Conference Paper

3D-modeling Competences at Labor Market of Ural Region

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Abstract

Present paper is devoted to the analysis of how 3D soft skills competences influence on a formation of a new job positions at labor market at Ural region of Russian Federation. It is shown how 3D-modelling skills requirements correlate with distribution of professions. Based on the data of labor market offers it is also shown a comparison between job offers and salaries. The main conclusion is made on the matter of how it is inevitable to make structural changes in the competence formation of an engineer of future because 3D-modelling competences are highly required in skills profile of an engineer from year to year.

Keywords: 3D modeler, 3D modeling, 3D computer graphics, 3D model, 3D space, CAD system.

1. Introduction

The world is constantly changing; gradually we are surrounded by more and more new technologies. In the twenty-first century it is impossible to imagine life without computer technologies. When creating any object, it is obvious that it is important to consider its main parameters and characteristics. Computer modeling expands on all spheres of our life and industry. For example, by the year 2000, there were 140 million personal computers in the world, in 2005, global deliveries of personal computers amounted to 202.7 million. In 2010 global sales of personal computers amounted to 350 million and in 2020 according to analysts the world will sell 2.21 billion personal computers [1]. Competence in the basics of modeling is an integral part of any engineer, which certainly affects the nature of work and the general qualification, depending on which the applicant can count on higher paying job.

3D modeling is common in such areas of our lives as medicine, architecture, fashion industry and engineering. The medical uses 3D modeling in order to scan organs, produce 3D models of scanned organs, which makes it possible to study pathology more precisely, and also gives the opportunity to practice before surgery, create implants

based on three-dimensional images of the patient, taking into account its functional features, create artificial bones, tissues, blood vessels, veins, and even organs for the patient [2]. Three-dimensional modeling in architecture allows you to create full-scale projects of buildings, structures and complexes [3]. Based on knowledge gained at university, the engineering community uses 3D models as the design of new devices, vehicles and structures, as well as for many other applications. They can also be the basis for physical devices that are built using 3D printers or CNC machines. When creating 3D models in jewelry, accuracy in such aspects of technology as installation, tolerances, allowances, thicknesses, shrinkages, etc., is of primary importance [4].

2. Analysis of Professions Distribution and 3D-modelling Skills Requirements

A 3D modeler is a type of multimedia artist or animator who creates three-dimensional models or visuals of items using a variety of different computer software programs and tools [2-3]. Also, 3D modeler works with two-dimensional image through a process called 3D rendering and with 3D computer graphics process of converting 3D models into 2D images on a computer [4-5]. 3D modeling as a science is a process of developing a mathematical representation of any surface of an object (either inanimate or living) in three dimensions via specialized software [6]. There are various systems and platforms for computer-aided design working with 3D modeling, these are: CAD (Computer Aided Design), CAM (Computer Aided Modeling), PDM (Product Data Management), CAE (Computer Aided Engineering), PLM (Product Lifecycle Management). The most common programs are based on computer-aided design systems: AutoCAD, Autodesk Inventor, SolidWorks, Compass-3D, Fusion 360.

At first it is important to understand who the stakeholders for this profession are, what are the requirements for a 3D-modeler. For this, about a hundred vacancies were analyzed. As a result, 7 types of vacancies were defined: design engineer, project engineer, interior designer, game designer, construction director, architect and 3D jewelry designer (fig. 1). On fig. 1 it is shown the distribution of professions which requires 3D-modelling skills.

Table 1 presents requirements indicated in analyzed vacancies. From the table 1 it can be seen that the most important requirements on the labor market in Yekaterinburg for those who are professionally engaged in 3D modeling are knowledge of 3D modeling software, has higher education and work experience. Some of requirements at first look do not depend on the employment sectors for 3D-modelling. Such qualities as positive

Figure 1: Distribution of professions required 3d modelling skills at labor market: 1) Design engineer (58% of all vacancies); 2) Project engineer (13% of all vacancies); 3) Interior designer (9% all vacancies); 4) Architect (7% of all vacancies); 5) Game designer (6% of all vacancies); 6) Construction director (5% of all vacancies); 7) 3D jewelry designer (2% of all vacancies).

personality traits, understanding of specialized corporate technologies and the ability to use PC / office programs are also welcome, these are requirements that are included to 10%-20% of applications. Requirement that has a minimum distribution of less than 10% is being able to work with design documentation, portfolio work, customer service, knowledge of unified system of design documentation, marketing, having a car, young specialist, work for the good of the company, negotiation skills, literacy, knowledge of English, multitasking, educability, time management and ability to lead projects.

3. Labor Market Offers Distribution

Figure 2 shows distribution of professions by salaries. Of course, there is a dependence on factors such as the size and age of the company where position is opened. Work experience, team work experience also increase salary. Based on these facts, it can be concluded that positions from 500 $ to 800 $ (US dollars) are mainly opened for young specialists or specialists with little work experience. Sometimes companies have these starting positions to search a person with high potential and further to develop him or her. Vacancies offering salaries from 900 $ to 1,100 $ are specialists with a medium level of work experience around 3-5 years who have already been offered vacancies in good companies. Vacancies offering salaries starting at 1,200$ are for specialists with experience of more than 10 years of successful work a a good well-known company.

TABLE 1: Requirements for top-10 job offers

| Requirement	Percentage (%) of applications requited quality
Knowledge of 3D modeling software	86
Experience	64
Higher education	50
Positive personality traits	43
Understanding specialized enterprise technologies	34
Ability to use PC / Office programs	27
Knowledge of Unified System of Design Documentation	20
Be able to work with design documentation	18
Portfolio work	16
Customer service	11
Marketing	9
Ability to lead projects	7
Young specialist	7
Educability	7
Time management	7
Work for the good of the company	5
Knowledge of English	5
Multitasking	2
Be able to create a render	2
Negotiation skills	2
Literacy	2
Having a car	2
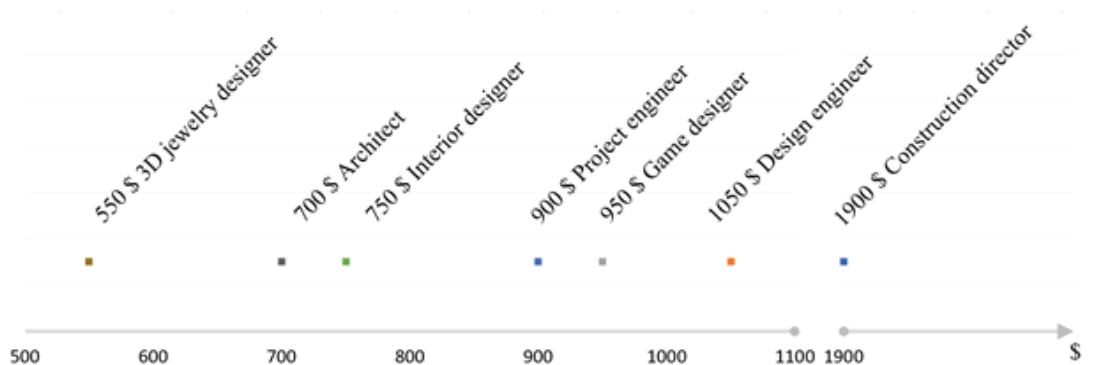
Figure 2: Labor markets offers distribution by salary.

4. Conclusion

Present paper describes requirements for 3D modelling skills based on the analysis of labor market at Ural region of Russian Federation. It is shown what requirements are formed by stakeholders and what percentage of vacancies require 3D modelling skills. Salaries analysis of opened job positions was made to make a distribution at the labor market. Skills in 3D-modelling are becoming necessary to have a well-paid job, that is why engineering programs at Universities face to a high demand of development of new programs of education.

Acknowledgements

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