UDC 614;37.022
https://doi.org/10.33296/2707-0255-13(25)-06

Alexander SHEVCHENKO
Medical Doctor, Master of Medicine,
Economics and Pedagogy, PhD Student,
Ukrainian Engineering Pedagogics Academy,
Kharkiv, Ukraine
https://orcid.org/0000-0002-4291-3882

QUALIMETRIC CRITERIA FOR FORMATION OF VALEOLOGICAL COMPETENCE IN THE ADAPTIVE EDUCATION SYSTEM

Abstract. The article focuses on valeological competence, which is the ability of a higher education student to lead a healthy lifestyle, practice safe behaviors and provide pre-hospital emergency care to people in critical conditions, and the qualimetric model of this competence. Analysis of the legislation of Ukraine, international UN and WHO documents confirmed the relevance of health at the population and personal levels in connection with the its declared value. The proposed qualimetric model takes into account the academic discipline "Health Pedagogy" curriculum content, the fact that the successful formation of valeological competence requires studying the full course of the discipline and equilibrium qualimetric distribution of cognitive, activity, motivational and personal components. The thematic distribution of the valeological competence components "weights", carried out by the method of expert assessments, allowed to determine the most important topics of the discipline "Health Pedagogy", among which were the prevention of chemical dependence, emergency care, rational nutrition. Qualimetric assessment of the success of the formation of valeological competence in students can be conducted both comprehensively and by individual components. In particular, the ability to provide emergency care and lead a healthy lifestyle should be assessed separately. In this case, the ability to practice safe behaviors can be assessed only after studying all topics of the discipline. The formed qualimetric model of competence assessment is subject to adjustment according to the feedback principle, which is indicated as a perspective of further research. Also, the ability to adjust the model is a factor in facilitating the adaptive management of the pedagogical process during the study of valeological disciplines by non-medical students.

Keywords: health care, competence approach, valeological competence, non-medical training profile, reference qualimetric model.

Introduction. Health is one of the greatest personal and social values. The right to health care is guaranteed by Articles 25 of the Universal Declaration of Human Rights, 12 of the International Covenant of Social Economic Rights, 6 and 24 of the Convention on the Rights of the Child; 10, 11, 12 and 14 of the Convention on the Elimination of All Forms of Discrimination against Women, the European Social Charter [6]; 49 of the Constitution of Ukraine [4] and 6 Fundamentals of Ukrainian Legislation on Health Care [8], regulated by Article 283 of the Civil Code of Ukraine [29] and a number of other national regulations. Of the 8 Millennium Development Goals defined by the UN [11], 3 are devoted to health issues: reducing child mortality; improving maternal health; and combating HIV/AIDS, malaria and other diseases. The third UN Sustainable Development Goal 2030 is also the goal of good health [30], in particular the promotion of healthy lifestyles and the promotion of well-being for all at all ages [31].

The Constitution of the World Health Organization states [3] that "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition". WHO also determined that human health is approximately 50% dependent on lifestyle, 20% on hereditary factors, 20% on the environment and 10% on the health care system. The decision about the ratio of the influence of these four factors was actually made by the method of expert assessments, by voting [5]. The accuracy of such an estimate, made several decades ago, is confirmed by the fact that the ratio is preserved after numerous repeated checks [9]. The division of the phenomenon of health formation into parts with the assignment of weight to these parts is actually a qualimetric approach.

Qualimetry (from lat. *quail* – quality, and anc. Greek *metro* – to measure) is a field of scientific knowledge that studies the methodology of complex assessments of phenomena and processes with the designation of the relationship between the

qualitative and quantitative characteristics of their components [2]. The quantitative assessment of the quality of the educational process, first of all, should be related to the competencies, the formation of which is aimed at the modern education system [19]. Qualimetric assessments of the formation of competencies are used more and more often, but this topic requires additional study.

Analysis of recent research and publications. Many researchers dealt with qualimetry issues: Yu. Andriianov, R. Arkaieva, H. Azghaldov, I. Annienkova, V. Fediukin, A. Feofanov, L. Fesik, V. Fomin, V. Kershenbaum, R. Khvastunov, N. Khovanov, V. Kornieieva, O. Kostin, O. Kuts, I. Lapshyna, A. Lobanov, M. Lopatin, V. Maruhin, V. Mykhailenko, A. Nedbai, H. Poliakova, M. Rostoka, E. Raikhman, I. Russman, Z. Riabova, N. Shestakova, O. Shikhova, I. Shyshkin, V. Staniakin, A. Subetto, H. Yelnykova, et al. [12]. Often such studies dealt with technical issues (for example, industrial production, architectural construction) [10; 13], assessment of personnel work quality [32], student rankings [16], and university rankings [20]. In preventive medicine, qualimetric studies were carried out by V. Kaptsov, V. Kutovoy, V. Kucherenko, L. Vedmedenko [7]. Researchers who use qualimetry in pedagogy study both individual competencies [16], and the quality of education, the quality of educational services [14]. The ability to perform a qualimetric assessment fits into the concept of qualimetric competence, which includes organizational and managerial, control and evaluation, information-analytical and personal components [25]. Qualimetric competence is the basis for assessing students' knowledge, so some researchers believe [25] that it should be formed at the highest level among graduates of pedagogical specialties.

The high level of competence development is in line with national education standards [1] and the education quality standards of the International Organization for Standardization (ISO), the European Organization for Quality (EOQ), the European Association for Quality Assurance in Higher Education (ENQA) and the International Network for Quality Assurance Agencies in Higher Education (INQAAHE).

Qualimetric assessments of the formation of the success of competencies meet the criteria of "measurability for comparison with standards" and contribute to the adaptive management of the quality parameters of higher education.

The aim of the study is to determine the qualimetric criteria for the formation of valueological competence in the context of adaptive learning for non-medical students.

Presentation of the main material of the study. Adaptive learning involves students choosing their own educational trajectory to meet their educational needs, individual depth and pace of learning. At the same time, the formation of competencies remains the criterion for the success of education. The student's adaptation to the rapidly changing conditions of life should occur both through the choice of disciplines in combination with the compulsory disciplines of the "core of the specialty", and through self-education. The student, as an active subject of the educational process, must develop harmoniously, acquiring special and general competencies for subsequent professional activities and full-fledged social interaction. At the same time, the humanistic nature of education should be preserved.

According to the authors of the academic discipline "Health Pedagogy" curriculum [27], which is taught at the Ukrainian Engineering Pedagogics Academy for Bachelor and Master non-medical students from Ukraine and Germany, valeological competence must be formed in all university graduates, regardless of specialty [18]. Understanding the basics of health saving and commitment to a healthy lifestyle is an essential part of modern humanistic education.

For the formation of valeological competence, it is necessary to lead a healthy lifestyle, practice safe behavior and be able to provide emergency first aid in critical conditions. To form valeological competence through the study of the discipline "Health Pedagogy", it is necessary to study all topics of the academic discipline, achieving success in improving the four components of competence: cognitive

(knowledge), activity (skill), motivational-value and personal (required qualities). It is this principle that the proposed qualimetric assessment takes into account.

Assessment of knowledge and skills in the course of studying the academic discipline "Health Pedagogy" is carried out after students build mind maps, write notes, complete test tasks and cases. Questionnaires and in-depth interviews are conducted to assess the success of the formation of motivational-value and personal components of valueological competence. To optimize the learning process, tests are combined with questionnaires. Questionnaire part of the test-questionnaire may contain confidential questions that are not submitted for public discussion and are not subject to evaluation according to academic rules. However, without studying them, it is impossible to draw a conclusion about the effectiveness of competence formation.

The qualimetric assessment is based on the decomposition of the object of study of the components in order to determine the value of each component for the overall result. A reference qualimetric model of the formed valeological competence has been compiled (table 1), adjusted using the method of expert assessments, in which the achievement of the maximum result is estimated at 100%. The "weight" ratios of the four components of competence are equal to each other (the conditional "weight" of each component is 25%), but unevenly distributed among the 14 topics of the course of the academic discipline. The most significant topics of discipline in accordance with the opinion of experts are the topics of "chemical addictions (dependencies)" (use of narcotic and toxic substances, tobacco smoking and alcohol abuse) – 12%, "emergency care" (cardiopulmonary resuscitation, bleeding control, transport immobilization of victims, protection from the additional action of damaging factors) – 10%, rational nutrition – 9%.

Table 1

Reference qualimetric model of valeological competence formed through the academic discipline "Health Pedagogy"

The topic name in the discipline "Health Pedagogy"	Valueological competence component, %				"Weight" of the component. %
	Cognitive (knowledge)	Activity	Motivational-Value	Personal	
	a	*b*	*c*	*d*	*a+b+c+d*
1. Health saving in education	1	1	2	1	5
2. Rational nutrition	2	2	2	3	9
3. Physical culture and sports, mode of work and rest	1	2	2	3	8
4. Safe use of medicines	2	2	1	1	6
5. Trauma. Domestic violence. Bullying	1	1	2	3	7
6. Poisoning, radiation, occupational diseases	2	2	1	1	6
7. Emergencies	3	3	2	2	10
8. Blood and organ donation	1	1	2	2	6
9. Cardiovascular and pulmonary diseases	2	2	2	1	7
10. Infectious and parasitic diseases	3	2	1	1	7
11. Inclusive education	1	1	1	1	4
12. Mental and psychological health. Professional burnout	1	2	2	2	7
13. Sex education and family planning	2	1	2	1	6
14. Chemical dependencies	3	3	3	3	12
"Weight" of the component, %	*a1+a2+ ...+a14*	*b1+b2+ ...+b14*	*c1+c2+ ...+c14*	*d1+d2+ ...+d14*	*a1+a2+ ...+d14*
	25	25	25	25	100

To conduct an expert assessment, a questionnaire was used in which 2 mandatory parameters were set: the equal "weight" of the four competency components of 25% and the minimum assessment of each component on individual topics of 1%. Average values are rounded to whole numbers. 23 experts with medical education and at least one year of teaching experience took part in the assessment of the significance of the

components of the valeological competence of the reference qualimetric model. A survey of experts was conducted in the Kharkiv region of Ukraine in 2021. The "weight" of the expert's opinion was increased depending on the number of positive answers to the following questions:

- whether the expert has experience in teaching valeological disciplines to non-medical students for more than one year;

- whether the expert has a Candidate of Science (PhD) or a Doctor of Science degree;

- whether the expert has scientific publications about qualimetric assessments and competence-based approach.

Each positive answer to questions about the qualifications of an expert increased the "weight" of his opinion by 100%. That is, 1 positive answer increased the coefficient of "weight" of the assessment to 2 times (there were 8 such experts in total); 2 positive answers – up to 3 times (6 experts); 3 positive answers – up to 4 times (1 expert).

The resulting qualimetric model of valeological competence can be refined depending on changes in the course of the academic discipline "Health Pedagogy", but only if the curriculum is extended. Clarification will require a second peer review. However, taking into account the patterns of factor-criteria modeling, which takes into account the relationship between simple and complex properties of an object, it can be assumed that the ratio of the "weight" of the main topics will be preserved.

The qualimetric model of the student's educational activity simplifies the creation of educational standards, specifies the criteria for academic success. The received evaluation judgments of learning success play the role of feedback with the pedagogical influence of the teacher, which allows you to adjust the pedagogical activity and predict its results.

Qualimetric assessment of competence formation involves numerous measurements at all stages of training. Given that the formation of competence has a

long duration (from the semester to several years of study), and the formation of competence can occur during the study of several academic disciplines, it is advisable to assess the formation of individual components of competence. This approach becomes easier if the competence itself includes several logical blocks. In the case of valeological competence, these blocks are defined by us as: 1) the ability to lead a healthy lifestyle; 2) the ability to practice safe behavior patterns; 3) the ability to provide emergency (pre-medical) care.

Forming a separate unit of valeological competence is easiest in the case of emergency care, and most difficult in the case of safe behaviors. This is determined by the construction of the curriculum of the academic discipline "Health Pedagogy". Thus, students are asked to study the issues of emergency care separately from other topics of the discipline.

Healthy lifestyle issues can be grouped into several sequential sessions. These are issues of nutrition, optimal work and rest, physical activity, hygiene, psycho-hygiene, abandonment of particularly dangerous bad habits that lead to chemical dependence. There are issues of safe behavior in all topics of the discipline "Health Pedagogy", so the qualimetric assessment will be most informative only after the completion of training on all topics of the discipline.

Safe behavior in an emergency, for example, is the safety of the rescuer or resuscitator. It is connected with the decision-making on the necessity and possibility of rescuing the victim, resuscitating him. During the training, we tell the students that if their lives are in danger while rescuing another person, and the result of the rescue effort is questionable, then the rescue should be abandoned.

Safe sexual behavior is the refusal of unprotected sex, the proper use of contraception, avoidance of situations in which sexual violence can be used, timely examination for sexually transmitted (parenteral) infections, treatment of these infections, abortion refusal [23].

Safe behavior during sports and physical training is the right choice of sports activities appropriate to their capabilities and current activity level, in classes under the guidance of experienced mentors, coaches, dosed loads with a gradual increase in complexity and duration of approaches (exercises), safety in control of the physiological indications (pulse, pressure, coordination of movements as measures of overfatigue), adjustment of a food and consumption of liquid according to the training mode, refusal of stimulants, anabolics, doping. When choosing a sport, keep in mind that fitness is always safer than high-achievement sports, and therefore more in line with a healthy lifestyle.

Industrial safety depends on the action of its harmful factors, compliance with safety rules, timely and sufficient training of personnel, the availability of overalls, personal protective equipment, the obligation to use them, the absence of emergencies, the system of assistance to victims [21].

Safety in the learning environment is related to the microclimate and lighting of the premises, ergonomics of the workplace, tension and stress of the educational process, compliance with safety precautions when working with high-risk sources (electrical equipment, chemicals, fast moving objects, etc.), absence violence during conflicts, no injuries during sports [26].

Domestic safety is related to the microclimate of the premises, the operation of electrical and gas appliances, ventilation systems, the level of radioactivity of the premises, the absence of physical and sexual violence, conflicts, injuries while doing housework and around the house.

Travel safety is associated with road traffic injuries, criminal violence, air pollution, radiation background. In turn, road safety is associated with compliance with traffic rules, mutual courtesy of all road users, technical condition of vehicles, road surface, adjustability of sections of busy roads (traffic lights, road markings, signs), the presence of underpasses, lighting in dark time of day, using seat belts and child seats, driving sober [26].

Safety of medicines is connected with their use on purpose, taking into account contraindications and possible side effects, expiration date, absence of falsifications.

Food safety is related to their freshness, absence of microbial, chemical and radiation pollution, impurities of natural and agricultural poisons (poisonous mushrooms, vegetables with high nitrate content), terms and conditions of storage, production technology, quality of raw materials, counterfeiting.

Safety of drinking water is connected with water intake sources, operation of treatment facilities, quality control of water treatment, including chemical composition and radiation pollution, technical condition of water supply systems, additional treatment in places of consumption.

Infectious safety is related to human living conditions (overcrowding, hygiene of housing and public places), quality of food, drinking water, epidemiological spread of infectious infections, vaccination levels, compliance with quarantine measures during outbreaks of infectious infections, epidemics and pandemics, availability of medical care and medicines, level of sanitary education [22; 15].

Radiation safety depends on compliance with safety precautions when handling radioactive materials for medical and military purposes, nuclear fuel for nuclear power plants, radioactive ores, the consequences of radiation disasters, nuclear tests, radiation control, compliance with the ban on agricultural production, fire prevention and fire prevention control of radiation level of premises (radon and radioactivity of construction materials), efficiency of decontamination at radiation leaks, observance of the allowed time of carrying out medical procedures and their multiplicity, time of stay in airliners [24].

The analysis of the "Health Pedagogy" curriculum showed (Figure 1) safety issues presence in absolutely all topics, so the discussion of safe behavior strategies can be considered completed only after graduation.

1. Key topics	The main risk factors	Diseases & pathological conditions
1.1. Healthy lifestyle		
Rational nutrition	Overeating	"Civilization" diseases: - obesity; - atherosclerosis; - hypertension; - diabetes mellitus; - coronary heart disease; - heart attack, stroke; - dementia.
	Unhealthy diet	
Cardiovascular health	Salt abuse	
	Hereditary factor	
Physical culture and sports	Sedentary lifestyle	
Work and rest mode	Fatigue	
Psychohygiene	Distress, burnout	
	Tobacco smoking	Chemical dependencies as an indicator of unhealthy lifestyle
	Alcohol abuse	
	Drug abuse	
1.2. Emergencies		
Bleeding cessation; cardiopulmonary resuscitation; transport immobilization	Domestic injuries	Injuries
	Transport injuries	Clinical death
	Sports injuries	Skull & spine damage
Trauma	Criminal & military violence	Fractures
		Bleeding
		Shock, coma
		Burns, frostbite
		Electrotrauma
Safe medicines use	Instructions violation	Poisoning
	Falsifications	Allergic reactions
Poisoning protection	Bites of poisonous animals and insects	Poisoning
		Allergic reactions
	Contact with poisonous plants	Shock, coma
		Clinical death
	Mushroom poisoning	
	Bacterial toxins	
	Poisoning by combustion products	
	Poisoning at industrial enterprises	
	Poisoning in agriculture	
Radiation protection	Medical procedures	Radiation sickness
	Radioactive food	Induced oncology
	Radioactive building materials	Reproductive dysfunction
	Plane flights	
	Living or working in contaminated areas	

Fig. 1. Safety, a healthy lifestyle and emergency care issues in "Health Pedagogy" discipline

1. Key topics	The main risk factors	Diseases & pathological conditions
1.3. Other key topics		
Infectious & parasitic diseases	Viruses	Carrying infections
	Bacteria	Infectious diseases
	Helminths	Parasitic diseases
	Fungal infections	Allergies
	Protozoan infections	Infectious-toxic shock
	Hygiene violation	Clinical death
	Epidemiological regime violation	
	Vaccinations refusal	
Sex education & family planning	Dangerous sex	Sexually transmitted infections
	Contraception refusal	Unwanted pregnancies
		Abortions
		Secondary infertility
Chemical dependencies	Tobacco smoking	Oncology, circulatory disorders
	Alcohol abuse	Alcoholism, drunkenness
	Drug abuse	Drug addiction
Professional burnout	Distress	Chronic fatigue syndrome
	Compensation failure	Social maladaptation
2. Installation & additional topics		
Health in education		
Inclusive education		
Domestic violence. Bullying	Physical abuse	Injuries
	Sexual abuse	Unwanted pregnancies
	Psychological abuse	Mental disorders
Occupational diseases	Chemical factors	Pneumoconiosis
		Bronchoobstruction
	Physical factors	Vibration disease
		Polyneuropathy
		Osteoarthritis
Blood and organ donation	Transmissible infections	Viral hepatitis
		HIV/AIDS
Mental & psychological health	Heredity	Endogenous psychoses
	Prions	Schizophrenia
	Conflicts, violence	Distress, psychotrauma
	Age changes	Dementia
		Alzheimer's disease
	Chemical dependencies	Alcoholism
		Drug addiction
Pulmonary diseases	Infections	Pneumonia
	Occupational diseases	Pulmonary tuberculosis
	Tobacco smoking	Lung cancer
	Heredity	Bronchial asthma

Fig. 1. Safety, a healthy lifestyle and emergency care issues in "Health Pedagogy" discipline

The ratio of safety issues, the basic postulates of a healthy lifestyle and emergency care in the discipline "Health Pedagogy" is shown in *Figure 1*. Safety issues are subject to qualimetric study in the following contexts:

- the student knows what is a safe strategy in the situations studied by "Health Pedagogy" – the cognitive competence component;

- the student correctly chooses the safest strategy when performing practical tasks or solving situational exercises (cases) – the activity competence component;

- the student declares his need/readiness to act safely in the situations studied by "Health Pedagogy", is ready to teach safe strategies to others – a motivational-value competence component;

- the student chooses the safest strategy of behavior in life and professional situations, abandons the unsafe strategies that he had previously practiced – the personal competence component.

Conclusions. The qualimetric criteria for the formation of valeological competence, proposed based on the results of the current study, are based on four equilibrium components of competence – cognitive, activity, motivational-value and personal. At the same time, 14 topics of the academic discipline "Health Pedagogy" curriculum have different "weight" in the proposed reference qualimetric model, determined by peer review with a ranking from a minimum of 1% to a maximum of 3% for each thematic component of competence. The qualimetric regularity of the formation of valeological competence, established by the experts, was tested for comparison with the settings of safe behavior, the models of which must be formed among students in the context of the academic discipline "Health Pedagogy". The relative independence of the part of the discipline related to the provision of emergency care, the average connection between the formation of a healthy lifestyle and the high connection of safety issues with the mandatory completion of a full course of study in the discipline were determined.

Prospects for further research. The proposed reference qualimetric model of valeological competence, formed through the academic discipline "Health Pedagogy", is used to assess the success of the formation of valeological competence in non-medical students of 011 and 015 "bachelor" and "master" engineering and pedagogical specialties from Ukraine and Germany who are studying at the Ukrainian Engineering Pedagogics Academy. The accumulation of data on the success of the formation of valeological competence within the proposed qualimetric model for a sufficient number of students for statistically reliable processing will allow not only to correct the proposed model according to the feedback principle, but also improve the adaptive component of the relative new valeological discipline.

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Олександр ШЕВЧЕНКО
лікар, магістр медицини, економіки та педагогіка, здобувач PhD,
Українська інженерно-педагогічна академія,
Харків, Україна
https://orcid.org/0000-0002-4291-3882

КВАЛІМЕТРИЧНІ КРИТЕРІЇ ФОРМУВАННЯ ВАЛЕОЛОГІЧНОЇ КОМПЕТЕНТНОСТІ В СИСТЕМІ АДАПТИВНОЇ ОСВІТИ

Анотація. Стаття присвячена валеологічної компетентності, яка полягає у спроможності здобувача вищої освіти вести здоровий спосіб життя, практикувати безпечні моделі поведінки та надавати долікарняну невідкладну допомогу людям у критичних станах, та кваліметричній моделі цієї компетентності. Аналіз законодавства України, міжнародних документів ООН та ВООЗ підтвердив актуальність здоров'язбереження на популяційному та особистому рівнях у зв'язку з задекларованою цінністю здоров'я. Запропонована кваліметрична модель враховує зміст навчальної програми академічної дисципліни «Педагогіка здоров'я», факт, що для успішного формування валеологічної компетентності потрібно вивчити повний курс дисципліни та рівноважний кваліметричний розподіл когнітивного, діяльнісного, мотиваційно-ціннісного та особистісного її компонентів. Тематичний розподіл вагових

коефіцієнтів компонентів валеологічної компетентності, проведений методом експертних оцінок, дозволив визначити найбільш значущі теми дисципліні «Педагогіка здоров'я», серед яких були теми профілактики хімічних залежностей, невідкладної допомоги, раціонального харчування. Кваліметрична оцінка успішності формування валеологічної компетентності у здобувачів вищої освіти може бути проведена як комплексно, так і за окремими компонентами. Зокрема, окремій оцінці підлягає спроможності надавати невідкладну допомогу та вести здоровий спосіб життя. При цьому спроможність практикувати безпечні моделі поведінки може бути оцінена лише після навчання за всіма темам навчальної дисципліни. Сформована кваліметрична модель оцінки компетентності підлягає коригуванню за принципом зворотного зв'язку, що зазначено у якості перспективи подальших досліджень. Також можливість коригувати модель є фактором полегшення адаптивного управління педагогічним процесом під час вивчення валеологічних дисциплін студентами немедичного профілю навчання.

Ключові слова: здоров'язбереження, компетентнісний підхід, валеологічна компетентність, немедичний профіль навчання, еталонна кваліметрична модель.