated, which leads to the point that the knowledge in area of specialization of IT university graduates is not satisfying the job-market needs. I can't really find reasonable explanation why the results of my research is different from the findings of the Country Capability Survey from 2010, but one of the assumption was that OECD was choosing survey participants among large companies, which hire graduates from Kazakhstani top universities, and my research participants dealt with hiring graduates from lower-ranking universities.

The second interesting fact is that the OECD Country Capability Survey found out that Kazakhstani university graduates lack the culture of communication (OECD, 2011). Considering this, I questioned whether employers consider university to be the place,

where students should develop their professional communication skills. Question eight in the survey, I asked employers what type of social skills should university develop, where most employers agreed that university should prepare graduates who would be responsible to do their work, capable to do work individually and to do self-learning. However, only half of my participants (12 out of 25) agreed that universities should develop the skills of professional communication. Here, I assume that my participants understand that the skill of professional communication should be developed by entry-level employees during the first days at work and universities can't develop professional communication skills in students. Here, we can see that employers complain that IT graduates can't communicate with each other, though not all employers understand that universities must teach the soft skills like communication to university students.

RQ3: What is the perceived effectiveness of internship programs for Kazakhstani university students in IT companies, and what are suggestions to improve it?

There are three findings, which refer to this RQ. The first one states the following,

Finding 5: Internship in Kazakhstani universities are not organized effectively as internship students are not learning any professional skills, and employers use internship students as “extra-workers” to do some routine work, like copying papers.

This finding means that internship programs organized by local companies are not bringing benefits to students in terms of teaching them professional skills. This finding has been confirmed by IT employers comment, who said “as for today internships in companies are organized poorly, in a way that students serve the role of person who is used to bring over something or take over something.” Employer mentioned that around 80% internships in Kazakhstani companies are organized such way.

In fact, my interview participant explained that Kazakhstani university find internship programs to be one of the solutions to provide students practical experience.

Policy-maker explained that “not all universities have the required supply and not all universities can afford building themselves training/production areas or have such areas for agricultural specialties.» I understand that at current time, Kazakhstani universities have minor opportunities to provide students with the required amount of laboratory training equipment and technologies. Policy maker said that universities “simply don’t have opportunities to buy the [required] type of equipment. Not all universities have that opportunity” Policy maker, clarified that it is not true that universities have no resources and opportunities to get the laboratory equipment, adding that universities “can afford creating laboratories for scientific purposes. But when it comes to production work, let’s say where there is a need to create metal products, they [universities] can’t bring the required equipment, and to organize the whole manufacture.” Thus, universities seek the help from industry representatives to provide practical experience to students.

Unfortunately, the internship programs organized in local companies don’t bring the benefit of providing practical experience to students, as companies are not interested in educating internship students. They assign them to do some routine assignments, such copying papers, and don’t want to participate in educational processes. My next finding explains why employers are not participating in educational processes and poorly organize internship programs.

Finding 6: Employers want IT graduates to have more practical experience, which should be delivered through the internship programs, however, employers themselves are not interested in teaching the internship students how to do work because it is too costly for companies as they don’t want to allocate time and resources for internship students. This finding implies that the value of practical experience is highly valued among IT employers, however, they are not interested in training the undergraduate internship students. The university Career and Advising Center

employee during the interview explained that “it costs money for companies to have the interns. They have to provide a supervisor, they have to provide that supervisor’s time and resources to basically teach the students.” IT employer said that “employers are not willing to teach internship students how to do work, as students are temporary workers who will leave when internships end.”, implying employers consider internship students as temporary workers who will leave when internships end, and it is not beneficial for employers to spend their time/resources on educating those temporary workers. On the other hand, as described in finding nine in the previous chapter, employers want to have IT graduates who would be prepared to jump into production right after graduating from university.

I interpret that local employers have low motivation to participate in internship programs as it is not beneficial for them to train ‘temporary workers’. It might be explained by the absence of training culture in local companies or probably because government should consider ways to provide appreciation benefits for employers for participating in internship programs. Simply saying, it is necessary to encourage employers to participate in internship training programs by providing them benefits. As an example, in the Canadian model of co-operative education, government provides tax credit to employers who get engaged in training students (Ontario Ministry of Finance, 2014). In that sense, the same type of approach might be adopted by local educational system. Giving tax reduction to employers might motivate them to invest time and resources in students’ training. On the other hand, this model requires employers to pay internship students salaries. Paid internships useful to motivate students to work harder because receiving salaries would obligate students to do work with care. The idea of paid internship benefits was developed in one of the open-ended survey answers, where respondent explained that “most Kazakhstani companies are not ready to hire students to work on paid jobs, thus

most students are not motivated to show their capabilities during the internships”. So, above I explained why employers don’t want to be involved in internship programs, and I talked about the Canadian internship model. Below, I have another finding, which talks how employers regard internship programs in Kazakhstan and in the US.

Finding 7: According to the university Career and Advising Center employee, the organization structure of internship programs is done differently in the US and in Kazakhstani universities. This finding implied that in the US, the internship programs are organized mostly as job-search mechanisms, where students are expected to find their employers on their own, and to participate in companies’ production workflow.

Interviewee stated that in Kazakhstani context, “internships mean something different here.» Interpreting his words, I understood that internship programs in Kazakhstan are mostly considered as a part of educational process, where students are expected to get familiar with the operation of company and employers do not involve students in company’s work. This is similar to ‘job-shadowing’ which is done in order to familiarize students how work is done in companies.

Referring the Canadian model, the requirement of engaging university students in company’s work is documented in internship requirements. In the list of co-operative education program requirements for employers, it is stated that students must be “engaged in productive work rather than merely observing” (Canadian Association for Co-operative Education, 2014, par. 3). Though, I find that in order to implement the effective internship programs, it might be useful to adopt some of those requirements from the co-operative education model in order to assure that students would be engaged in doing professional work rather than merely observing how people work in companies.

These were the findings for the research question three. Below, I will present three findings for research question four.

RQ4: How Do Kazakhstani Employers Understand The Purpose Of Higher Education? For Example, Do They Consider Higher Education to Have a Primarily Vocational purpose, or Do They Interpret That University Education Also Has National Priority Of Educating Active and Informed Citizens of Kazakhstani Society?

Finding 8: Employers in this study want universities to prepare graduates who would be fully prepared to start work without investing resources for on-job training.

This finding reflects that employers in my study want universities to equip students with skills, which are demanded by the job market, so that companies wouldn't have to invest resources in training entry-level employees. This suggestion was colorfully described in the comment by open-ended survey respondent, which offered to develop IT programs, where students would learn knowledge and skills from various fields:

“IT-specialists need to know the processes and data of the field in which they are working on automating systems. In order to do this, students need to take course lectures of additional specialization. For example, IT specialist in accounting need to take courses in IT accounting, IT specialist in transportation needs to learn about logistics, machinery building, traffic code, etc”

Obviously, it is not possible for universities offering IT programs, which would teach students concepts from other non-IT fields, such as IT and machinery building and etc. Once hiring the IT graduates, employers should invest resources in training the entry-level employees. Similar type of argument was developed in comment of a senior education specialist at the Asian Development Bank, who stated that employers “want everyone to come prepared and ready. Employers need to invest in their own employees” (Mishra, 2014, par.25).

IT employer during the interviews talked about suggestion of developing project management skills at university level, and explained that investing on educating entry-level employees with project management skills is not profitable for companies, adding that “not all companies are interested in that cause it requires too much of resources, so companies have to “hunt” for employees who have those skills.” The similar type of argument was developed in the discussion of finding two. Further developing my point of view, I would add that currently companies desire universities to align the curriculum with the needs of industry. This finding was another evidence that job-market wants to see more vocationalism in higher education. My next finding for research question four talks more in detail how vocationalism is currently being reflected in university curriculum.

Finding 9: According to the IT university teacher in my interview, Kazakhstani universities are too focused on teaching IT students how to work with particular software applications in practical contexts, as opposed to developing understanding of fundamental principles and methods of IT systems operation. This finding implies that universities teach students how to work with particular type of application rather than developing the understanding of fundamental knowledge of particular IT field. Though, this opinion was developed with only one interview participant, I find it useful to discuss. The interview participant talked about his/her experience of taking computer graphics course in a Western university, where the person developed his/her understanding about the theoretical concepts of computer graphics science, such as the mathematical and geometry concepts in 2D and 3D space (including working with mathematical operations and coordinates and other mathematical/geometry principles) (Hughes, Van Dam, McGuire, Sklar, Fooley, Feiner and Akeley, 2014). The person stated that when upon return to Kazakhstan and while teaching the a computer graphics course him/herself in Kazakhstan, the students expected that they would learn how

to work with a particular type of software application (state software) as opposed to learning the theoretical fundamentals of the computer graphics operation.

This finding raises the question whether my interview participants understand what type of knowledge should develop university in students. As a response to one of my survey questions, I found that 13 out of 25 participants agree that university education must be about learning the fundamental technical knowledge and skills, and it shouldn't be about training students how to work with particular type of software applications. This confirms that the vast majority of my research participants understand that university education is not about training people how to work with particular type of tool. In that sense, I find that industry representatives of my research understand that university education is for teaching students the fundamental theoretical concepts of IT systems, which involved learning how to solve math, physics, geometry and other science field problems.

Despite that there is an understanding among employers, universities seem to lean towards vocationalism of higher education, and teaching students how to use software tools rather developing the theoretical fundamentals. It means that university should produce graduates who would be the future knowledge workers in industry, and apply their knowledge to do work more complex, which would require them designing software, developing something new rather than learning how to work with already developed software applications.

As an answer to the research question about employers' satisfaction with IT graduates, I found that there exist a skill gap between what is demanded in the job-market and what universities teach to students. This was explained in open-ended survey answers, where participants stated that universities use the out-dated curriculums and teachers are not qualified enough. Also, my second finding states that universities teach IT students

how to work with applications rather than teaching them theoretical concepts. I find that developing the theoretical understanding in IT students is required in order to have students who would be able to design new software or create new IT technologies. Teaching how to work with software applications does not contribute to developing knowledge-based human capital. Above, I talked how vocationalism is presented in IT university education at the moment. Below, I will discuss how employers understand the role of university serving as a public good.

Finding 10: Employers consider that universities should be more targeted at providing social skills which would be helpful at the job-market, like responsibility, preparedness to do work individually, and capability for self-learning. Surprisingly, my research participants claimed that social skills and dispositions like tolerance and humanity should be taught to students by their parents and school teachers, and universities coursework shouldn't be investing time in that work.

This finding implies that employers desire universities to educate graduates who would be capable to learn work processes without investing money on additional on-job training of the fresh university graduates. This was implied by the results of the survey question eight, where employers rated the social skills which should be developed during university studies. Respondents claimed that universities should develop the social skills like responsibility and preparedness to do work individually. The skill gap problem, which I discussed as finding four, implies that universities don't educate the skills and knowledge demanded in the job-market, thus employers tend to value the skill of self-learning among the top demanded social skills.

On the other hand, the fact that employers value the above mentioned three skills shows that the IT job-market needs employees who can be classified as knowledge-workers. The categories, which define knowledge worker productivity state that

“knowledge workers have to manage themselves” (Drucker, 1999, p.83), which implies that knowledge workers should be responsible for the work they do. The second description of knowledge worker states that “knowledge work requires continuous learning on the part of the knowledge worker, but equally continuous teaching on the part of the knowledge worker” (Drucker, 1999, p.83). This means that knowledge worker is someone who can do self-learning as well as transfer knowledge to others. So, the description of the knowledge workers’ productivity states that knowledge worker is someone who is responsible for the work he/she does, and capable of doing self-learning. Comparing the description of knowledge-worker and what type of characteristics employers want to see in university IT graduates, I concluded that employers prefer universities to prepare graduates who would possess the skills of knowledge worker.

The ‘sad’ part of this finding was that my participants didn’t think about the role of university as a public good, where students should be educated to serve for the needs of society. They claimed that social skills like humanity, cosmopolitanism and sense of duty shouldn’t be part of university curriculum. This was found by the results of survey question eight, where participants rated the above mentioned three skills as least important to university education curriculum. During the interviews, IT employer explained that “tolerance and other social skills should be given by parents and at school level. As on stages of person’s development, the person obtains all required skills for socialization.” Here, interviewee implies that the stages of person’s development ends after graduating from secondary school, and when person goes to university, he/she is considered as fully developed individual. I don’t agree with my participant’s point of view, that forming fully developed individual ends after graduating from secondary school. I find that university education is another stage of developing the civic upbringing in people. Ehrlich (2000) states that “a fully developed individual must have the ability to think clearly and in an

appropriate complex and sophisticated way about moral and civic issues”, and educating those individuals who care about society and emerging issues around them should be done at kindergarten and primary/secondary level, further continued during university studies.

At this point, my discussion of findings ends and below I will develop the answers to the research questions. The section will be organized by research questions.

Answering to RQs

RQ1: Which Type of Skills and Knowledge Are Currently Demanded in the IT Job-Market According to Kazakhstani IT Employers?

As an answer to this research question, my research identifies that practical skills required at various stages of software development life-cycle (designing, testing, documenting requirements, etc) are demanded by IT employers. Also, IT industry needs graduates with project management skills, who would be able to do managerial work and lead IT projects considering different factors, such as given budget, timeframe and human resources for completing assigned IT projects. Additionally, my research found that industry desires to have graduates, who would understand the concepts in various non-IT fields, such as IT specialist with background in accounting or oil and gas.

RQ2: To What Extent are IT Employers Satisfied With the Skills, Knowledge and Capabilities of IT Majors from Kazakhstani Universities?

In general from data analysis about employers satisfaction with various IT graduates’ skills, employers showed a medium level of satisfaction. From research analysis, my participants expressed their dissatisfaction with the skills, knowledge and capabilities of IT majors from Kazakhstani universities in terms that universities educate students to work with old technologies, IT university curriculums are outdated and teachers qualification level is low. This statement was based on answers of the open-ended survey questions and the answers from interviews.

RQ3: What is the perceived effectiveness of internship programs for Kazakhstani university students in IT companies, and what are suggestions to improve it?

My research findings suggest that internship programs at Kazakhstani universities are considered ineffective because employers use internship students to do some routine work, like copying papers, as opposed to doing professional related assignments like developing web-sites. They don't want to invest their time and resources on educating internship students the professional skills, as internship students are regarded as temporary workers in their companies. As one of the suggestions to make internship programs more effective, my research suggests to adopt the Canadian model of co-operative education. In this model employers are given tax reduction benefit, which might be one of the ways to engage employers to participate in internship programs.

RQ 4: How Do Kazakhstani Employers Understand The Purpose Of Higher Education? For Example, Do They Consider Higher Education to Have a Primarily Vocational purpose, or Do They Interpret That University Education Also Has National Priority Of Educating Active and Informed Citizens of Kazakhstani Society?

My research analysis suggests that employers consider higher education to have a primarily vocational purpose. They consider that university curriculum should align with the needs of industry. Participants suggest universities should educate graduates, who would be able to start working after graduation immediately without spending employers' resources on additional training. My participants consider that university education is not for educating social skills like tolerance and humanity in graduates, but it is rather for developing individuals with social skills, which would be necessary at workplace. My participants were not aware about the larger social purposes of university education, and in their responses, they didn't consider that university education also has a national priority of education active and informed citizens of this country.

These were the answers to the research questions. In the next section, I will present the conclusion of this research.

Chapter 6: Conclusion

In the previous chapter, I discussed the findings of this research. This chapter, I will discuss whether I achieved the purpose of my research, recommendations and suggestions for future research and limitations of this study. At the end, the concluding part will be presented.

Achieving my Research Purpose

The problem that motivated me to do this study was finding out whether Kazakhstan IT universities are meeting the demands of the job-market. Also, I wanted to find-out whether employers understand the purpose of higher education serving as a public good. In order to explore this problem, the purpose of this research was to understand the perspectives of the IT professionals involved in hiring process in Kazakhstan on the role of the university in preparing IT professionals for Kazakhstan, and the quality of IT education in Kazakhstani higher education.

In this section, I want to present to which extent I achieved the goal of this research.

First of all, as we saw from the discussion section for Research Question one about the skills and knowledge demanded in the job-market, my participants stated that IT industry needs specialists who would have various practical skills like designing software, testing, documenting requirements besides knowing programming languages. On other hand, industry requires specialists who would possess managerial skills. In that sense, participants talked about the needs of teaching project management to IT graduates.

Second, from the discussion for Research Questions two about employers satisfaction with graduates knowledge and skills, I found that my participants showed that they are not satisfied with the graduates' knowledge and skills. Despite that the results of quantitative survey showed that employers rated their level of satisfaction with graduates skills somewhere between 'neither satisfied nor dissatisfied' and 'satisfied', research

participants were not satisfied with the qualification level of university IT teachers and the outdated curriculums for IT programs.

Third, I investigated whether internship programs at Kazakhstani universities are effective and what type of suggestions can participants provide to improve the internship programs. As the result, my participants claimed that internship programs are not organized effectively because employers assign internship students to do some routine work like copying papers. Employers consider internship students to be temporary workers, and they don't want to invest their time and resources on teaching those students professional skills. As a suggestion, my participants agreed that giving benefits for employers who participate in internship programs might motivate employers to actively participate in training internship students.

Fourth, my research aimed to exploring IT employers perspective about the role of university as a public good. Here, my participants claimed that universities should educate students only those social skills, which are demanded in the job-market. They find that teaching social skills like tolerance and humanity is not necessary at university level.

So, the important part of my research purpose was achieved as I found out that my participants regard the role of university as a private good, which should educate students the skills and knowledge currently demanded at job-market. My participants find that the quality of IT education to be not satisfying because university teachers are not qualified enough for teaching the up-to-date skills and curriculums are 'outdated' too. As the result of this study, I identified which type of skills are currently demanded at the job-market, and how to improve the effectiveness of internship programs.

Recommendations

This section will be present recommendations relevant to the audiences identified in the introduction part of this thesis.

Recommendations for policy-makers who are involved in curriculum

design. Considering the findings of this research, it is recommended to design IT curriculums, where students would develop their practical skills, such as designing software, testing, documenting. In the discussion chapter, I provided suggestion for using project-based learning. This model provides benefits for developing the practical skills required at different stages of software development life-cycle. Also, IT job-market currently needs graduates who would have managerial skills, so including project management in IT curriculum is also recommended. I also talked about developing joint-degree programs, where students would be able to take courses from various non-programming fields.

Recommendations for policy-makers in educational field. From the finding about the low effectiveness of internship programs, my study suggests that there is a need to motivate employers to participate in internship programs. I recommend to provide employers benefits for participating in internship programs, such as it is done in Canadian co-operative education model. By getting some benefits like tax clearance, which I talked about in the discussion section, employers might become more interested in investing their time and resources on training internship students. Also, it is recommended to develop documents, which would formulate the organization part of internship programs. As an example, it might be an agreement between university and employer, where it would be stated what each stakeholder would be obligated to do.

Consistent with the results of this research, IT employers ask universities to align university curricula with the needs of industry. In that sense, policy-makers in educational field should consider that universities also serve the role of social institution, which is supposed to educate moral and civic responsibility to students. So, despite that the educational field currently is moving towards vocationalism, policy-makers should

consider ways to educate individuals, who would obtain knowledge and skills to serve for the needs of society; students should understand the importance of serving for society needs.

Recommendations for employers. My recommends employers to organize paid-internship programs, where students would receive salary for doing work in their companies. Thus, students would care more about the quality of the work they do. Also, employers should consider ways for developing training culture in their companies. As one of the recommendation, employers should consider that despite training programs cost money for companies, investing in training programs is beneficial for developing human capital.

Suggestion for Future Research

Considering that this study investigates how IT employers understand the role of university as a public good, I would recommend future researchers to design a quantitative research to investigate opinion from a larger amount of participants. The future research should broadly focus on the topic of university purpose for developing moral and civic responsibility in students. Unfortunately, the quantitative part of my research included only one question, which investigated this issue, and other emerging issues on this topic were clarified with a smaller number of participants during interviews. So, the results of this study obtained the result from a small amount of participants. So, I suggest to develop another quantitative research and gather opinion from larger amount of participants regarding this topic.

Limitations of This Study

This study aimed to investigate IT employers' perspective on the role of university in preparing IT professionals, and the quality of IT education in Kazakhstani universities. My data collection was limited to employers located in Astana and Almaty cities. The

quantitative part of this research was a small-scale study with only 25 representatives from IT industry. So, my findings do not represent the opinion of entire population of IT employers, and opinions of other IT employers might be different from findings presented in this study.

Conclusion

As I conclude this thesis, I want to state how my research contributed to the discussion and debates on the topic of employer satisfaction with IT graduate skills. First of all, I found that Kazakhstani employers are not satisfied with the level of IT university graduates skills and knowledge. Employers consider that universities teachers are not qualified for teaching the up-to-date skills and university curriculums are outdated. The second analysis of this research suggest that employers value university education as a private good. They consider that university has primarily a vocational purpose, and universities shouldn't serve the role of social institution, where students should be educated about civic and moral responsibility. Personally, I don't agree with this statement. In that sense, policy-makers in education should consider these findings while developing policies and curriculum designs for IT majors.

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Appendix A: Description of interview participants

Interview participants job titles and their experience/relationship of dealing with the university internship programs

Participant's title	Respondent's experience in IT and experience with university internship programs
IT employer	The person previously had experience of hiring the IT internships and teaching them how to do work
Policy maker	This person is involved in governmental work in the area of higher education issues, and currently works on making changes around the juridical side of the law about the internship programs in universities
University Career and Advising Center employee	The respondent previously was involved in work related to helping university students to find companies to do internships, and setting-up connections with potential employers for university graduates. This person previously had the experience of working in one of the US universities, and the person was knowledgeable of the topic how internships are organized in Kazakhstan vs how the internships are organized in the US universities.
University teacher	This respondent have the experience of working as an IT teacher in one of Kazakhstani universities. The person retrieved his/her IT degree in one of Western universities, so this person was helpful for me in terms of comparing what are the differences between the Kazakhstani and the Western higher educational systems.

Appendix B: Survey Questions

PAGE1

Q1: Hello,

Please read through this consent form prior to filling-out the survey. This survey is designed to evaluate employers' satisfaction with IT graduates skills. I kindly ask to participate in this survey only those participants, whose work field is related to IT industry, and who previously had experience in hiring IT graduates.

DESCRIPTION: You are invited to participate in a research study on evaluating employers' satisfaction with the IT entry-level skills. You will be provided with a survey handout, which is designed to rate employers' satisfaction with the ICT graduates' skills. In the first part, you will be requested to provide some basic information about you current position (IT manager, department head, etc) role and the field where your organization operates (Ex: IT services, Software production, Telecommunications, etc). Please do not provide your personal information (name, contact information). The second part of the survey includes several questions including closed (mostly rating specific type of skills), semi-closed (questions with commentary boxes) and open-end (written answers) questions. Please provide answers to all the questions. This is important for the research purposes.

IMPORTANT: Please do not provide your personal information in this survey (your name, phone number, etc).

TIME INVOLVEMENT: It will take around 30 minutes to fill-out the survey.

RISKS AND BENEFITS: There are no risks associated with this study. The result of the study should be beneficial

- for the policy makers involved in the curriculum development process;
- for the university administrators, who are looking for the feedback from the employers about the skills required at the job place in order to better organize the teaching process of the IT students;
- for university students/graduates, as the results of this research should be beneficial for them in terms of explaining which type of technical and non-technical skills are necessary at the job market.

If you would be interested to obtain the results of this study, I will be glad to share them once my study will be finished. Please notify me via email that you want to see the results.

My email: madina.jumabayeva@nu.edu.kz

PARTICIPANT'S RIGHTS: If you have read this form and have decided to participate in this project, please understand your participation is voluntary and you have the right to withdraw your consent or discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled. The alternative is not to participate. You have the right to refuse to answer particular questions. The results of this research study may be presented at scientific or professional meetings or published in scientific journals.

CONTACT INFORMATION:

Questions: If you have any questions, concerns or complaints about this research, its procedures, risks and benefits, contact the Principal Investigator:

Madina Jumabayeva

Madina.jumabayeva@nu.edu.kz

Mobile: 8-(778)-611-17-84

Independent Contact: If you are not satisfied with how this study is being conducted, or if you have any concerns, complaints, or general questions about the research or your rights as a participant, please contact the NUGSE Research Committee to speak to someone independent of the research team at +7 7172 709350. You can also write an email to the NUGSE Research Committee at gse@nu.edu.kz

If you agree with what is stated in the consent form, put your initials here.

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Q2: From the list of specialties below, select the category, which best describes your professional field

- A. Production, technical field (entry-level specialist)
- B. Professional field in IT (Engineer, expert, analysts, etc)
- C. Managerial field (manager, department head, director)
- D. Other (Please specify)

Q3: Please rate the importance of the following skills to your overall satisfaction with entry-level IT specialists' skills in your company.

Each item is scaled in range from 1 to 5. 1 - Absolutely not important. 2 - not important. 3- Medium level of importance. 4 - Important. 5 - Absolutely important.

Ability to use practical knowledge received during the studying process and during practical experience

The level of knowledge in the area of specialization

Capability to solve engineering problems in the area of specialization

Capability to conduct a scientific research and application of creativity in the area of specialization

Required level of academic English

Capability to quickly learn the company's mission

Capability to show leadership skills

Capability to work in team

Capability for self-learning

Presence of analytical skills

Patience, responsibility, interest in professional development

Knowledge of specialized computer programs

Proficient computer skills

Capability the modern information-communication technologies

Other (capability to conduct discussions, self-governance, capability to use juridical literature, level of practical experience at work)

Q4: In your opinion, how Kazakhstani universities can improve the process of preparing IT graduates for job-market? Provide your answer below.

Q5: What type of new directions in IT field should additionally added in education process of Kazakhstani universities?

Q6: Please indicate your level of satisfaction with the following skills of IT graduates, who work in your company (department)?

The ranking scale:

1 - Absolutely dissatisfied. 2 - Not satisfied. 3 - Medium level of satisfaction. 4 - Satisfied.
5 - Absolutely satisfied.

Ability to use practical knowledge received during the studying process and during practical experience

The level of knowledge in the area of specialization

Capability to solve engineering problems in the area of specialization

Capability to conduct a scientific research and application of creativity in the area of specialization

Required level of academic English

Capability to quickly learn the company's mission

Capability to show leadership skills

Capability to work in team

Capability for self-learning

Presence of analytical skills

Patience, responsibility, interest in professional development

Knowledge of specialized computer programs

Proficient computer skills

Capability the modern information-communication technologies

Other (capability to conduct discussions, self-governance, capability to use juridical literature, level of practical experience at work)

Q7: From the list of statement below, select the one, which consider to correct.

A. Universities should be targeted towards teaching fundamental knowledge, such as solving engineering problems, applying algorithms, and other. Also, develop general understanding of IT students about the work of IT systems (understanding of software development life-cycle, understanding theory of electronic circuits operation and other). Universities shouldn't prepare graduates with narrow specialization which are currently demanded at the job-market.

B. Due to the high demand for workers with narrow specialization, universities should develop programs only with narrow specialization, such as learning particular type of programming language or working with particular type of operational system, etc.

C. I have no idea.

D. If you have a different opinion regarding what type of knowledge should universities provide, please state if here.

Q8: For successful interaction between society and students, which type of social competencies must be attained after graduating from universities. Select all that applies.

Preparedness to do work individually

Time-management

Planning and organizing own work

Preparedness for self-learning

Building strategy for self and professional development and education

Professional communication

Developing friendly relationship with others

Team work

Being able to solve conflict situation and respect the opinion of another person

Ability to collect, save, analyze, reshape information (make conclusions, predict, learn new knowledge by analyzing and synthesizing information and other), as well as transfer information to others

Computer proficiency and ability to use computer equipment

Self-learning

Self-organization

Self-sufficiency

Responsibility

Ability for self-control

Ability to do self-planning

Demand for self-development

Reliability

Sense of duty

Orientation for human values

Liberality

Tolerance

Cosmopolitanism

Humanity

General public-culture

Appendix C: Interview Consent Form

**INFORMED CONSENT FORM****Employers' satisfaction with the entry-level IT employers' skills**

DESCRIPTION: You are invited to participate in a research study on evaluating employers' satisfaction with the IT entry-level skills. You will be asked to take part in 1 interview session. The interview session will be recorded.

TIME INVOLVEMENT: Your participation will take approximately 30 minutes.

RISKS AND BENEFITS: There are no risks associated with this study. The result of the study should be beneficial

- for the policy makers involved in the curriculum development process;
- for the university administrators, who are looking for the feedback from the employers about the skills required at the job place in order to better organize the teaching process of IT students;
- for university students/graduates, as the results of this research should be beneficial for them in terms of explaining which type of technical and non-technical skills are necessary at the job market.

Your decision whether or not to participate in this study will not affect your grades at university. The researcher will use pseudonyms, thus your identity, and name of university, will be unknown to anyone, except the researcher. All data and recordings and notes will not include any names or identifying information, and all such information will be destroyed after completing the research study.

PARTICIPANT'S RIGHTS: If you have read this form and have decided to participate in this project, please understand your participation is voluntary and you have the right to withdraw your consent or discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled. The alternative is not to participate. You have the right to refuse to answer particular questions. The results of this research study may be presented at scientific or professional meetings or published in scientific journals.

CONTACT INFORMATION:

Questions: If you have any questions, concerns or complaints about this research, its procedures, risks and benefits, contact the Principal Investigator:

Madina Jumabayeva, Madina.jumabayeva@nu.edu.kz, Mobile: 8-(778)-611-17-84

Independent Contact: If you are not satisfied with how this study is being conducted, or if you have any concerns, complaints, or general questions about the research or your rights as a participant, please contact the NUGSE Research Committee to speak to someone independent of the research team at +7 7172 709350. You can also write an email to the NUGSE Research Committee at gse@nu.edu.kz

Please sign this consent form if you hereby the following:

- I have carefully read the information provided;
- I have been given full information regarding the purpose and procedures of the study;
- I understand how the data collected will be used, and that any confidential information will be seen only by the researchers and will not be revealed to anyone else;
- I understand that I am free to withdraw from the study at any time without giving a reason;
- With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.

Signature: _____

Date: _____

Appendix D: Interview Protocol Questions

1. Where should students learn the social skills like respecting others, working in a diverse team, global citizenship, etc?
2. What is the role of group adviser in teaching the social skills to students in Kazakhstani universities?
3. Why do employers do not care much about the social skills of IT graduates?
4. What are the new types of IT fields which should be taught at universities?
5. Do the current IT programs cover those new fields?
6. Why those new fields should be developed?
7. What are the weak sides of IT education in Kazakhstan?
8. Do you agree that universities should provide practical knowledge?
9. What type of practical knowledge should universities give?
10. Do you agree that students should do internships?
11. What type of internships would provide a good practical knowledge?
12. How could industry and universities better correlate in the process of preparing good specialists?
13. What do you think about the qualification level of university teachers at Kazakhstani universities?
14. What do you think about the practical experience which is given at university laboratories? Is it a good quality practical experience or it can be improved? If yes, how it can be improved?

Appendix E: NUGSE Ethics Approval Form

NUGSE RESEARCH APPROVAL APPLICATION FORM

PROJECT TITLE: Employers' satisfaction with the entry-level IT employers' skills

Advisor

name: Jason Sparks Title: **Assistant Professor**

Student

name: Madina Jumabayeva Email: **madina.jumabayeva@nu.edu.kz**

Program: Master of Educational Leadership

Purpose of the study and research questions**Purpose of the study:**

This study seeks to understand the perspectives of the IT professionals involved in hiring process in Kazakhstan on the role of the university in preparing IT professionals for Kazakhstan, and the quality of IT education in Kazakhstani higher education.

Research questions:

1. Which skills, knowledge and capabilities do IT employers believe university IT programs should develop in students?

2. To what extent are IT employers satisfied with the skills, knowledge and capabilities of IT majors from Kazakhstani universities?
3. How do Kazakhstani IT employers understand the role of the university in society? For example, should universities primarily prepare students for the job market, or there is a greater educational purpose for university?

Research Designs and Methods

Research Design:

My research will use a quantitative method and it will be survey with 20 questions, which will be administered on online survey tool (eg. SurveyMonkey) and in a paper form. The study will have a cross-sectional survey design, as it will be an observational study which would collect data from IT employers at one point of time. The purpose of my survey would be answering the three research questions.

Participants:

The target population of my research will be 50 employers from Astana city who were previously involved in hiring process of IT graduates. I will be surveying 50 IT employers, which I have found among the existing IT companies and which are currently providing IT services in Astana. The number of participants is set to 50 people due to the limit of IT companies allocated in Astana. This will be an availability sampling because my research will use responses from employers which are willing to participate in the study. I plan obtain the information about the existing IT companies in Astana city from IT professional communities, using the information from the Kazakhstani job search engines and from the telephone search directory.

Research site:

My research will be conducted in Astana city among the IT companies which are located in the city.

Data collection instruments:

I will design a survey instrument with 20 questions, which will be closed-end, semi-closed and open-ended questions. I am planning to adopt questions from the existing survey instruments and create my own questions.

My survey will contain three types of questions. The first type will be demographic closed-ended questions about the respondent and respondent's organization. For the privacy purposes, I will not ask respondents personal information and the company's title. Example:

2. From the list of following categories, choose a field which best describes your occupation

IT manager

HR manager

Department head

Lead IT specialists

Other (please specify)

The second type of questions will target for identifying employers' opinion about the type of knowledge that universities should provide: the job-market targeted knowledge or the fundamental IT knowledge plus the life-long learning knowledge. Example:

4. Should universities emphasize on teaching the fundamental knowledge of IT industry, such as teaching the basic algorithmic and programming skills, or universities should emphasize on teaching the market-oriented knowledge, such as the programming languages which are in trend at the job market (mobile application development, web-programming, etc)? Please provide your answer in the box below.

The third type of questions will be used to analyze employers' satisfaction with the ICT graduates non-

technical skills, such as critical thinking, problem-solving skills, analytical skills, ability to work in teams and other. Those questions will be closed – end and semi-closed end questions.

Example:

1. Using the following scale, please indicate how well are you satisfied with the ICT graduates preparation to work in teams?

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The third type of questions will be asking employers' opinion about the type of skills required for the entry-level IT employees in their company, such as particular programming language skills, knowledge about particular type of IT technologies, and other type of IT technical skills. Those questions will be semi-closed and open-ended survey questions. Example:

2. Please mark the technical skills which are necessary for the full-time entry-level IT employees in your company. You may also add your own answer.

- Database
- Networking
- Security
- Software Engineering
- Programming

Другое (укажите)

Procedures:

I will provide both the survey and the consent form for the participants. Participants will be asked to fill-out the consent form and immediately after that to fill out the survey. I will use an online tool for delivering the questions. One of the online tools that I am planning to use is SurveyMonkey. Also, upon the request of the participants, I might distribute the hard-copy version of the survey. The data collection will start on March 10th and end on April 2nd. Probably, I might extend the deadline of the answers collection until the mid of April. This will depend on the responsiveness of my participants.

ANONYMITY AND CONFIDENTIALITY PROCEDURES

Consent forms and all survey answers with identifiable participant information will be kept in a separate, secure location. I will not share this information with anyone else other than my research adviser. I promise that the research findings wouldn't harm the participants of my research by any means and they wouldn't have any unpleasant ramifications for them. All the responses from the participants of my research will be kept apart and I will not share the responses with other researchers or organizations. I will not collect the information of the participants (their names, the company's where they work), so this research will be genuinely anonymous.

The copy of the informed consent form of my research is attached in Appendix A.

RISKS OF THE RESEARCH

There are no risks associated with participating in this study.

BENEFITS OF THE RESEARCH

The results of my research will be provided for participants, who are interested in obtaining the research results. This information will be provided upon request by email at the end of my research.

The following groups should potentially benefit from the results of the study:

1. Policy makers involved the curriculum design process - The result of the study should be beneficial for the policy makers involved in the curriculum development process. Considering

all the recent innovations in the IT industry, the understanding of the preferences of the IT industry graduates skills has been significantly reframed. As the result of this research, I am aiming to identify which type of technical and non-technical should be provided for the ICT graduates during their university studies.

2. University administrators – the feedback from the employers about the skills required at the job place should help the university administrators better organize the teaching process of the ICT students.

3. University students/graduates – the results of this research should be beneficial in terms of explaining which type of technical and non-technical skills are necessary at the job market.

Advisor/tutor signature

Date

Student signature

Date

Appendix F: Example of Transcribed Interview

Interview with university Career and Advising Center employee

I: Could you please tell me what kind of internships are IT students doing here?

R: Well, we have all kind, as you might expect... what we do, and since we are new university, we went out and visited companies in most of the major cities in Kazakhstan, and visited companies which would be interested in our majors, whether it would be social sciences and humanities or science and technology or engineering. We basically asked them what type of interns they would like to have. That advocated us in terms of what kind of internships are out there, first of all. And secondly, that gave us an idea how we could professionally develop our students in order to enter the job market. So we let the companies tell us what type of internships they want as opposed to was telling to companies. Now to a certain degree, there are some organizations that like us to tell them what type of would like to see and we what we like interns to learn. But for most parts, companies have needs and companies use interns as screening device for future employees. It is our job as a service organization to try to fill those needs as best we can.

I: What type of internships are students doing? Are they doing actual work in the companies or they just learn about the structure of the company, how people are working there?

R: Companies usually invest in internships and they don't really get value of internships as such. So saying that our students are working... yes, they are performing work while they are there, but their performing tasks which would teach them what the company is actually doing as opposed to actually contributing to the bottom line of the company, the revenue floor of the company. Like I said, it costs money for companies to have the interns. They

have to provide a supervisor, they have to provide that supervisor's time and resources to basically teach the students. So we see internships serving a couple of functions. First, it exposes the student to the work environment - what does it mean to work, and most of our students don't have much exposure to that. Most of them did some work in high school, few of them have part time jobs now here and there, but not that many. Secondly, as I said internships are screening device for company who is looking for future employees. Maybe not specifically not that student, but it teach the quality of students we have at this university. And hopefully, they have a positive view of that quality. Cause that way they'll come back to us, when they are ready to hire people as such. So that's pretty much why we are doing the internships- we want the students to have exposure and we want companies to have exposure to our students.

I: So, basically, the students are going to companies, they are learning about the company, but they are not doing the work related to their major.

R: Well, it depends on the internship and how the company structures the internship. Like I said, sometimes they do actual work. Is it a productive work? Well, we hope somewhat productive. But it is not necessarily productive that company makes a profit out of it. Other companies, it is more of a observation as opposed to work as such. But it depends on a company. One thing that we notice is that software companies do use our students for actual work-writing apps or whatever. Engineering companies, it is more called job shadowing. That is to say you would basically would be around a person sort of accompanying what their job is. But it is more of observing. We had a couple of internships that we not gonna pursue any more, where they intern was copying stuff or doing translation. But those were very, very rare. Probably, for 95% it was a positive experience either in observation point of view or actual participating in work flow of the company.

I: So, do you setup any agreements with the companies, where companies would be saying 'yes we will teach students the skills, we would provide some type of experience to students' or is it just an agreement where companies would get students and agree to provide some type of experience

R: It depends on the company. Some companies we have a meeting with a follow-up emails, there are no agreements. They say we take five interns. They say ok. Part of that process is monitoring the value. We ask them for the job description, so we have something to circulate among students so our students can apply for internships. This is also for our purposes, so we can understand if this is a valuable internship. Also, if it is a credit bearing, we assign a staff member to monitor the internships. The student is required to send a weekly report and a final report on internship experience to the faculty member. If it is a sanctioned internship, then my office monitors it and we ask for weekly and final report during the internships. We try to watch internships very closely. And if we discover no value from the internships, we try to send back the student. So we try to make it a valuable learning experience.

I: Did you hear about cooperative education (co-ops) in the United States?

R: We can operate that way and we do operate that way with some companies. Like I said it depends in company what is the comfort level is for us. Sometimes it is just a meeting, couple of email conversations and phone calls and put the paperwork together and it goes forward. In other cases, the company wants proposal from us. In those cases, they also like us to select students to send as oppose to other situation when the company selects students. It is all over the board. It is not like in the US. Every company we deal wants to have some sort of interaction with the career advising center. In the US, it is more like a job-board when the organization puts the internship on the job-board and usually university

intervention is really minor. It is usually directly between the student and the organization. In other cases, you can see more interaction. In most cases when it is credit bearing with somebody on the academic side has to ask to review as a credit bearing internships. We can't do that for two reasons. First, we are in Kazakhstan and internships mean something different here. Second reason, is that this is a new university. We are barely known except for our name. As a part of our activity, we have to explain companies about our university, our programs and our educational philosophy, what we are trying to do in terms of the market, which is basically, address the needs of the market.

I: In the US, are there any kind of benefits which are given to the employers because of being involved in the cooperative education? What are the benefits?

R: The benefit for employers is basically to screen for future employees and you can also talk about the involvement in the education process of the youth and the social activities. But the main benefit is screening for future employees. There are some companies in Kazakhstan and in the US, where employers use interns as extra employees. But they shouldn't do that. That's we try to monitor that ourselves the best we can.

I: I was just wondering.. are there any kind of tax reduction which is given to employers because of being involved in the co-op programme.

R: I am sure there is.

I: there is tax reduction.

R: Yes, there is. I am not familiar with that.

I: Do you think we should adopt that approach here. Should we give any benefits for employers for being involved in educational process?

R: Employers get benefits: future employees. They can also about the social contribution to society. is you are associated with the university, there is a certain public relation gain. I am sure there are certain companies which work with this university. And they can tell people they work with this university. So I think they get benefits. Should we give them further benefits with the tax reduction. Maybe... I have no strong opinion.

I: There are so many other universities in Kazakhstan which don't have the name of this university and maybe to improve the process of internship education, maybe there are should be some benefits, which universities can give to employers

R: Yes and no. Other universities have been here longer than we were. Some of them are fairly sophisticated at this. We do have competition. It is not like everyone goes to this university and no one goes to Karaganda State University. Not true... on the other hand, I like the idea of having competition. That makes us work harder and I hope other universities like the idea of having competition. It means that companies come first to the university which produces the best graduates. That makes Karaganda to work harder to produce better graduates and it makes us to work harder to produce better graduates because if we don't companies will go to another university and get their future employees from there. So it is kind a double edge thor. Yes we can be cooperative with everybody and everybody can be friendly and we won't do internships there because Karaganda State University is there. But it won't make it any healthy in terms of the broader picture in terms internships and universities in Kazakhstan. The only advantage that Europe and the US have a very competitive educational system. 4000 different universities in the US and around the same number in Europe and you can choose. And Employers can choose where they want to hire graduate

I: So it is the quality of students which is not satisfying the employers that's why they are not interested in participating in educational process.

R: Well, I think they are interested in educational process because that's where the quality comes in. OK? Companies, like Total and other companies don't exclusively work with one university. I can already tell you that. They usually take interns from different universities. Maybe their first choice is this university, maybe not... They can afford that. We can't produce enough graduates to fulfill the need companies in the area we train students. Maybe someday but not now.

I: Just one more question. Do you think that copying the model of the cooperative education will be applicable to Kazakhstan?

R: Well, would be. But you'll have to do it a bit differently because we have a different environment. Developing a cooperative programme with other universities is difficult for us. There is a lot of concern among other public universities about what this university is about. Part of that problem is that how much resources we are given compared to other universities. We get a disproportional amount of resources. If you record another university, you are not gonna be happy with that. It is natural. We are trying to cooperate with other universities, but it is a very slow process. We do agreements with other universities and we visited other universities not only in Kazakhstan but around the world. I have told several universities when we met. They don't really have career and advising centers and most of them have people doing things around the edges like student mobility or student mobility. I have talked to other universities that I'll be happy to talk about what we do and tell us what you do and how you do it and maybe through that sharing of information we can build some sort of relationship. But we are at the very early stage of it.

I: What type of challenges there might occur for this university to implement the co-op programme like in the US. Fulfilling all the requirements Is it giving credits for internships or making the internships longer than 3 months. What kind of challenges might happen?

R: First we need to go through a decision making process to allow a credit bearing internships. We do have one in school and it is not consistent among other schools. It is only been operating for a year and it is not a perfect system yet. It is getting more efficient as we work on it. It is really building the system and the standard operating procedures for that system to make sure it is running smoothly and efficiently. It is the main obstacle for co-op programme and to any other type of program. We are only at the beginning stage of it. In the future, we'll get better and right now we are only at the beginning. Cause we are still learning. We are open to other universities.

I: You mentioned that something will not go smooth while implementing the co-op programme. What type of challenges might happen? Can you give examples?

R: First, to make other universities to recognize the career and advisor centers' importance for students. Secondly, to educate other universities that cooperative education can be a positive experience. Probably, the third might be to be able to effectively communicate with other universities that we have valuable information, which might not be familiar with that. Most of universities don't have a career and advising centers. They have someone taking care of internships and I don't think it is quite developed. I know they travel around the country like we do. They bring companies but probable not at the same level as we do. Some universities seem to be more localized and we seem to be more national. We do to any place to get the internship opportunity. Those are the small challenges. The largest challenges. Communication with other universities.

I: So, cooperative education they need to collaborate with other universities? Right?

R: I think it is important

I: So why is it important. Why universities need to collaborate with other universities.

R: it is important. Internships exist in Kazakhstan. The knowledge needs to be transferred to other universities here. That's where cooperation comes in place. Secondly, we need to think where we place our interns and where other universities place their students. That's why we need to understand the internship market. It is a sharing of knowledge and hopefully we have some things we can teach to them.