EFFECTIVE METHODOLOGY FOR TEACHING INFORMATICS AND COMPUTER GRAPHICS IN SECONDARY AND HIGHER EDUCATION

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Annotation: The study applied technique to instruction of computer graphics and informatics throughout secondary and higher grades school is presented in this piece of writing. Through utilises interactive, visually appealing, and technology-driven methods, the emphasis is on assisting educators in fusing theoretical knowledge with real-world application. In addition to identifying existing issues and reviewing pertinent research, the study presents an educational framework that combines multidisciplinary methods, project-based learning, and the flipped classroom. Enhancing learners and their enthusiasm, inventiveness, and comprehension of visual digital technology topics is the goal of the suggested technique. The findings show that integrating theory, visualisation, and practical exercises enhances digital literacy and academic performance.

Keywords: computer graphics, informatics education, teaching methodology, flipped classroom, project-based learning, digital literacy, visualization, interdisciplinary learning.

Given the speed at which technology is developing across all professional domains, informatics and computer graphics have emerged as essential elements of contemporary education. Understanding and using computer graphics concepts is crucial for a variety of fields, including engineering, architecture, multimedia design, and virtual reality. Therefore, in addition to imparting technical information, teachers are required to foster in their pupils a sense of creativity, spatial thinking, and digital competency.

Nonetheless, many teachers find it difficult to properly teach computer graphics. According to The Journey to Improve Teaching Computer Graphics (2019), students frequently find it difficult to relate mathematical concepts like coordinate systems, vectors, and transformations to visual results. Furthermore, some educational institutions lack the necessary gear, software, or programs for preparing teachers to confidently use contemporary teaching techniques.

The objective of this research is to give readers an efficient, approachable methods of instruction for the study of graphics and informatics. The study examines current methods, identifies recently published research's standards of excellence, and offers useful tactics that may be used right away in the learning environment.

2. Literature Review

The difficulties and solutions in teaching computer graphics have been the subject of an expanding corpus of study. According to Kadirbergenovna (2022), striking a balance between theoretical justification and real-world visualisation is the primary instructional challenge. While students gain more from interactive resources, animations, and project-based learning, many teachers still heavily rely on lectures.

Similarly, a thorough study of computer graphics education throughout the world was carried out by The Journey to Improve Teaching Computer Graphics (2019). It was discovered

that, as opposed to abstract lectures, pupils typically do better in classes that prioritise instant feedback and real-time visual exploration.

The flipped classroom paradigm was included into computer graphics courses by Umoetuk and Akpan (2023). According to their research, students' comprehension and retention greatly increased when they watched pre-class films to grasp the fundamentals of the subject and then practiced coding or modelling in class.

Incorporating descriptive geometry into computer graphics courses was suggested by Yuldashev (2025). Students' spatial thinking and technical drawing abilities are enhanced by this multidisciplinary method, which connects abstract geometry theory with its computer-based applications.

Furthermore, Alhajri (2016) investigated the integration of digital and analogue approaches in design education, demonstrating that conceptual comprehension is strengthened by practical sketching prior to computer modelling.

Last but not least, visualisation literacy-the ability to comprehend and produce meaningful visual representations-was emphasised by Krekhov, Michalski, and Krüger (2019) as a critical competency for computer graphics education.

These studies together show that theory and practice must be combined, active learning must be encouraged, and technology must be used to bring abstract concepts to life in computer graphics education.

A dynamic and student-centered approach is necessary for the efficient teaching of computer graphics and informatics. An interesting and significant learning experience is produced by combining multidisciplinary approaches, visual practice, and theoretical instruction. Project-based learning combined with flipped classrooms has been demonstrated to boost motivation, enhance comprehension, and encourage creativity.

Future research should concentrate on creating digital materials and preparing educators to apply these strategies in various learning environments. Teachers who want to modernise their teaching of computer graphics and informatics might use the suggested framework as a useful model.

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