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THE FORMATION OF PROFESSIONAL GRAPHICS COMPETENCIES OF FUTURE GRADUATES OF UNIVERSITIES
ПРО ФОРМУВАННЯ ПРОФЕСІЙНИХ ГРАФІЧНИХ КОМПЕТЕНЦІЙ СТУДЕНТІВ БУДІВЕЛЬНИХ І МОРСЬКИХ СПЕЦІАЛЬНОСТЕЙ

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Abstract. *Development of the abilities to perceive, create, and save and share various types of technical graphics are the main tasks of the graphic preparation of professional engineering education. Our research highlights the importance of independent self-study that reinforces the retention of the newly acquired knowledge and shapes student's independent skills, knowledge, and abilities. Integration of traditional and active teaching methods necessary for formation of professional graphics competencies*

Keywords: *professional competencies, graphic education, building and maritime specialties, individualized educational methods*

Анотація. *Розвиток здібностей правильно сприймати, створювати, а також зберігати та передавати будь-яку технічну графічну інформацію є основними задачами графічної підготовки у професійній інженерній освіті. Наші дослідження підкреслюють вагомість самостійної роботи студентів, що зацікавлені в більш глибокому засвоєнні теоретичного матеріалу та набутті якісних практичних навиків і вмінь. Для формування професійних графічних компетенцій необхідно комплексне поєднування традиційних та активних методів навчання*

Ключові слова: *професійні компетенції, графічна освіта, будівельні та морські спеціальності, індивідуальні методи навчання*

Such an effective education system necessarily includes an effective vocational training of professionally competent engineers. The long-term educational practices in the leading universities in Odessa, Ukraine, indicate that a solid understanding of engineering graphic disciplines, such as drawing, is a prerequisite to the formation of professional competencies amongst prospective engineers. This understanding fosters a culture of graphic literacy the essence of which is laid out in "Engineering Geometry or Engineering Graphics" disciplin and serves as a foundation for further skill development.

We position that adherence to a vocational training of such quality requires an adoption of a broader, more comprehensive approach to professional competency.

Moreover, it requires an objective assessment of hurdles specific to graphic education. We further suggest that the formation of a professionally - adequate graphic competencies amongst prospective engineers becomes more effective when individualized educational methods, such as personalized motivational techniques, increased student engagement, and supervised self-study, are employed during the vocational training of a prospective engineer based on the psychologically-pedagogical approaches to its contents.

The purpose of the study is to explore improvements in methodologythe questions of psychological and pedagogical principles for graphic preparation of the engineering staff at the present stage of reforming higher education. Recently, the issue of professional competencies in the context of professional development received a lot of attention from the international scientific community. However, our literature review indicates that, as of today, there is no one universally accepted definition of the term “professional competencies," neither with regards to its form, nor with respect to its substance [1-2].

The term and its derivatives are both under- and over-inclusive. For example, the exact meaning of “professionalism” tends to be highly specific to a particular profession; “professional training” refers to an industry-specific skill set acquired to perform a job in a specific field. At the same time, the terms are often used interchangeably to indicate a generic high levels of training and qualification.

We believe that current interpretations of “professional competency” in the modem foreign literature as “a furthered understanding,” “an ability to adequately execute a task," “an ability to perform an activity,” and others do not fully capture the substance of the term. We position that “professional competencies” should be measured against the actual results of the professional activity of an individual.

This is due to the fact that, only by delivering the outcome required by the profession, can an employee be considered professionally competent. Thus, we believe that the main objective of a vocational training is not limited to a formation of a solid knowledge base and a necessary practical skill of a student, but also includes a formation of a socially active, creative, and engaged personality of a prospective engineer, which we consider to be definitive of his/her professional competencies.

In addition to such comprehensive approach to professional competency, one must understand the nature of the graphic education as well as the unique hurdles faced by this discipline. Graphic education is a process, during which a student acquires knowledge, skills and abilities needed to work with graphic information. Developing the ability to properly receive, create, safe, and transfer technical graphic information with regard to various objects and processes is the ultimate goal of graphic education in the realm of vocational training.

Pre-vocational graphic education plays an important role in achieving such coverage. Unfortunately, such pre-vocational education (e.g., drawing) is absent from many high-school curricula. Because of this, many first-year students experience difficulties in connection with the development of multidimensional space perception as well as with their abilities to interpret blueprints and other technical documentation.

The study of fundamental mathematics, descriptive geometry, and engineering

graphics in vocational schools plays a paramount role in the education of a prospective engineer. The reduction in study hours of these disciplines inevitably leads to a reduction in the scope of the academic issues addressed.

Nevertheless, an adequate coverage of graphic disciplines is still possible with the help of an integrated, individualized approach to the educational process, as is evidenced from our research outlined below and elsewhere.

During our research, we conducted a number of observational controlled studies that measured the quality of graphic education delivered to first- and second-year construction and marine students [3-4]. Total of 225 students across ten study groups were studied during 2014-15 and 2015-16 academic years. For the six study groups of first-year students, a single-plan exercise in the form of an express knowledge control was performed during the practical part of the first semester coursework. Tests and tutorial consultations were performed during the computer-based classes. Graphic exercises were performed during an independent self-study; each such graphic exercise was supervised by a professor and was timed. For the four study groups of the second-year students, randomized questionnaires were distributed to assess the levels of knowledge acquired in the key disciplines; the questionnaires were individually assessed based on the level of knowledge retained. Approximately 95% of all students studied took part in each of these control exercises.

Based on the data obtained, we identified three distinct aspects of individualized education - motivation, student engagement, and independent self-study - that we perceive as central to the improvement of graphic vocational training of prospective engineers.

Annually for more than 30 years of descriptive geometry and engineering graphics OGASA holds traditional open Olympics on descriptive geometry among first-year students of the leading universities in Odessa with participation of 120 students each year until that confirms some positive results in the graphics system training.

Throughout the research, psychologically motivated students, who were aware of the professional competition and who were determined to develop their understanding of the subject matter and their practical skills, exhibited the strongest desire to attain the best results amongst their peers. Based on this observation, we position that motivation, and it’s strengthening, serves as an important tool in the management of education process.

A strong motivation significantly affects the object of the action, thus, creates a goal-orientated behavior. An educator should continuously plan, implement, and re-evaluate the educational process, so that it presents new knowledge as necessary for the student and creates a necessity of obtaining such knowledge. Our observations engagement is an important component of graphic education. Such engagement should be grounded in a clear understanding of the questions presented and in a deep interest in the object studied.

Student's attention should be directed towards the constructional characteristic of the object depicted and its multi-dimensional structure. Great emphasis should be placed on the development of solid graphic skills and on student’s ability to execute graphically accurate blueprints and other technical documentation.

Such educational method is relatively labor-intensive, since it requires more than a one-directional teacher-to-student communication of the subject matter. For this dynamic educational method to take place, an interested, engaged and positively motivated educator should orient him/herself towards active, determined students, so that students could participate in the study process and could form an ability to actively and effectively perceive, process, and recreate graphic information studied. We conclude that, in order to increase the quality of the training provided, the emphasis should be placed on improving the levels of student engagement in graphic vocational training, which to a significant degree is dependent on the professionalism of the educator. Our research further highlights the importance of independent self-study that reinforces the retention of the newly acquired knowledge and shapes student's independent skills, knowledge, and abilities.

The data collected suggests that independent self - study is most effective when supervised by an educator at the outset, while the student develops a sufficient skill to perform such study on his/her own. Thus, we suggest that independent self-study during the first year of vocational training should be systematically supervised by a professor. It is worth noting that an effective organization of independent self-study, and the subsequent continuous graphic training, implies an existence of an appropriate study space, i.e., classrooms equipped with drawing tables and computers with Internet access.

The educational information support required includes necessary textbooks; visual and study aids; lecture transcripts and sample answers, both in hard and soft copies; study guides addressing an efficient organization of independent self-study as well as sufficient number of various assignments and guidelines as to their completion.

Conclusion. In conclusion, we believe that the creation of proper conditions for professional and personal growth of prospective engineers and the formation of their creative skills and professional competency should become one of the main objectives of vocational training. An effective formation of such professional competencies amongst students depends on an individually tailored orientation of the educational process, as well as on the dynamic combination of traditional and individualized educational methods. Professional competency of an engineer is the sum total of integrated foundational knowledge, generic skill set and abilities, high levels of graphic and technological literacy and proficiency, creative approach to task organization, professionally valuable and personal characteristics, and openness to continuous self-development

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ТЕСТИРОВАНИЕ МАКЕТНОГО ОБРАЗЦА ГОНИОФОТОМЕТРА БЛИЖНЕГО ПОЛЯ

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TESTING MODEL SAMPLES GONIOPHOTOMETER NEAR FIELD

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Аннотация. В статье рассматривается тестирование макетного образца гониофотометра, реализующего новый метод получения пространственного распределения силы света источника оптического излучения на основе фотометрии ближнего поля.

Ключевые слова: светораспределение, фотометр, фотоприемник, сила света, кинематическая схема, измерение.

Abstract. The article discusses the testing of the model sample goniophotometer, which implements a new method to obtain the spatial distribution of light intensity of the optical radiation source based on near-field photometry.

Keywords: the distribution of light, the photometer, the photodetector, the intensity of the light, kinematic scheme, measurement.

Вступление.

Важнейшей светотехнической характеристикой световых приборов является светораспределение, определяющее распределение его светового потока в пространстве, окружающем световой прибор (СП) [1-2]. Его измеряют гониофотометром дальнего поля, в котором светильник вращается по заданным осям относительно неподвижного люксметра на таком расстоянии, что угловой размер люксметра относительно светильника мал [3].

Как физическая величина, сила света соответствует модели точечного источника света и потому не может характеризовать световые характеристики светильника в ближнем поле, рассчитываемые только по пространственному распределению яркости светильника [4].