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The Importance of Knowledge Transfer to Industry

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Abstract The paper examines the specific knowledge universities transfer to industry, reflecting to creative industry needs. As results shows, the most asked alumni competences should be tacit knowledge and divergent thinking. Divergent thinking influence the creativity. Creativity is often defined as the ability to develop new and useful ideas, but in deep literature review, we can see few irregularities and different definitions of creativity. The paper also evaluates the importance of creativity from business environment point of view and from the creative industry perspective and creative firm owners. As point of view. Another key finding is, that to educate creative people will be one of the key competitive advantage, because mainly the ability to create and disseminate knowledge is often at the heart of the organization's competitive advantage not only in creative industry, but in transport industry as well.

Keywords Creativity, education, knowledge transfer

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1. Introduction

On the one hand, companies approached universities, particularly research-intensive universities, to get innovations to sustain their competitiveness. Universities, facing financial constraints, commodified their knowledge to serve companies, in what has been christened as*academic capitalism* " or *entrepreneurial universities* [1,2,3]. On the other hand university has to prepare graduate, who stands the labor market. As research shows, only the technical knowledge is not sufficient any more, graduate should be creative and have divergent thinking and dispose of tacit knowledge. Tacit knowledge was originally defined by Polanyi in 1966. It refers to intuitive, hard to define knowledge that is largely experience based [4]. Tacit knowledge is also regarded as being the most valuable source of knowledge, and the most likely to lead to breakthroughs in the organization [5]. Frost links the lack of focus on tacit knowledge directly to the reduced capability for innovation and sustained competitiveness. On the other hand, explicit knowledge is type of knowledge which is formalized and codified, and is sometimes referred to as know-what. It is therefore fairly easy to identify, store, and retrieve. This is the type of knowledge most easily handled by KMS, which are very effective at facilitating the storage, retrieval, and modification of documents and texts [6]. Analysing the process of creativity, there is a decisive force deriving from the usefulness and the appropriateness in terms of change, renewal and updating. The criteria are visible in the definition of MacKinnon , according to which "creativity is a process that takes place over time and is characterized by originality, adaptability and the spirit of caring for a particular realization" [7]. The creative person is able to make a viable idea, develop it in detail, to improve it, to complete or even make it attractive [8].

In a very schematic manner, it can be said, that creativity can be compared to a system developed by humans based on standards to govern life in society. Csikszentmihalyi's work summarizes this idea [9]. He defines creativity as the sum of "interactions of a system made up of three elements: a culture featuring symbolic rules, a person who introduces something new into this symbolic domain and experts who acknowledge and validate the innovation." In his system, the dovetailing of the standards of four universes must be considered, starting from the central core of individual creativity, moving to fields of creativity, then to domains of creativity, with all of these included in a broader system represented by cultural creativity.

Aside from the relationship of creative individuals to rules, creativity is not limited to a cognitive activity. For Kind and Kind, creativity should be analyzed as a social problematic by examining collaboration relationships among members of a team [10].

The idea to foster the student creativity in the education process is not new. Back in 1965, Bruner was arguing that children should be encouraged "treat a task as a problem for which one invents an answer, rather than finding one out there in a book or on the blackboard" [11,12,13].

The necessity of creative education can be mainly justified by the need of creative workers in the creative sector. Narrower definition of the creative economy gives priority to the creative sector consisting of creative industries, which have gradually evolved from the so-called cultural industries and closely related to the artistic and cultural creativity [11]. In this context, the creative industries are seen as a new key sector of the economy which is a source of employment growth and profits. However, this approach can be applied only in those countries, or regions whose economy is oriented in this direction [12].

2. Literature review

Education can be considered as one of many tools to achieve economic growth. Nowadays, more and more authors argues, that the education process does not support creativity. The creativity is essential to the process of creating something new and unique [15].

Past research shows that the creativity applied to the education system has produced positive results in several countries. One example is the China whose system requires constant innovation and prosperity and the education system has established a creative approach in education, what brings a positive results [16,17].

We could see a tendency to integrate creativity in curriculum frameworks [10]. As written before, especially Asian countries like Hong Kong, Mainland China, Taiwan, Singapore or South Korea, have imposed curriculum reforms, which emphasized creativity development in their primary and secondary schools. One common feature of these countries is that they all recognize the importance of creativity across the curriculum, such as science, language, arts and so on. To cultivate creative citizens, Asian countries are undergoing vigorous education reform in a top-down process, in the strong support of their governments [18].

The aforementioned arguments of several authors affirm the necessity of the presence of creativity, respectively creativity in education. Creative thinking should be a priority in higher (third-level) education as well [19]. Higher educational institutions, is responsible for, the creation and dissemination of knowledge [20]. Currently rising unemployment rate and decreasing the percentage of graduates in the labor market has resulted in the higher education system should do more to promote the development of students' creativity [17].

E. P. Torrance defines the creativity as the process of producing hypotheses and their verification and communication of results. This definition implies the creation of something new, something that the individual did not know before, or what existed before. It implies also such things as inventiveness, discovery, curiosity, imagination, experimentation, manipulation etc. Creative ideas become evident through such things as: scientific theories, inventions, better quality products, novels, poems, projects, paintings, sculptures etc. [20,21,22].

The creative process is one in which the action occurs through a new relational product , growing from the uniqueness of an individualism on the one hand , and the things , events, people or circumstances of his life on the other hand [23].

American psychologist J.P. Guilford has even expressed and verified the hypothesis that the creativity is not identical with the intelligence measured by IQ tests) , but the extention of creativity can be seen as a sign of intelligence [24].

The difference between intelligence and creativity describes Getzels and Jackson (Table 1). In this table, Getzel and Jackson describes the characteristic reactions showing up creative and intelligent behavior. Both, intelligence and creativity are mental abilities. But, the basic difference between the two is that intelligence is a general capacity or ability of an individual, whereas, creativity requires different thinking.

Table 1. Intelligence vs. Creativity

Intelligence	Creativity
- Ability to remember	-Divergent Thinking
- Ability to remember the content	-New, original ideas
- Deductive reasoning	-Ability to invent
- Convergent thinking	-Constructing what can happened
- Selective Retention	-Willingness to take risk
- Defensiveness	

Source: Getzels, J. W. & Jackson, P. J. (1962). Creativity and Intelligence: Explorations with Gifted Students. New York: John Wiley and Sons, Inc.

3. Methodology

The research was intended to describe an importance of new knowledge transfer of graduate student at the labor market in the area of firms acting in the creative industry, consequently the existence of student´s creativity and divergent thinking at the engineering student programs. The primary research consisted of qualitative research – In Depth Interviews, Questionnaires and personal observation.

Depth Interviews consisted of interviews with experts from the creative industry, concrete advertising agencies and architect ateliers. Interviews were realized in four advertising agencies, operating in Žilina region. All the advertising agencies operate more than 10 years at the advertising market. Architect ateliers in number of four, where leaders in architecture in Žilina region as well.

The student questionnaire contained 50 questions arranged into groups according to personal characteristics connected to creativity. The individual questions were

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divided into the following areas: flexibility, intuition, curiosity, deep faith in own work, extensive knowledge, autoregulation, perseverance. 350 respondents attended the questioning. Respondents were students of the Faculty of Operation and Economics of Transport and Communications attending study programs: Postal Technology and Services, Postal Engineering, E-Commerce and Management. The students were not accidentally chosen from these study programs. The aim of this survey was to choose respondents educated for creative and non-creative industry as well. The survey was subsequently evaluated so that higher score indicates a higher degree of respondent creativity.

Data were also analyzed by cluster analysis, hierarchical clustering, using Euclidean and Manhattan distance metrics. Single linkage method was used, where distance between groups is defined as the distance between the closest pair of objects, where only pairs consisting of one object from each group are considered:

$$D(r,s) = \text{Min} \{ d(i,j) \} \quad (1)$$

where object *i* is in cluster *r* and object *j* is cluster *s*.

The research also applies survey research methods to a large systematic random sample, contributing to the generalizability of the research findings. This study takes an integrative approach to qualitative research, applying methods and theory from creative economy, psychology and sociology.

4. The Results

Creativity, as follows not only from theoretical approaches but also from this research, is affected by many different factors. Not only education but also leisure activities, place where we grew up, environment where we currently operate, are the key factors influencing creativity.

4.1. Education and it´s impact on degree of creativity

Comparing students at different study levels (see Figure 1), different score can be seen. Master program students achieved lower score in intuition, Curiosity, Deep faith in own work. Surprisingly, master program students are no longer so curious. Not very positive is also declining of Deep faith in own work score of 2,4 % in master programs. This score can also reflect of the education system, where the characteristic of Deep faith in own work should increase, not decrease.

4.2. Necessity of creativity in business practice

More are people interested in particular area and acquire wisdom or knowledge, more creative they will be. They have greater insight into the possibilities that are important for the creativity development. The research proves, that a higher level of education (including both "leisure and out school" activities) promote a higher level of creativity. Education is important. It is still important to acquire wisdom and knowledge but it is important to be interested in other areas to advance one´s creativity as well. (See Figure 1)

As the survey showed, some owners of the architectural studios as well as advertising agencies had graduated in completely different study program in which they currently operate. 70 % of respondents graduated in more than one different study programs. For many owners was not a problem to graduate at different universities. The survey showed that owner´s education related to their profession is beneficial to make the business, the education made them professionals in the field of advertising and architecture, however, additional education in other fields is beneficial and needed for making creative ideas and thoughts.

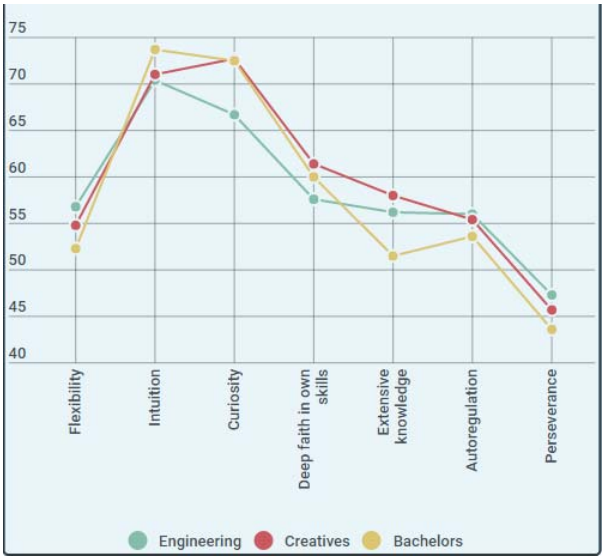

Figure 1. Personal characteristics of different groups

Before setting up own business, the respondents did not operate in the field of advertising or architecture. The previous sphere of business varied as well. Most advertising agencies and architecture studios was set up for the reason to cover the free market space. Some other reasons for setting up own business were: meeting new interesting people, multiplicity of tasks or abolition of previous working position and looking for new job in another sector.

4.3 Competitive advantage - creativity

The survey shows, that there are two positions of creative employees: first, individuals able to artistic expressions, secondly individuals who use creativity as managing tool of the company activities. All respondents regards creativity as a firm success factor. For example,

architects not only give to architectural works rendering but also the "soul". For the architects is typical to bring pleasant feelings to their work, in view of the fact, that they have (or are said to be able) developed sense of orientation in space. In such conditions, firm intellectual capital is characterized by 90 % of the results (projects) of their work is based on their talent and inseparable part of their work is to develop their talent.

4.4 Cluster analysis

The results shows, that for deep cluster analysis larger sample of respondents is needed. We can see few related factors, but this relation cannot be generalized. As Figures 2 and 3 show, there is no difference between Euclidean and Manhattan distance metrics, interesting cluster arose between Extroverts and their personal characteristics like curiosity, deep faith in their own work, extensive knowledge and autoregulation, perseverance. As we supposed, introverts are less creative than extroverts.

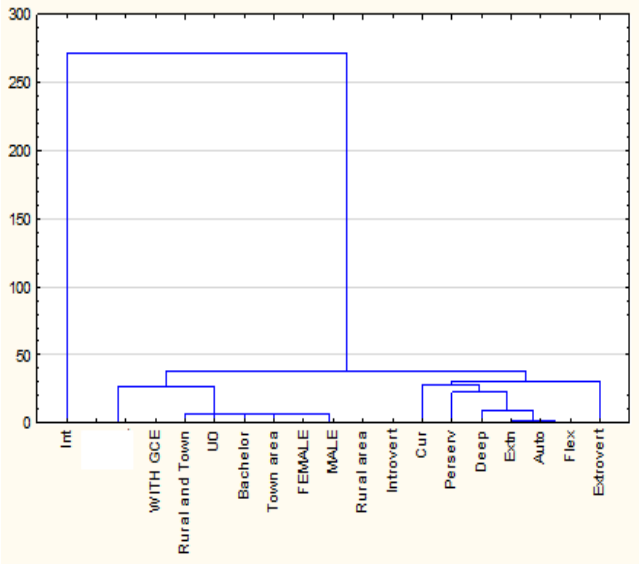

Figure 2. Dendogram using Euclidean distance metrics

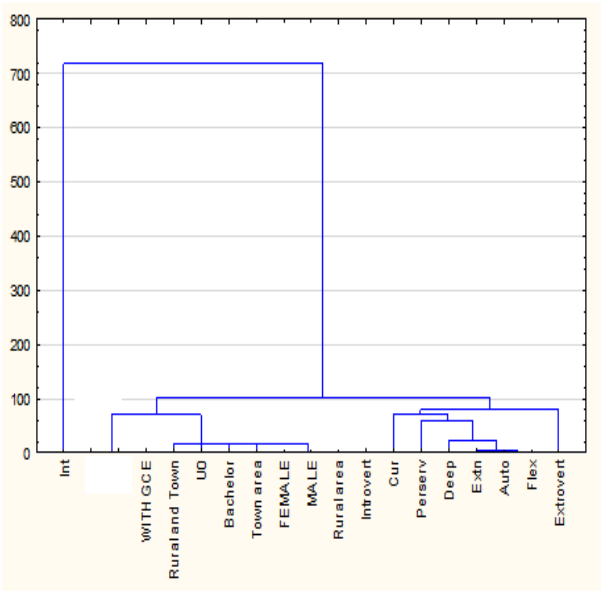

Figure 3. Dendogram using Manhattan distance metrics

4. Conclusion and discussion

The survey confirmed a high degree of creativity, creative ideas, creative thinking in interviewed firms. Employees of these firms benefits from the creative ideas from various sources. Interestingly, with creative ideas come these mainly in their free time. It is also interesting confirmation interlacing creative and knowledge economy. Besides necessity of having creative ideas is also knowledge important. To be only educated, or only trained or only creative in the field of creative industry is not enough. The combination of interlacing creativity and education is in these creative industries necessary and very important.

Education at the technical study programs is based on academic knowledge. However, there are sectors and industries where creativity is more important than knowledge or at least important than knowledge. The research confirmed the demand from employers for creative employees, resp. demand for "creative abilities". Not very positive fact remains, that master study program students reached lower levels of intuition, curiosity and especially deep faith in their own work compared to bachelor study program students.

As the survey showed, the majority of respondent, the owners of advertising agencies and architectural studios graduated at several universities and different study programs. All these need creative employees, who would be able think and act creatively. The survey has also brought new findings about the cohesion of man intelligence and creativity, resp. necessity to learn how to act and think creatively, which till now have not been infused into the education system adequately. For many reasons mentioned above, the education promote the creativity and creative thinking.

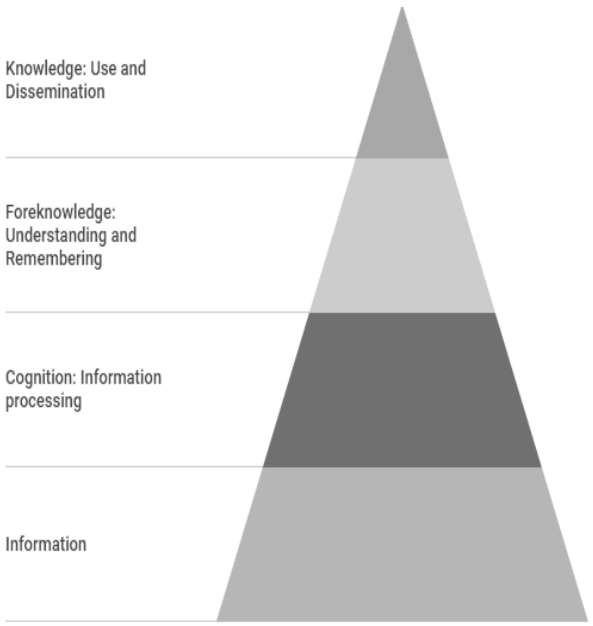

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Figure 4. The knowledge creation process

As research shows, the most important is to dispose of the tacid knowledge. In this meaning, the tacid knowledge is the part of the end of the pyramid shown in figure 4. The figure presents the knowledge creation flow from the information to the knowledge, when one can use and disseminate the knowledge.

Author of this paper degree with Alan Frost that knowledge creation depends upon the mechanisms described in the subsection on knowledge sharing, combined with the ability to put knowledge into practice in an environment which supports interaction and experimentation.

The creative process is a delicate one, and it is easily ruined by strict adherence to rules and regulations, or by bureaucracy.

To educate creative people will be one of the key competitive advantage, because mainly the ability to create new knowledge is often at the heart of the organization's competitive advantage in any industry.

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