

**ЕКСПЕРИМЕНТАЛЬНІ ТА ПРИКЛАДНІ
ДОСЛІДЖЕННЯ**

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**SYSTEM APPROACH TO EVALUATION OF
E-TRAINING QUALITY**

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The article deals with evaluation of students' development within the traditional mode of training in universities and e-learning online. The research is relevant for practitioners as it is responsive and applicable to the needs of modern digital education. The paper gives detailed description of evaluation resources and characterizes effective e-learning on the example of e-training complex SmartEnglish^{online} that is built on the bases of psychopedagogical laws of eco-humanistic self-development. Evaluation strategy has been developed as a result of the long term scientific investigation of learning process efficiency under natural condition of university training including e-learning online. A complex of quality control performed by experts and tutors is presented. Its validity and reliability are shown. Special attention is given to students' self-evaluation. Both theoretical and empirical approaches have been used for defining training efficiency. The research contains empirical results and observations as heavy emphasis is placed on the experimental data. For supporting evaluation process special computer programs have been designed. They provide professional tests and inventories for defining level of individual cognitive and personal development. The results are processed mathematically and accumulated in the database. They are developed and presented in the format of 1) histograms, 2) comparative tables, 3) profiles of personal development in the context of e-training aims. As expected, the positive correlation of metacapacities and metaqualities with sense-cognitive orientation of a personality is revealed. The links between the level of individual metacharacteristic development and comprehensiveness of sense-cognitive orientation are discovered. It opens the possibility of efficient purposeful

development of student's personality under conditions of e-training in the context of a given orientation.

Keywords: e-learning online, evaluation, personality development, quality control, effective training.

Системний підхід в оцінці якостей е-навчання

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Мета: стаття присвячена оцінці розвитку студентів у традиційному режимі навчання в університетах та електронному навчанні в Інтернеті. Дослідження є актуальним для практикуючих фахівців, оскільки воно реагує і застосовується до потреб сучасної цифрової освіти.

Методи: Для підтримки процесу оцінювання розроблені спеціальні комп'ютерні програми. Вони забезпечують професійні тести та описи для визначення рівня індивідуального пізнавального та особистісного розвитку. Результати обробляються математично і накопичуються в базі даних. Вони розроблені і представлені у форматі 1) гістограм, 2) порівняльних таблиць, 3) профілів розвитку особистості в контексті цілей електронного навчання.

Результати: У статті дається детальний опис оціночних ресурсів і характеризується ефективно електронне навчання на прикладі електронного навчального комплексу SmartEnglishonline, побудованого на основі психолого-педагогічних законів еколого-гуманістичного саморозвитку. Стратегія оцінювання була розроблена в результаті довгострокового наукового дослідження ефективності навчального процесу в природних умовах підготовки університетів, включаючи електронне навчання в Інтернеті. Представлено комплекс контролю якості, який виконують експерти та викладачі. Показана його дієвість і надійність. Особлива увага приділяється самооцінці студентів. Для визначення ефективності навчання використовувалися як теоретичні, так і емпіричні підходи. Дослідження містить емпіричні результати та спостереження, оскільки велика увага приділяється експериментальним даним. Як і очікувалося, виявляється позитивна кореляція мета-властивостей і метаквалів з сенсорно-когнітивною орієнтацією особистості. Виявлено зв'язки між рівнем

індивідуального метахарактерного розвитку та комплексністю сенсорно-когнітивної орієнтації.

***Висновки:** стаття відкриває можливість ефективного цілеспрямованого розвитку особистості студента в умовах електронного навчання в контексті даної орієнтації.*

***Ключові слова:** електронне навчання он-лайн, оцінка, розвиток особистості, контроль якості, ефективне навчання.*

Introduction. Modern society, which is in a state of intensive social and technological transformations, puts forward new requirements for the training of future specialists. Along with professional knowledge, there is a need for the development of personality capacities and qualities. Besides, it is also imperative that students should not only function effectively in conditions of change, but also develop themselves in accordance with the needs of society.

Many changes have taken place in contemporary reality, such as transformation of consumer behavior, wide distribution of effective technologies and platforms, economic pressure etc. These changes pose a serious challenge to traditional systems of education. As early as in 2014, *The Economist* identified three disruptive changes already occurring. First, rising tuition and fees. Students no longer can afford these. Second, an emerging consensus that universities owe a responsibility to educate students not only during their years of enrollment, but also after graduation. Universities are increasingly being tasked with providing instruction and training throughout a graduate's professional lifetime. Third, the technology revolution is radically changing the way students and professionals learn (The Economist, 2014).

Yet educators in many parts of the world cling to tradition and demonstrate imperviousness to adapting to the coming changes. However, the creation and use of advanced technical means and their interrelation with life, society, and the training environment, the application of this knowledge for practical needs transform global education and encourage new forms of learning, considering that traditional ways are underperform.

New technologies represent tremendous opportunities for students and boost their ability to learn whenever and wherever they

want. Without the use of e-learning facilities for study conventional universities are currently inefficient.

Higher-education institutions do not need to choose between online and traditional learning. What they must do is blend the two. Their goal for now should be to seek the proper balance between the two forms of instruction and to demonstrate that universities can deliver an outstanding digital experience on par with that which students take for granted in other areas of their online lives (Wisbauer, 2017).

The quality of education is a widely used phrase at present. The quality can be seen differently in conjunction with the knowledge, information and educational technologies. These can be considered as catalyst for change in education, where the goal of our efforts is reforming and modernizing education for our knowledge – based society. One part of the effort is devoted to the special issues of quality of e-learning, which is seen as a potential tool for changes in education (Misuta & Pribilovab, 2015).

The quality of traditional teaching at a university is not homogeneous and varies from subject to subject, so varied quality of e-learning within one university can be observed, as well. To eliminate this diverse level of quality, it is necessary to implement a system of quality that ensures the required minimum level of e-learning quality across the university (Oliver, 2005).

We believe that the level of abilities and qualities development can serve as a criterion for the effectiveness of training (Demidyuk, 2009a). In connection with this, there is an issue of determining personality psychological resources and the ways of their purposeful development.

In the training environment of modern education, the program of purposeful complex development of professionally, socially and existentially valued metacapacities and metaqualities of a personality directly in the process of studying at higher-education institutions remains an open question. In this connection, there is a need to find principles for the organization of effective e-learning, within which the development of this metacomplex on the basis of the psychological patterns of its formation is possible, both in the

conditions of everyday life, and in the process of mastering specific educational subjects.

Thus, the psychological mechanisms and objective laws of functioning and purposeful development of students' metacapacities and metaqualities are the actual task of psychological science in an attempt to answer education to the challenge of a constantly changing society (Demydiuk, 2015b).

The aim of this research work is to create the system approach to evaluation of e-training quality and empirically investigate the possibility of purposeful development of students' metacapacities and metaqualities within online training course.

Methodology of research. To achieve the research aims, general scientific and special research methods were used while performing the investigation. They are both theoretical, such as analysis, comprehension, systematization and generalization of the achievements presented in the psychological literature on the research issue and empirical, in particular - observation, ascertaining experiment (determination of personal resources developmental level), individual interviews, surveys, testing, scaling, content analysis, teaching experiment as a method of active formation of students' metacapacities and metaqualities within the educational process, diagnostic experiments to control the changes taking place and to establish links between metacharacteristics (correlation and factor analysis). In empirical researches, original author's methods and e-techniques were used for constructing personality profiles (Demidyuk, 2008). One of the most effective ways to evaluate online training quality is to ask those who actually participate in the online training course. For this purpose we created and used the test-questionnaire of personality metacharacteristics development and self-assessment forms (Demydiuk, 2015a). Mathematical processing of data was carried out. The results were accumulated in the database.

Evaluation strategy has been developed as a result of long term scientific investigation of learning process efficiency under natural condition of university training including e-learning online. It is based on the concept of training efficiency determined by the

interaction of three basic components of learning process: students' activity; training materials; trainers' activity (Serheieva, Demydiuk & Turlakova, 2008).

The innovative technology of students' personal and professional development provides determination of teaching foreign languages effectiveness in higher education institutions based on the complex evaluation of both cognitive and professional development of students, including the development of socially and existentially valued qualities. For these purposes special measuring tools are used to ensure integration of learning outcomes and personal development (Demydiuk, 2018).

For supporting evaluation process, a special computer program has been designed. It provides professional tests and inventories for defining level of: 1) individual cognitive and personal development; 2) traditional training and e-training material as well as traditional training and e-training sessions. The results are accumulated in the database on the platform MOODLE. They are developed and presented in the format of 1) histograms, 2) comparative tables, 3) profiles of the traditional training and e-training materials, traditional training and e-training sessions and personal development in the context of training aims. The evaluation program provides a mode of self-evaluation. It gives opportunity for students to provide self-evaluation getting results with short comments immediately.

The longitudinal empirical study was conducted on the basis of the Kharkiv National University of Civil Engineering and Architecture (Demydiuk, 1999; Demidyuk, 2009b). More than 300 post-graduates and students of different educational qualification levels or degrees such as "bachelor", "specialist" and "master" participated in the experiment. Longitudinal studies thus made observing changes more accurate. Surveys and interviews helped reveal the strengths and weaknesses of online training strategy. E-techniques for constructing personality profiles allowed to monitor dynamics of students' personal development during the online training in order to achieve the desired outcomes.

As a result of the theoretical analysis, it was established that comprehensiveness of personality sense-cognitive orientation serves as the key factor of development efficiency, which allows to determine

the conditions of purposeful complex development of students' metacapacities and metaqualities (Sergeyeva, 2013).

We have evaluated online training quality on the example of e-training complex SmartEnglish^{online} (Serheieva, 2018).

Training experiment. For training experiment the students were divided into 4 groups: control group - K and experimental groups E1, E2, E3.

In the control group K the training was organized within the traditional mode without the strategic orientation. It was a teacher-centered delivery of instructions to classes of students who were the receivers of information. All students were taught the same materials at the same point and those students that did not learn quickly enough failed, rather than being allowed to succeed at their natural speeds. Therefore in this group the traditional teacher-centered methods were used.

The experimental group E1 had the platform-based training. The traditional existing training materials were converted into e-learning modules. The approach was focused on individual students' needs to have possibility of access to e-training materials at any convenient time. However, they had deadlines for work and control.

In the experimental group E2 the training was organized on the bases of psychological laws and mechanisms of abilities and qualities development (Sergeyeva & Demidyuk, 2012). It was the student-centered approach to training which was focused on learners and their needs. Students were active, responsible participants in their own learning and had individual programs of training.

The experimental group E3 had integrated e-learning experience. The training was aimed at the purposeful development of metacapacities and metaqualities in the conditions of natural educational environment. Besides, the advantages of digital technologies for learning and teaching were fully exploited. It was the student-centred learning environment with tracking the performance of learners and identifying where learning needs to be improved. For experimental purposes effective e-learning was organized on the example of e-training complex SmartEnglish^{online} that is built on the bases of psycho-pedagogical laws of eco-

humanistic self-development (Sergeyeva, 2009). This platform-based course contains both communication and interaction learning activities. The students were engaged and involved in the learning process as the inbuilt interactive features in the tool fostered learners' engagement.

Our research was also focused on the patterns of students' memory development based on SmartEnglish^{online} mnemonics, providing: 1) the optimal number of grammatical and lexical material repetitions organized from its essence and sense; 2) spontaneous use of lexical resources as part of grammatical structures; 3) the staged formation of internal speech actions contributing writing and speaking skills (Serheieva, Demydiuk, Turlakova, 2008).

Results. The best way to evaluate the quality of training including e-learning online is to conduct pre and post learning assessments. We have made several time samples. The pre-assessment gave us the clear picture of abilities and qualities development before the training course, while the final assessment showed the progress of metacharacteristics formation and consequently the effectiveness of learning strategy. Assessment results provided us with concrete numbers. The personality measures of the first and second time samples are presented in the format of metacharacteristics profiles (see figure1).

Personality measures of the first time sample are presented by means of the full line and the second time sample by applying the dotted line.

The students in the control group (K) showed low level of cognitive development and practically did not develop their metaqualities: flexibility – 0,36 (+0,01), empathy – 0,37 (+0,01), creativity – 0,35 (+0,02), responsibility – 0,37 (+0,03), internality – 0,36 (+0,03), independence – 0,36 (+0,03), excepting objectivity – 0,50 (+0,12).

The learners in the experimental group E1 showed the growth of such meta-qualities as objectivity – 0,63 (+0,22), independence – 0,57 (+0,21) and internality – 0,53 (+0,19). They fractionally increased figure indicators of their cognitive development levels and showed a tendency to develop capability to problem-solving.

In the experimental group E2 there has been the noticeable development of capability to problem-solving and capability to effective communication. Learners increased the levels of their cognitive development and figure indicators of such metaqualities as objectivity – 0,63 (+0,27), internality – 0,66 (+0,26), independence – 0,64 (+0,25), responsibility – 0,55 (+0,19) and creativity – 0,49 (+0,14).

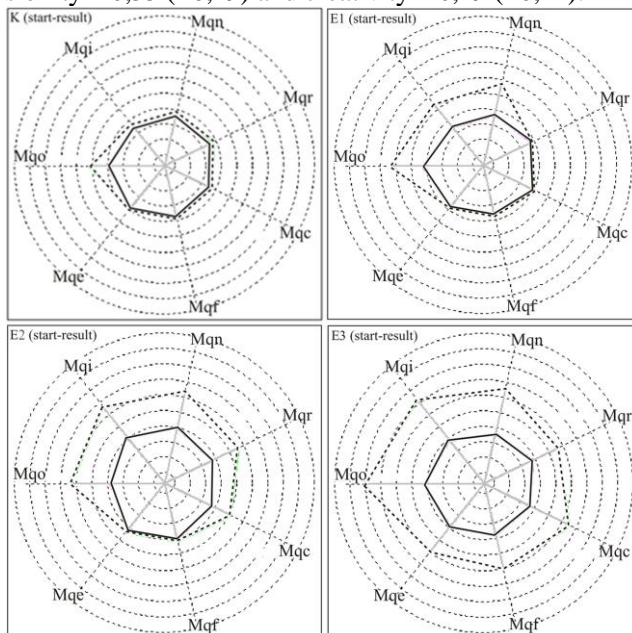


Figure1. Profiles of personality metacharacteristics

Note. The following abbreviations are given: Mqo (metaquality of objectivity); Mqn (metaquality of independence); Mqi (metaquality of internality); Mqc (metaquality of creativity); Mqr (metaquality of responsibility); Mqe (metaquality of empathy); Mqf (metaquality of flexibility).

The students in the experimental group E3 have reached the highest level of the cognitive development. They significantly developed capability to self-development, capability to effective communication and capability to problem-solving and all

metaqualities: objectivity – 0,80 (+0,40), internality – 0,72 (+0,34), independence – 0,66 (+0,31), creativity – 0,64 (+0,30), responsibility – 0,56 (+0,19), flexibility – 0,58 (+0,23) and empathy – 0,57 (+0,21).

As the result of the correlation analysis, sustainable interdependency between professionally, socially and existentially significant abilities and qualities of personality became apparent.

In addition to it, the positive correlation of metacapacities and metaqualities with sense-cognitive orientation of a personality was revealed. The more comprehensive orientation, the more optimal the process of forming and automating work methods and, as a consequence, the development of metacharacteristics.

The results of factor analysis revealed evidence of symptom clusters, which allowed identifying the correspondence of the metacapacities to the functions of consciousness: capability to effective communication corresponds to communicative, capability to problem-solving to regulatory and capability to self-development to the cognitive function of consciousness.

Discussion. We share opinion of other researchers that one of the most critical differences between student-centered learning and teacher-centered learning is in assessment. Student-centered learning typically involves more formative assessment and less summative assessment, than teacher-centered learning (Crumly, 2014).

Qualitative assessments are best for specific skills and tasks. It provides learners with immediate feedback. As such, they are able to determine their own strengths and areas for improvement. Learner performance evaluations give the opportunity to judge the quality of online training on a case-by-case basis. Effective online training courses lead to meaningful change. They give learners the online training resources they need to achieve their potential. As a result, high-quality online training results in the desired outcomes (Sharma, 2018).

Educational researchers state that meta-analyses of studies into formative assessment have indicated significant learning gains where formative assessment is used, across all content areas, knowledge and skill types, and levels of education (Black & Wiliam, 1998). Our data obtained as a result of the experiment proved the same.

We have developed computer-assisted evaluation which covers all forms of educational assessments, both summative (i.e. tests that contribute to formal qualifications and seek to monitor only educational outcomes) and formative (i.e. tests that promote learning and involve qualitative feedback). We defined criteria for evaluation and monitored learners progress and performance. Then, the results upon completion of the online training course SmartEnglish^{online} were measured. We used evaluation techniques to measure online training quality and identify areas for improvement.

Learners of experimental groups E2 and E3 with student-centered training participated in the evaluation of their learning. Students were more motivated to learn and took responsibility for their own learning. Putting responsibility for the learning path in the hands of students developed learners' autonomy and independence. They identified their strengths and weaknesses and modified learning activities to improve achievements. Formative evaluation improved students' metacognitive awareness of how they learn. In essence, students have learned highly valuable lifelong skill such as self-evaluation.

The innovative online student-centered training course SmartEnglish^{online} contributed greatly to development of students' metacognitive competence that helped realize self-management of the learning process including quantitative and qualitative success analysis.

Conclusions. System approach to evaluation of e-training quality gives the power to estimate every aspect of online training strategy and furthermore, to develop measurable goals. Developing evaluation that supports learning and students' motivation is essential to the success of e-training.

As a result of the longitudinal training experiment, the possibility of purposeful development of students' metacapacities and metaqualities within online training course in the conditions of studying at higher educational institutions which ensured the integration of cognitive and personal development of learners was confirmed.

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