

Written Review by the Official Reviewer
on the Dissertation of Sapar Nurakhmetovich Toxanov
on the topic: “Information-Educational Distance Learning Portal Based
on Smart Technology”
for the Degree of Doctor of Philosophy (PhD) in the Field of 6D070300
“Information Systems (by Branches)”

No	Criteria	Compliance with Criteria (please select one of the response options)	Rationale of the Official Reviewer's Position
1.	The dissertation topic (as of its approval date) aligns with the directions of scientific advancement and/or government programs	<p>1.1 Compliance with Priority Directions in Scientific Development or Government Programs:</p> <p>1) The dissertation was conducted within the framework of a project or targeted program financed from the state budget (please specify the project or program's name and number).</p> <p>2) The dissertation was conducted within the framework of another state program (please specify the program's name).</p> <p>3) The dissertation aligns with a priority direction in scientific development approved by the Higher Scientific and Technical Commission under the Government of the Republic of Kazakhstan (please specify the direction).</p>	The dissertation research, in terms of its research subject, stated objectives, and solved tasks, aligns with the directions of scientific advancement and government programs, including the “Kazakhstan-2050” Strategy.
2.	Importance for Science	The work makes / does not make a significant contribution to science, and its importance is well disclosed / not disclosed	The significant contribution to science is confirmed by the author's certificate of the Republic of Kazakhstan on the portal, as well as publications on the dissertation topic in journals indexed in the SCOPUS database. The importance of the work is supported by nine scientific and practical results obtained as a result of its completion.
3.	Independence Principle	Self-reliance level: 1) High ; 2) Medium; 3) Low; 4) There is no independence	A high level of independence of the doctoral candidate is demonstrated through participation in three international conferences as a speaker and co-authoring

			fourteen publications on the dissertation topic, including articles in journals indexed in the SCOPUS database.	
4.	Internal Principle	Unity	<p>4.1 Rationale for the relevance of the dissertation: 1) Justified; 2) Partially justified; 3) Not substantiated.</p> <p>4.2 The content of the dissertation reflects the topic of the dissertation: 1) Reflects; 2) Partially reflects; 3) Does not reflect</p> <p>4.3. The purpose and objectives correspond to the topic of the dissertation: 1) comply; 2) partially correspond; 3) do not match</p> <p>4.4 All sections and provisions dissertations are logically interconnected: 1) are fully interconnected; 2) the relationship is partial;</p>	<p>The applicant has convincingly justified the relevance of the scientific problem.</p> <p>The content of the dissertation reflects the stated topic. Indeed, the table of contents, illustrating the structure of the work, allows for the logical progression of the dissertation's research idea. The content of the structural units follows a coherent logic.</p> <p>The aim and objectives fully align with the dissertation's topic and comprehensively address all key aspects of the research. The aim, 'to develop models and methods for integrating individual components of information technology to create a flexible comprehensive information-educational environment on a unified system basis, utilizing Smart technologies, aimed at improving the quality and efficiency of the educational process in the context of a credit-module system of organizing education and enhancing the effectiveness of the education system in the Republic of Kazakhstan,' is in harmony with the topic 'Information-Educational Distance Learning Portal Based on Smart Technology.'</p> <p>The chapter and section titles of the dissertation are in line with the defined tasks formulated according to the research aim.</p> <p>In recognizing the significance of S. N. Toxanov's dissertation in addressing both theoretical and practical challenges, it is</p>

		<p>3) there is no relationship</p>	<p>worth noting that all sections of the dissertation are logically interconnected, well-grounded, and characterized by clarity and a coherent presentation of material. The dissertation work consists of a manuscript totaling 127 pages of computer-generated text, including 30 figures, 12 tables, and 1 appendix.</p> <p>It is evident that meticulous work has been carried out in each section of the research topic, which has been fully explored. The stated objectives have been successfully addressed, and the research aim has been achieved.</p>
		<p>4.5 New solutions proposed by the author (principles, methods) are argued and evaluated in comparison with known solutions:</p> <p>1) there is a critical analysis; 2) partial analysis; 3) the analysis is not one's own opinions, but quotes from other authors</p>	<p>The solutions and methods proposed by the candidate in this work are well-argued and substantiated in accordance with fundamental scientific methods. By analyzing and systematizing a substantial amount of material, the candidate has successfully developed models and methods for integrating individual components of information technology and created a flexible comprehensive information-educational environment through the use of Smart technologies.</p>
<p>5.</p>	<p>Principle of Scientific Novelty</p>	<p>5.1 Are scientific results and statements new?</p> <p>1) completely new; 2) partially new (25-75% are new); 3) not new (less than 25% are new)</p>	<p>The scientific results and propositions of the dissertation are entirely novel. The primary findings and results of the dissertation have been published in peer-reviewed journals and presented at international conferences. They have also been confirmed by a certificate of intellectual property on the portal and an act of implementation in the educational process.</p>

		<p>5.2 Are the conclusions of the dissertation new?</p> <p>1) completely new;</p> <p>2) partially new (25-75% are new);</p> <p>3) not new (less than 25% are new)</p>	<p>The conclusions derived and formulated by the author of the dissertation are entirely novel. The results of testing the developed models and methods in the distance learning process demonstrate the effectiveness of these models and methods.</p>
		<p>5.3 Technical, technological, economic or management decisions are new and justified:</p> <p>1) completely new;</p> <p>2) partially new (25-75% are new);</p> <p>3) not new (less than 25% are new)</p>	<p>The technical, technological, and managerial solutions presented in the dissertation work are entirely novel and well-founded. They are substantiated by the presence of an implementation act for the obtained research results and a certificate of entry into the state register of copyright-protected objects.</p>
6.	Rationale for Main Conclusions	<p>All key findings are based/not based on scientifically sound evidence, or reasonably well-founded (for qualitative research and arts and humanities courses)</p>	<p>The results obtained and the conclusions formulated by the candidate, S. N. Toxanov, are well-founded and reliable, ensured by the research's scientific foundation and the correct application of research methods. The scientific propositions presented for defense, as well as the candidate's conclusions and findings, do not raise doubts, and the results obtained during the research are entirely consistent with the research's objectives and tasks.</p>
7.	Key Positions Presented for Defense	<p>The following questions need to be answered for each position separately:</p> <p>7.1 Is the position proven?</p> <p>1) proven;</p> <p>2) rather proven;</p> <p>3) rather unproven;</p> <p>4) not proven</p> <p>7.2 Is it trivial?</p> <p>1) yes;</p> <p>2) no</p> <p>7.3 Is it new?</p> <p>1) yes;</p> <p>2) no</p> <p>7.4 Level to apply:</p> <p>1) narrow;</p> <p>2) medium;</p>	<p>Position 1. Multiple Models for the Identification of Educational Space Subjects</p> <p>It is substantiated in the dissertation, is non-trivial and novel. This position has been demonstrated in journal articles, including an international peer-reviewed journal with a non-zero impact factor:</p> <p>Toxanov, S., Biloshchytskyi, A., Kuchansky, A., Andrashko, Y., Faizullin, A., Development of the set</p>

		<p>3) wide</p> <p>7.5 Is it proven in the article?</p> <p>1) yes;</p> <p>2) no</p>	<p>models and a method to form information spaces of scientific activity subjects for the steady development of higher education establishments // Eastern-European Journal of Enterprise Technologies. – 2021. - №2. – pp. 6-14.</p> <p>Toxanov, S., Biloshchytskyi, A., Kuchansky, A., Andrashko, Y., Faizullin, A. The comparison of methods for assessing the productivity of scientific subjects. International Scientific and Technical Conference on Computer Sciences and Information Technologies 1, pp. 84-88</p> <p>Position 2. Model of an Open Subsystem for Computer-Based Knowledge Testing.</p> <p>Position 2 has been substantiated in the dissertation, is non-trivial, novel, and has a wide range of applications. It has also been demonstrated in articles in journals, including:</p> <p>Toxanov, S., Abzhanova, D., Faizullin, A. (2022). Development of an information and educational portal of distance learning based on educational data mining. Scientific Journal of Astana IT University, (9), 22-35.</p> <p>Toxanov, S., Biloshchytskyi, A., Kuchansky, A., Andrashko, Y., Faizullin, A. Methods of assessing the scientific activity of scientists and higher education institutions. ATIT 2020 - Proceedings: 2020 2nd IEEE International Conference on Advanced Trends in Information Theory 9349348, pp. 162-167</p>
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8.	Principle of Reliability of Sources and Provided Information	8.1 Choice of methodology - justified or methodology described in sufficient detail. 1) yes; 2) no	In the first chapter of the dissertation, indisputable arguments are presented for the selection of the methods used in further analysis. These methods encompass systems analysis, modeling theory, systems engineering, graph theory for describing network topological structures, statistical research, and comparative data analysis for describing network state characteristics. Additionally, the dissertation utilizes fuzzy set theory for computer-based knowledge testing, hierarchy analysis for evaluating development efficiency, probability theory and

		<p>mathematical statistics, algorithms theory for developing information technology algorithms and software tools, knowledge assessment methods, and object-oriented modeling technologies for software product development.</p>
	<p>8.2 The results of the dissertation work were obtained using modern scientific methods research and methods of processing and interpretation data using computer technology: 1) yes; 2) no</p>	<p>The results of the dissertation research were obtained using modern scientific research methods and data processing and interpretation techniques, employing computer technologies. The work made use of contemporary software packages, including MS VISIO, programming languages such as PHP and Javascript, frameworks like Laravel, Javascript jQuery, CSS framework MaterializeCSS, the Twig templating engine, and HTML markup language.</p>
	<p>8.3 Theoretical conclusions, models, identified relationships and patterns are proven and confirmed by experimental research (for areas of training in pedagogical sciences, the results are proven on the basis of a pedagogical experiment): 1) yes; 2) no</p>	<p>Theoretical conclusions and models were substantiated and confirmed through experimental research. The models and methods were tested and the results are presented in a separate section of the dissertation.</p>
	<p>8.4 Important statements are supported / partially confirmed / not supported by references to relevant and reliable scientific literature</p>	<p>Key statements in this work are entirely supported by references to current and reliable scientific literature, as reflected in the analysis of the theoretical sections of the dissertation, with numerous citations from primary sources closely related to the research topic.</p>
	<p>8.5 Used literature sources are sufficient / not sufficient for a literature review</p>	<p>The candidate has conducted an extensive literature review on the research topic, primarily focusing on contemporary journal articles in peer-reviewed publications. This includes drawing upon the works of Kazakhstani</p>

			researchers. The list of cited sources encompasses 97 references, and the sources utilized are sufficient for the literature review.
9.	Principle of Practical Value	9.1 The dissertation has a theoretical value: 1) yes ; 2) no	The dissertation holds theoretical significance, and the credibility of its theoretical propositions is substantiated by experimental data and the results of verification of the proposed methods and models.
		9.2 The dissertation is of practical importance and there is a high probability of applying the results obtained in practice: 1) yes ; 2) no	The results obtained during the research have high practical value and can be utilized for addressing issues related to designing individual trajectories of distance learning for students. The practical outcomes of the work are confirmed by relevant implementation reports.
		9.3 Are the suggestions for practice new? 1) completely new ; 2) partially new (25-75% are new); 3) not new (less than 25% are new)	The practical solutions are entirely novel.
10.	Quality of Writing and Formatting	Quality of academic writing: 1) high ; 2) average; 3) below average; 4) low.	Sapar Nurahmetovich Toxanov's dissertation on the topic 'Information-Educational Distance Learning Portal Based on Smart Technology,' submitted for the degree of Doctor of Philosophy (PhD) in the specialty 8D06101 'Information Systems (by fields),' complies with the requirements. The dissertation is written in a proficient scientific and technical language, with clear and concise formulations of scientific propositions and conclusions, exhibiting a coherent structure.

Conclusion

I believe that the reviewed dissertation by Sapar Nurahmetovich Toxanov on the topic “Information-Educational Distance Learning Portal Based on Smart Technology” fully meets the requirements set by the Committee for Quality Assurance in the Sphere of Education of the Ministry of Education of the Republic of Kazakhstan for dissertations aimed at obtaining a PhD degree. It is relevant, scientifically novel, significant for theory and practice, and encompasses substantial experimental research.

The author of the dissertation is deserving of the conferred Doctor of Philosophy (PhD) degree in the specialty 6D070300 “Information Systems (by fields).”

Official reviewer:

Doctor of Engineering Sciences,
Professor, Professor of Department
of Software Systems,
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Oksana Mulesa

The signature of the professor Oksana Mulesa
is certified by
Academic secretary
of Uzhhorod National University



Olena Melnyk