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REDESIGN OF AN INTRODUCTION TO COMPUTER NETWORKS COURSE – INTEGRATING TPACK WITH GENERATIVE AI [RESEARCH IN PROGRESS]

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ABSTRACT

Aim/Purpose	The computer science degree is a combination of theory and practice, where some of the courses are mostly practical, some of the courses are mostly theoretical, and most of the courses are a combination of both. Introduction to Computer Networks (ICN) is a classic example of such a course, which includes both practical as well as theoretical material. Students learning towards a degree in computer science have difficulties understanding abstract concepts. The purpose of the study is to identify the issues that are creating these difficulties and to propose a framework for solutions.
Background	Students find it difficult to understand abstract problems and therefore try to map these problems to less abstract models. This study looks at ways to transform theoretical materials into more concrete examples with the expectation of enhancing the student learning experience and increasing student success.
Methodology	The TPACK framework is being used to revise the ICN course with the main emphasis on integrating technology in a pedagogically sound manner.

Publishers Note: This is the abstract of the paper. The full version of this paper will be available as soon as possible.

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	Laboratory projects are being designed around Wireshark assignments with generative AI playing a role in helping students complete tasks with which they are having difficulties. Pre- and post-quizzes will be administered before and after each activity in order to evaluate the effectiveness of the laboratory assignments while final exam scores will be compared to previous semesters in order to assess whether the revised labs contributed to greater student success in the course. In addition, student-generative AI conversation logs will be analyzed to evaluate the tool's impact on student learning by looking for common themes and patterns in their interactions.
Contribution	This study contributes an iterative practitioner-based approach for redesigning an Introduction to Computer Networks (ICN) course guided by the TPACK framework and generative AI. Moreover, we expect that our approach can be applied to other theoretical courses in higher education, where students are struggling to understand complex abstract material.
Findings	Research in progress – there are no present findings.
Recommendations for Practitioners	Research in progress – there are no present recommendations.
Recommendations for Researchers	Research in progress – there are no present recommendations.
Impact on Society	We expect that this research will help instructors identify key issues that students have with theoretical concepts and create solutions which can be implemented in the higher education classroom.
Future Research	Research in progress and not complete.
Keywords	TPACK, Wireshark, Generative AI

AUTHORS

Joyce Vogel is a lecturer at the Jerusalem College of Technology, where she teaches courses in both Computer Science and Software Engineering. Her primary research interest lies in improving pedagogical methods for teaching computing subjects, with a focus on developing more effective and engaging ways to deliver technical content. She is passionate about enhancing student learning experiences in the ever-evolving field of computer science education. She is currently pursuing a Ph.D. in Education at Johannes Kepler University, in Linz, Austria, where her research focuses on computer science education and innovative approaches to teaching and learning. Joyce holds a Bachelor of Arts degree and a Master of Arts degree in Computer Science from the City University of New York, Queens College campus.

Thierry (Noah) Dana-Picard is a Full Professor in Mathematics at Jerusalem College of Technology (JCT, Israel), an academic institution mostly devoted to High-Tech. Over the years, he chaired the Mathematics Department, and afterwards served as President of JCT. Now he is the director of a research chair at JCT. Until now, he has published more than 150 papers. He is interested in algebraic curves and surfaces (isoptics, envelopes, offsets, etc.) and with students is part of the development of some components of mathematical software. He is strongly involved in Teacher Training, and an important part of his research is devoted to Education in a technology-rich environment. He is also involved in graduate courses on mathematics related to space technologies, and acts as advisor for Ph.D.s related to STEAM Education.

Dan Bouhnik received a BSc degree in Computer Science from the Jerusalem College of Technology in 1981, an MSc in Computer Science from Bar-Ilan University in 1988, and a PhD in Computer Science from Pacific Southern University in 1991. He is the author of several books used to teach advanced computer science. He is currently an Associate Professor and serves as the Rector of the Jerusalem College of Technology. His main research interests include Information Science, Knowledge Management, Information Security, and Big Data issues and their effect on society.