Chapter 2
Teaching Stereo Vision in a Multicultural Classroom With Active Learning and Multimedia Resources for Enhanced Engagement

Fiseha Berhanu Tesema
https://orcid.org/0000-0002-7472-4007
University of Nottingham, Ningbo, China

Gareth Richard Morris
University of Nottingham, Ningbo, China

ABSTRACT

This reflective case study examines the design, delivery, and outcomes of a session on stereo vision within a Computer Vision module aimed at undergraduate students. The session employed active learning, problem-based learning (PBL), and multimedia resources to engage students in understanding stereo vision concepts. Pedagogical strategies aligned with Bloom's taxonomy and educational theories such as constructivism and multimedia learning. The session's alignment with intended learning outcomes (ILOs) focused on theory application, evaluation of techniques, and the creative design of stereo vision systems. The case study evaluates the session's effectiveness based on student feedback, formative assessments, and observer insights. Challenges such as content pacing, technological issues, and cultural diversity were identified, with recommendations for future improvement. This study highlights the importance of interactive, inclusive teaching approaches in fostering engagement and deep learning in technical subjects.

1. INTRODUCTION

The rapid advancement of technology has transformed the landscape of higher education, particularly in technical fields such as computer vision, artificial intelligence, and robotics. As industries increasingly rely on these technologies, the demand for skilled professionals has surged, placing greater pressure

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on educators to equip students with both theoretical knowledge and practical skills. However, teaching technical subjects in higher education presents a unique set of challenges, especially in large, culturally diverse classrooms as one might expect and the work of Meyer (2014) alludes. These challenges are compounded by the abstract nature of many technical concepts, the varying levels of prior knowledge among students, and the need to foster engagement and inclusivity in an increasingly globalized educational environment. In an era where technology is reshaping industries and societies, the role of educators in preparing students for the challenges of the 21st century cannot be overstated. This chapter underscores the importance of adaptability, inclusivity, and innovation in teaching technical subjects, offering a roadmap for educators to create engaging and effective learning experiences that empower students to succeed in a rapidly evolving world.

This chapter thus reflects on a session delivered to fourth-year undergraduate Computer Science students at an international university as part of a 20-credit Computer Vision module. The session focused on stereo vision systems, a foundational topic in computer vision that involves extracting 3 Dimension (3D) information from 2 Dimension (2D) images. Stereo vision is a critical component of many real-world applications, including autonomous vehicles, augmented reality, and medical imaging. However, teaching this topic effectively requires bridging the gap between abstract theoretical concepts, such as epipolar geometry and disparity maps, and their practical applications. This challenge is particularly pronounced in multicultural classrooms, where students bring diverse educational backgrounds, language proficiencies, and learning preferences. The session employed a range of pedagogical strategies, including problem-based learning (PBL), collaborative group discussions, multimedia resources, and formative assessments. Subtitled videos, interactive quizzes, and hands-on activities such as working with random dot stereograms were used to enhance understanding and engagement. These strategies were informed by educational theories and best practices in technical education, such as Mayer's (2001) cognitive theory of multimedia learning and Vygotsky's (1978) social constructivism. The session aimed not only to teach stereo vision concepts but also to prepare students for careers in fields that require critical thinking, problem-solving, and teamwork.

In terms of reach and resonance, this chapter contributes to the growing body of literature on effective teaching practices in technical education, particularly in the context of large, diverse classrooms. In transnational higher education, examples of work in this area include Pernice et al. (2017) and Jordan, Bai and Morris (2017). By reflecting on the successes and challenges of this session, the chapter offers practical insights for educators seeking to enhance student engagement and learning outcomes in computer vision and related fields. The chapter is structured as follows: Section 2 reviews relevant literature on teaching strategies in technical education, emphasizing active learning, collaborative learning, multimedia integration, and formative assessment. Section 3 details the session's design, including its alignment with learning outcomes and the use of innovative teaching methods. Section 4 reflects on the session's outcomes, drawing on student feedback, observer notes, and theoretical frameworks. Finally, Section 5 concludes with recommendations for future improvements and broader implications for teaching computer vision in higher education.

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