Лесотехнически университет
Ф-т „Горска промишленост"
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REVIEW

on a dissertation for the acquisition of the educational and scientific degree **"Doctor"** (PhD) in: Higher Education Area 5. "Technical Sciences", Professional Field 5.13. "General Engineering", Scientific Specialty "Ergonomics and Industrial Design".

Author of dissertation: MSc. Eng.-Des. Tsvetan Stoyanov Stoykov, full-time PhD student at the Department of Interior and Furniture Design, Faculty of Forest Industry at the University of Forestry (UF), Sofia, Bulgaria.

Dissertation Topic: "IMPROVING THE DESIGN PROCESS IN THE FIELD OF INTERIOR DESIGN VISUALIZATIONS THROUGH MICROLEARNING"

Supervisor: Assoc. Prof. Dessislava Angelova, PhD, Eng.-Des.

Reviewer: Prof. Orlin Slavchev Davchev, PhD, Arch., University of Architecture, Civil Engineering and Geodesy (UACEG) - Sofia; field of higher education 5. "Technical Sciences", professional field 5.7. "Architecture, Civil Engineering and Geodesy", scientific specialty "Synthesis of Architecture with Other Arts, Interior and Architectural Design",

appointed as a member of the scientific jury by Order No. ZPS-53/06.02.2026 of the Rector of the UF.

1. Brief introduction of the candidate.

Tsvetan Stoykov possesses a solid, broad-profile background in the fields of technology and design. He completed his secondary education at the Technology School "Electronic Systems" (TUES) affiliated with TU-Sofia, specializing in "Computer Hardware," which provided him with in-depth knowledge in the technical field. His academic development continued at the University of Forestry – Sofia, where he successively obtained the educational and qualification degrees of "Bachelor" (2013) and "Master" (2014) in "Engineering Design". The candidate's professional path is closely linked to digital technologies and visual arts. Since 2015, he has held the position of Digital Arts Specialist and Director at "Red Vertex" Ltd., where he combines creative skills with managerial responsibilities. He is fluent in English, which allows him to work in an international environment and access specialized foreign literature. The combination of an engineering mindset, experience in digital arts, and academic training in the field of design establishes him as a well-prepared specialist with potential for research activity.

2. Relevance of the problem.

The topic of the dissertation is highly relevant, as it examines the application of modern technologies for computer-generated imagery and three-dimensional modeling within the context of interior design. In an era of full digitalization, photorealistic visualization is becoming an indispensable tool for communication between designers and clients, allowing for precise forecasting of the final result as early as the design phase. The author correctly

identifies the need for systematizing work processes in creating high-quality visual content, which is of critical importance for the efficiency of modern architectural and design studios. The research is timely, as it analyzes the dynamically developing software tools and methodologies for achieving an optimal balance between technical quality and creative expression in the digital environment. The relevance is further reinforced by increasing market demands for sustainable and visually compelling interior solutions, the presentation of which through innovative digital methods is the subject of in-depth analysis in the work.

3. Degree of knowledge of the state of the problem and creative interpretation of the literature review.

The candidate demonstrates a profound and detailed knowledge of the current state of the problem by analyzing a wide range of sources, covering both the theoretical foundations of design and the high-tech aspects of computer graphics. The literature review is not merely a mechanical listing of publications but represents a critical analysis through which Tsvetan Stoykov identifies current trends and technological gaps in visualization methodologies. The creative interpretation of the gathered information is impressive, as the author successfully intertwines classical principles of interior composition with the innovative possibilities of modern software tools. The literature used is up-to-date and directly relevant to the set goals, allowing the author to build a solid theoretical foundation for the subsequent experimental research and the development of the original workflow model. The style of presentation shows an ability to systematize complex subject matter and derive reasoned conclusions, which is a testament to the candidate's high level of erudition in the field under consideration.

4. Aim, objectives, hypotheses and research methods. Relevance of the chosen research methodology to the stated aim and objectives of the dissertation.

Aim and objectives: The main aim of the dissertation is clearly defined and focused on investigating the possibilities for increasing the quality and efficiency of photorealistic visualizations in interior design through the optimization of technological processes. To achieve it, the author formulates specific objectives, covering a theoretical analysis of light and materials, research into software rendering algorithms, and the development of an applied workflow model.

Hypothesis: The scientific hypothesis is based on the assumption that by systematizing the technological stages and precisely managing physically correct parameters, a significant reduction in production time can be achieved while maintaining maximum visual quality.

Research methods: The methodology used includes a comprehensive approach – from a comparative analysis of existing software solutions to empirical methods through conducting practical experiments to measure the time and quality of the final product.

Relevance: There is full relevance between the chosen methodology and the set goals. The structure of the research follows a logical sequence, in which theoretical conclusions serve as the basis for the experimental part. The methodology allows for objective verification of the results, which proves its adequacy relative to the scope of the dissertation.

5. Visualization and presentation of the results.

The dissertation is characterized by a high level of visualization, which is entirely natural given its subject matter. The author has applied a rich and precisely selected illustrative material, including charts, comparative tables, and high-quality photorealistic images, which do not merely complement the text but serve as primary evidence for the achieved scientific and applied results. The presentation of the results is logically systematized, tracing the path from raw technical parameters to the final visual product. Particularly valuable are the comparative renders, which clearly demonstrate the differences in lighting, texturing, and post-processing when using different approaches. This method of presentation allows the reader to easily verify the effectiveness of the workflow model proposed by the author, transforming complex technological processes into understandable and visually convincing conclusions. The volume and quality of the graphic material fully comply with the requirements for this type of doctoral dissertation.

6. Discussion of results and literature used.

Discussion of results: The results of the dissertation are presented through a profound and detailed analysis, which proves the effectiveness of the studied methods for photorealistic visualization. The author does not limit the work to a mere technical description of software tools but discusses the obtained data in the context of their practical applicability in interior design, emphasizing the importance of the balance between technological precision and artistic impact. The conclusions drawn are logically linked to the set objectives and provide a clear answer to the hypothesis established at the beginning of the work.

Literature used: The bibliographic reference includes a significant number of sources, covering a wide spectrum from fundamental theoretical developments to modern technical specifications and online resources in the field of computer graphics. The critical reading of the literature is impressive, as the candidate successfully synthesizes ideas from various fields — physics of light, architectural design, and digital arts. The sources used are cited correctly, which confirms the author's academic ethics and his thorough awareness of the achievements of other researchers in the subject matter.

7. Contributions of the thesis.

The dissertation of Tsvetan Stoykov contains significant results that represent original contributions to the fields of computer graphics and interior design. They can be classified as follows:

Scientific contributions

- A concept for integrating microlearning as an innovative pedagogical approach in computer visualization training has been developed and theoretically substantiated. This concept expands existing theoretical understandings of the application of microlearning in the field of design and engineering-design disciplines.

- A scientifically reasoned connection has been established between the individual stages of the computer visualization process and the possibilities for applying microlearning methods. It has been proven that the modularity characteristic of microlearning directly corresponds to the technological logic of the visualization process, including modeling, lighting, material creation, rendering, and post-production.

Scientific and applied contributions

- The historical development of expressive means for visualization in interior design has been systematized. Their role and influence on the organization and efficiency of the modern design process in the context of digital technologies have been analyzed.
- An original author's model for training in computer interior visualization has been developed. It successfully integrates microlearning formats with modern pedagogical approaches such as blended learning, "flipped classroom", project-based learning, and gamification.
- A structural framework for the application of microlearning in higher education in design has been created. The framework includes clearly defined modules, types of content, and evaluation criteria based on a systematic literature analysis and psycho-didactic principles.
- The influence of various training methods on knowledge acquisition has been empirically investigated and proven. The results of the conducted surveys and the pedagogical experiment confirm the higher efficiency of microlearning approaches, emphasizing the advantages of the video format.

Applied contributions

- An electronic textbook "Foundations of Computer Visualization" has been developed, successfully combining traditional teaching materials with innovative microlearning formats. Original open-access instructional video materials have been created for it, detailing the stages for performing practical tasks.
- The created microlearning modules and formats possess a high degree of applicability in a real learning environment — in both face-to-face and distance learning forms. They allow for flexibility and rapid adaptation of teaching content to the dynamic changes in software tools and technologies.
- The proposed training model functions as a practical toolkit for educators. It is designed to be easily implemented and adapted in other engineering-design disciplines related to 3D modeling, digital design, and visualization.
- The research results have direct practical value for the modernization of curricula. They provide educational organizations with a methodological basis for improving the quality of training for specialists in the field of interior visualization.

The presented contributions are clearly aimed at solving current problems in design practice and represent a valuable contribution to the development of digital arts and technologies.

8. Assessment of the extent of the dissertator's personal involvement in the contributions.

The degree of personal involvement of Tsvetan Stoykov in the presented scientific, scientific-applied, and applied contributions is convincing. The dissertation is the result of significant independent work, in which the candidate has combined his theoretical training with his extensive practical experience in the field of digital arts.

The original nature of the research is clearly visible in the development of the innovative training model and the electronic textbook, where the doctoral student personally created the methodology, structure, and educational content. The conducted pedagogical experiment and the subsequent data analysis were also carried out independently, which proves the candidate's ability to plan and implement comprehensive scientific research. The publications on the topic, a significant portion of which are single-authored, further confirm that the formulated contributions are the personal work of the dissertator and reflect his individual creative and scientific approach.

9. Critical comments and questions.

Despite the high scientific and practical value of the dissertation, the following notes and recommendations can be made:

Critical comments and recommendations

- As a recommendation for the candidate's future work, I would suggest a more detailed study of hardware resources in real-time rendering, which would complement the technological aspect of the proposed model.
- The text would benefit from a broader discussion of the potential difficulties in implementing the proposed model into curricula that are not closely specialized in computer graphics, considering the need for specific technical training of the instructors.
- I recommend that the author continues the development of the electronic textbook by including modules for Artificial Intelligence in the visualization process – a topic that is extremely relevant and would build upon the current research.

Questions to the dissertator

- What are the possibilities for adapting the proposed microlearning model to mobile platforms, given the habits of modern students to access information "on the go"?
- To what extent is the proposed methodology applicable to other aspects of interior design beyond purely visual presentation (for example, in furniture construction)?
- In your opinion, what is the greatest psychological barrier for students during the transition from traditional to microlearning in engineering-design disciplines?

10. Published articles and citations.

The results of the dissertation have been popularized through 5 scientific publications. The list includes:

2 single-authored reports in proceedings from the annual national scientific and practical conference "Digital Technologies in Architecture, Design, and Visual Arts" (2023 and 2024 editions);

2 single-authored reports presented at the prestigious international conference INNO 2024;

1 co-authored article published in the international scientific journal "Education Sciences" (MDPI Publishing).

Regarding the reflection in scientific literature, at the time of the dissertation's submission, citations have been registered in the international database Scopus, which are related to the publication in "Education Sciences".

11. Assessment of the publications on the dissertation: number, nature of the publications in which they are printed. Reflections in science - use and citation by other authors.

The presented publications fully correspond to the scientific specialty and the topic of the dissertation, exceeding the minimum national requirements for the educational and scientific degree "Doctor" in both volume and quality.

The nature of the publications shows a consistent strategy for disseminating the results – from specialized forums in Bulgaria to established global platforms. The publication in "Education Sciences", which is indexed in Web of Science and Scopus with an impact factor, deserves a particularly high assessment. The fact that the doctoral student has a contribution to a journal of such class is a testament to the relevance and scientific level of his work.

The reflection in science is tangible through the citations in prestigious editions, which is a rarity for a dissertation at the defense stage. This proves that the microlearning models in design proposed by Tsvetan Stoykov evoke real interest among the international scientific community. The candidate's publishing activity legitimizes him as a mature researcher capable

of successfully presenting his results in a competitive international environment.

The presented abstract reflects objectively the structure and content of the dissertation.

CONCLUSION:

The presented dissertation possesses all the characteristics of a completed scientific research with clear practical applicability. It fully complies with the requirements of the Act on Development of the Academic Staff in the Republic of Bulgaria (ADASRB) and the Regulations of the University of Forestry.

All of the above gives me reason to provide my categorical POSITIVE EVALUATION and to propose to the Honorable Scientific Jury to award MSc. Eng.-Des. Tsvetan Stoyanov Stoykov the educational and scientific degree **"Doctor"** (PhD).

Date: 26.04.2026
Sofia

REVIEWER:

(Prof. Orlin Davchev)