

ENHANCING DUAL EDUCATION THROUGH VIDEO-BASED LEARNING: PEDAGOGICAL AND TECHNOLOGICAL PERSPECTIVES

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Abstract. The dual education system integrates theoretical instruction with practical workplace training, requiring flexible and effective learning resources. Video-based learning has emerged as a powerful tool to support this model by bridging the gap between educational institutions and industry environments. This study explores the role of video lessons in dual education, focusing on their pedagogical value, technological requirements, and impact on students' professional competencies. The research employs qualitative analysis of existing educational practices and examines the effectiveness of instructional videos in improving learning outcomes, motivation, and accessibility. The findings indicate that well-designed video lessons significantly enhance students' understanding of professional concepts and support continuous learning in dual education systems.

Keywords: dual education, video-based learning, digital education, vocational training, e-learning technologies

Introduction. The rapid advancement of digital technologies has fundamentally transformed educational systems across the globe, reshaping teaching methodologies, learning environments, and the roles of both instructors and learners. In this context, higher and vocational education institutions are increasingly required to align their curricula with labor market demands, ensuring that graduates possess not only theoretical knowledge but also practical and professional competencies. One of the most effective educational models addressing this challenge is the dual education system, which integrates academic learning at educational institutions with practical training in real workplace settings.

The dual education model is widely recognized for its potential to enhance employability, reduce the skills gap, and strengthen cooperation between education providers and industry partners. However, despite its advantages, the implementation of dual education faces several challenges. These include inconsistencies between theoretical instruction and workplace practices, limited time for face-to-face teaching, and difficulties in ensuring uniform learning experiences for students across different enterprises. As a result, there is a growing need for innovative instructional tools that can support continuity, standardization, and flexibility within dual education systems.

In recent years, video-based learning has emerged as a powerful pedagogical and technological solution capable of addressing many of these challenges. Video lessons allow learners to access structured educational content independently of time and location, making them particularly suitable for students engaged in dual education, who often balance academic study with workplace responsibilities. Through the use of multimedia elements such as visual demonstrations, animations, and real-life case scenarios, video lessons enhance cognitive engagement and facilitate deeper understanding of complex professional concepts and processes.

Moreover, video lessons play a critical role in bridging the gap between theory and practice. Instructional videos recorded in laboratories, workshops, or industrial environments enable students to observe authentic professional activities, tools, and workflows before or during their practical training. This not only reinforces theoretical knowledge but also increases students' confidence and preparedness for real-world tasks. From a pedagogical perspective, video-based learning supports self-paced and learner-centered approaches, allowing students to revisit content as needed and accommodate diverse learning styles.

Despite the growing interest in video-based learning, its effective integration into dual education systems requires careful methodological and technological consideration. Factors such as instructional design quality, alignment with curriculum objectives, digital infrastructure, and teachers' media competencies significantly influence the effectiveness of video lessons. Poorly structured or technologically

inadequate video materials may fail to achieve intended learning outcomes, highlighting the importance of a systematic and pedagogically grounded approach to video lesson development.

Although existing research has explored digital learning tools and multimedia instruction in general education, there remains a lack of focused studies examining the specific role of video lessons within dual education systems. In particular, limited attention has been given to how video-based learning can enhance coordination between educational institutions and enterprises, support continuous learning, and contribute to the development of professional competencies.

Therefore, the purpose of this study is to analyze the pedagogical significance and practical potential of video-based learning in dual education. The research aims to identify key principles for designing and implementing effective video lessons and to evaluate their contribution to improving learning quality, accessibility, and integration of theory and practice in dual education environments.

Literature Review. The integration of digital technologies into education has been widely examined in contemporary pedagogical research. Scholars emphasize that digital learning tools, particularly multimedia and video-based resources, significantly enhance the effectiveness of teaching and learning processes by supporting active engagement and knowledge retention. According to Mayer's Cognitive Theory of Multimedia Learning, the combination of visual and auditory information facilitates deeper cognitive processing, enabling learners to construct more meaningful mental representations of instructional content (Mayer, 2020).

Video-based learning has been extensively studied in the context of online and blended education. Research indicates that instructional videos improve students' motivation, comprehension, and self-directed learning skills (Zhang et al., 2019). In vocational and technical education, video lessons are especially valuable due to their capacity to demonstrate procedural knowledge, operational workflows, and real-world professional scenarios that are often difficult to explain through text-based materials alone.

Dual education systems, which combine institutional learning with workplace-based training, have attracted increasing scholarly attention, particularly in Europe and Asia. Euler (2019) highlights that dual education enhances employability and strengthens cooperation between educational institutions and industry partners. However, several studies point out structural challenges within dual education, including insufficient alignment between theoretical curricula and workplace practices, variability in training quality across enterprises, and limited instructional time for academic subjects (Deissinger & Hellwig, 2020).

Recent research suggests that digital learning tools can mitigate many of these challenges by supporting coordination and standardization in dual education programs. Video lessons, in particular, enable educational institutions to deliver consistent theoretical instruction to students regardless of their training location. According to OECD (2021), the use of digital and video-based resources in vocational education contributes to flexible learning pathways and supports lifelong learning competencies.

Several empirical studies have explored the application of video lessons in vocational education and training (VET). For instance, Bétrancourt and Benetos (2018) found that video demonstrations significantly improve learners' procedural accuracy and task performance. Similarly, Hrastinski et al. (2020) argue that short, well-structured instructional videos enhance engagement and reduce cognitive overload when aligned with clear learning objectives.

Despite these positive findings, the literature also identifies challenges related to video-based learning implementation. Researchers emphasize that the pedagogical design of video lessons plays a critical role in determining their effectiveness. Poor video quality, excessive length, and lack of interactivity may negatively affect learners' attention and learning outcomes (Guo et al., 2014). Furthermore, teachers' digital and media competencies are crucial for the successful development and integration of video-based materials into curricula.

Although existing studies provide valuable insights into digital and video-based learning, there remains a noticeable research gap concerning their systematic

application within dual education systems. Most studies focus either on general e-learning environments or traditional vocational education, without adequately addressing the specific characteristics and requirements of dual education. In particular, limited research examines how video lessons can function as a pedagogical bridge between academic instruction and workplace training.

Therefore, this study contributes to the existing body of literature by focusing specifically on the role of video-based learning in dual education. By synthesizing previous research and analyzing pedagogical and technological perspectives, the study aims to provide a conceptual framework for the effective use of video lessons in dual education systems.

Methodology. This study adopts a qualitative research approach, including: Analysis of scientific literature on dual education and video-based learning; Review of existing video lesson practices in vocational education; Comparative analysis of traditional and video-supported instructional methods. The research focuses on identifying pedagogical principles and technological conditions that contribute to effective video-based learning in dual education. Results and Discussion. The analysis reveals several key advantages of video lessons in dual education: Pedagogical Effectiveness. Video lessons enhance understanding by visualizing abstract concepts and professional processes. Students can repeatedly review content, which supports individualized learning and knowledge retention. Flexibility and Accessibility. Video-based materials allow learners to study at their own pace, accommodating different learning styles and schedules. This is particularly beneficial for dual education students who divide their time between school and workplace training. Integration of Theory and Practice. Instructional videos recorded in real production environments help link theoretical knowledge with practical applications. This integration increases students' professional competence and readiness for the labor market. Challenges. Despite their benefits, video lessons require significant resources, including technical equipment, software, and instructor training. Poorly designed videos may reduce learning effectiveness, emphasizing the need for methodological guidelines.

Conclusion. Video-based learning represents a valuable innovation in dual education systems. When developed using sound pedagogical principles and supported by appropriate technologies, video lessons enhance learning quality, accessibility, and professional skill development. Educational institutions should prioritize the systematic integration of video lessons into dual education curricula and invest in instructor training and digital infrastructure. Future research may focus on empirical studies measuring the direct impact of video lessons on students' academic and professional performance.

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