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Enhancing Secondary Vocational Teachers' Short Video Pedagogy Competence from a Digital Literacy Perspective

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Abstract

This mixed-methods action research examined how comprehensive digital-literacy development enhances secondary vocational teachers' competence in short-video pedagogy. Forty-five teachers from three technical colleges completed a 12-month, four-phase professional development program covering digital literacy foundations, video production and instructional design, pedagogical integration, and classroom implementation with reflection. Data sources included a 40-item Digital Competency Assessment, a Video Pedagogy Competency rubric, classroom observations, reflective journals, and student feedback. Pre-post analyses showed large improvements in overall digital competence ($M = 2.8$ to 4.2, $p < .001$), with notable gains in technology-for-teaching and digital content creation. Implementation data indicated that most teachers adopted video-enhanced, project-based lessons, which significantly outperformed traditional approaches on student knowledge, technical skills, engagement, and collaboration. Qualitative themes highlighted strengthened teacher self-efficacy, a shift toward student-centered practices, and the value of professional learning communities. The study suggests that long-duration, evidence-based professional development that integrates technical and pedagogical strands is essential for sustainable innovation in vocational education, and that short-video pedagogy is highly adaptable across subject areas when supported by institutional infrastructure.

Keywords: Digital Literacy, Vocational Education, Short Video Pedagogy, Teacher Professional Development, Educational Technology

Introduction

Modern vocational education has unprecedented challenges as digitalization inherently alters working conditions and competency needs. Digital technologies permeated into professional practice have altered worker competency needs, necessitating the evolution of related vocational education provision practices (Brame, 2016). Secondary vocational teachers need greater digital literacy skills to equip learners with better competencies to deal with changing professional contexts marked by growing technological sophistication.

The COVID-19 pandemic accelerated digital change in education institutions, exposing teacher digital readiness deficits while demonstrating technology-supported teaching potential. Vocational training and education schools had particular concerns due to their emphasis on practice-based learning experiences that were traditionally intensive in physical presence and hands-on manipulation of instruments (Cattaneo et al., 2022). The disruption rendered novel pedagogical approaches imperative, maintaining the quality of education while adhering to digital delivery constraints.

Video pedagogy has been an ambitious technology-based learning approach in vocational learning settings with the special benefit of illustrating complex procedures, making techniques easier to learn, and allowing for flexible learning. It has been proven that video-based learning increases the engagement of learners, promotes better retention of information, and allows flexible access to learning content in various learning settings (Chang & Chen, 2022).

Successful implementation, however, demands that teachers have advanced digital literacy competencies that include technological proficiency, pedagogical awareness, and content development skills. Digital literacy is a basic competency for modern teachers, which is described as those skills that are needed to live, learn, and work in digitally mediated societies (Delcker & Ifenthaler, 2022). The European Commission's DigCompEdu framework offers detailed recommendations for teachers' digital competencies in various professional areas (Redecker, 2017).

This study addresses the main gaps in the current understanding of how digital literacy development enables secondary vocational teachers' short video pedagogy competence through action research process.

Literature Review

Digital Literacy in Vocational Education

Digital literacy has emerged as the anchor competence for vocational teachers, embracing technical proficiency, pedagogical content, and adaptive skills to facilitate successful technology integration (Ferrari, 2012). Literature continues to affirm that digital capability among educators has a profound impact on student learning and workplace readiness. Vocational environments necessitate digital literacy requirements above general technological competencies to include industry-specific uses mirroring current workplace demands.

Empirical evidence regarding vocational teachers' digital competence reveals high heterogeneity between institutional contexts and individuals. Competence acquisition is moderated by individual variables such as technology attitude, frequency of use, and prior experience, and implementation opportunities by contextual variables such as institutional support and resource availability (Gil-Flores et al., 2017).

Video Pedagogy and Project-Based Learning

Video pedagogy illustrates good teaching practices using digital technologies for improving the learning and teaching processes in various learning settings. Learning video has an immense impact on the engagement, understanding, and retention of the learners when they

are developed under evidence-based guidelines with the assistance of cognitive load management, multimedia design principles, and interactive engagement features (Ibrahim et al., 2012). Theoretically, effective video pedagogy relies on Mayer's cognitive theory of multimedia learning, which stresses the need for dual-channel processing, coherence, and temporal contiguity to maximize learning outcomes (Ibrahim et al., 2012; Mayer, 2021).

Modern video pedagogy is presented in various formats such as tutorial-style teaching, demonstration videos, and interactive multimedia. Brief videos lasting from three to ten minutes have been shown to be especially effective at holding the students' attention and supporting knowledge construction (Kemmis et al., 2014). Interactive features like embedded questions and multimedia annotations increase interactivity while supporting formative assessment.

In vocational education settings, video pedagogy is particularly beneficial when demonstrating intricate procedures, safety measures, and technical skills that need to be visually presented. Multiple viewing, independent study, and accessibility are supported by video instruction while minimizing safety risks in potentially dangerous settings.

Project-based learning is especially apt for vocational education due to its hands-on, real-life applications that motivate students, improve critical thinking capacity, and acquisition of daily-life skills in addition to equipping students with the demands of modern workplaces (König et al., 2020). Combination of project-based methods and video technology releases synergistic impacts in enhancement of technical skill development and content knowledge application.

Technology integration in project-based learning classrooms provides improved collaboration, documentation, and presentation alongside the development of professionally applicable technological competencies (McNiff & Whitehead, 2006). Project-based learning through video pedagogy provides effective learning in both theoretical learning and practicum application through technology-facilitated learning activities founded on real-world uses.

Teacher Professional Development

Effective teacher development together with effective education innovation implementation are the critical components of their effective implementation. Effective teacher development is operationalized within the literature in relation to content specificity, active learning experiences, coherence with current practice, duration, and interactive engagement (Redecker et al., 2017). Action research offers effective frameworks for teacher development, with systematic practice inquiry promoted in addition to evidence-based innovations implementation.

Action research methodology offers useful models of teacher development that allow practitioners to formally study practice while bringing evidence-based enhancements through repetitive cycles of planning, implementation, observation, and reflection. The method allows practitioner investigation connecting theoretical understanding with practical action developing capacity for continuous improvement and innovation. Action research

projects allow teachers to deal with real classroom issues while building research skills and evidence-based decision-making skills necessary for professional growth.

Technology-supported professional development tools provide heightened access, flexibility, and promise of personalization of teacher learning within various settings and constraints. Blended learning models incorporating face-to-face learning with web-based content, virtual coaching, and peer network collaboration provide particular promise for this endeavor of advancing teacher digital competence development within the bounds of schedule and geographical distance constraints. Digital space-supported professional learning communities enable sustained collaboration, resource sharing, and collective problem-solving beyond that realized within the duration of formal training sessions.

The integration of authentic assessment and portfolio development within professional development programs provides opportunities for teachers to document learning progress, reflect on practice changes, and demonstrate competency growth over time (Norton & Hathaway, 2010). These approaches align with adult learning principles emphasizing relevance, practical application, and learner agency while building sustainable capacity for ongoing professional growth. Effective programs also incorporate mentoring relationships, peer observation protocols, and collaborative reflection processes that support implementation and transfer of new knowledge and skills to classroom practice.

Methodology

Research Design and Participants

This research utilized the action research design investigating secondary vocational teachers' pedagogy competency development in short videos under digital literacy enhancement interventions. Mixed-methods design integrated quantitative measures with qualitative data collection to allow detailed insight into the process and result of teacher learning.

Participants included 45 secondary vocational teachers from three technical colleges representing diverse subject areas including automotive technology, culinary arts, healthcare, information technology, and business administration. Teacher experience ranged from two to twenty-five years, with varying technology experience levels. Purposive sampling ensured representation across subject areas, experience levels, and institutional contexts.

Professional Development Intervention

The comprehensive 12-month professional development program addressed multiple digital literacy and video pedagogy competence dimensions through four progressive phases:

Phase 1: Digital Literacy Foundation (Months 1-3)

- Baseline competency assessment
- Digital literacy frameworks introduction
- Basic technology skills development
- Digital citizenship training

Phase 2: Video Pedagogy Development (Months 4-6)

- Video production techniques
- Instructional design principles

- Content planning strategies
- Technical skills development

Phase 3: Pedagogical Integration (Months 7-9)
- Curriculum integration strategies
- Assessment design
- Student engagement techniques
- Project-based learning implementation

Phase 4: Implementation and Reflection (Months 10-12)
- Classroom implementation
- Action research project development
- Peer observation processes
- Continuous improvement planning

Data Collection and Analysis

Multiple instruments captured diverse aspects of teacher learning: Digital Competency Assessment Scale (40-item validated instrument), Video Pedagogy Competency Rubric, Classroom Observation Protocol, Reflective Learning Journals, and Student Feedback Surveys. Quantitative analysis employed descriptive statistics, paired-samples t-tests, and effect size calculations. Qualitative analysis utilized thematic analysis procedures identifying patterns within interview transcripts and reflective journals.

Results

Digital Competency Development

Pre-post assessment results demonstrated significant improvements across all digital competency dimensions. Overall scores increased from M = 2.8 (SD = 0.6) to M = 4.2 (SD = 0.5), representing large effect size ($d = 2.6$, $p < 0.001$). Technology for teaching showed largest improvement (M = 2.6 to 4.4, $d = 3.1$), followed by digital content creation (M = 2.5 to 4.3, $d = 2.8$). Detailed competency assessment results are presented in Table 1.

Table 1
Digital Competency Assessment Results

Competency Domain	Pre-Intervention M(SD)	Post-Intervention M(SD)	Effect Size (d)	p-value
Technology Operations	3.1 (0.7)	4.5 (0.4)	2.4	< 0.001
Technology for Teaching	2.6 (0.7)	4.4 (0.5)	3.1	< 0.001
Digital Content Creation	2.5 (0.8)	4.3 (0.6)	2.8	< 0.001
Professional Development	2.7 (0.6)	4.0 (0.6)	2.2	< 0.001
Overall Score	**2.8 (0.6)**	**4.2 (0.5)**	**2.6**	**< 0.001**

Note. Scores based on a 5-point Likert scale (1 = novice, 5 = expert). Effect sizes represent Cohen's d.

Video Pedagogy Implementation and Student Outcomes

Video pedagogy competency assessments revealed significant improvements across all dimensions. Technical proficiency increased from M = 2.4 (SD = 0.8) to M = 4.3 (SD = 0.6). Pedagogical integration competency increased from M = 2.8 (SD = 0.7) to M = 4.3 (SD = 0.5).

Classroom observations documented that 89% of participants implemented video-based activities within six months.The development trajectory across intervention phases is illustrated in Figure 1.

Figure 1.Video Pedagogy Competency Development Trajectory

Note. Competency scores measured using validated assessment instruments across 12-month intervention period. Lines represent mean scores for each competency domain (n=45).

Student engagement metrics demonstrated video-enhanced lessons significantly outperformed traditional methods (M = 4.5 vs. M = 3.2, $p < 0.001$). Project-based learning utilizing video technologies produced substantial improvements in student learning outcomes and engagement levels. Comparative learning outcomes are summarized in Table 2.

Table 2

Student Learning Outcomes Comparison

Outcome Measure	Traditional Methods M(SD)	Video-Enhanced Methods M(SD)	Effect Size (d)	p-value
Content Knowledge	3.2 (0.8)	4.1 (0.6)	1.3	< 0.001
Technical Skills	2.9 (0.9)	4.3 (0.7)	1.7	< 0.001
Engagement	3.2 (0.8)	4.5 (0.6)	1.8	< 0.001
Collaboration	3.4 (0.6)	4.4 (0.5)	1.8	< 0.001

Note. Scores based on 5-point assessment rubric. Traditional methods n=45, Video-enhanced methods n=45. All effect sizes represent medium to large practical significance.

These quantitative improvements in student learning outcomes are further visualized through multi-dimensional performance comparisons, revealing the comprehensive educational benefits of video-enhanced instructional approaches across diverse competency domains. These improvements are visualized across multiple performance dimensions in Figure 2.

Figure 2.*Student Learning Outcomes Comparison*

Note. *Radar chart comparing student learning outcomes between traditional and video-enhanced instructional methods. Scores range from 1 (lowest) to 5 (highest performance).*

Qualitative Findings

Thematic analysis identified major themes: Technological Empowerment - teachers described greater confidence and self-efficacy; Pedagogical Transformation - essential changes toward interactive, student-centered instruction; Improved Student Engagement - frequent observations of heightened motivation and learning outcomes; Professional Learning Community Building - collaborative support and sharing enabled long-term implementation.

Discussion

Results of the research are that capacity building of digital literacy with focus has very positive impacts on vocational teachers' ability to implement short video pedagogy with effects ranging from improved just-in-time teaching to institutional transformation and preparing students for digital workplaces. Competence gains of substantial magnitude on all dimensions assessed indicate systematic professional development interventions effectively bridge digital divides because they build sustainable capacity for ongoing innovation.

Differential growth patterns among subgroups of participants highlight the supreme necessity for personalized professional development plans that welcome various baseline competencies, learning styles, and organizational contexts (Redecker, 2017). Less experienced teachers required more general support, while more veteran teachers gained from rigorous strands and leadership roles. This addresses the necessity of differentiated professional development to cater to the distinctive needs of each individual and provide complementary program objectives.

Sustained competency gains over the 12-month intervention period offer compelling evidence for long-duration professional development models compared to short-duration training models. The incremental skill development process, with theory base, practical application, learning in groups, and follow-up support, promoted deep learning and confident adoption beyond formal course completion.

Effective video pedagogy deployment in varied vocational contexts attests to the flexibility of the instructional method under proper teacher preparation (Roll & Ifenthaler, 2021). Incorporation of project-oriented instructional methods and video technology tools manifested synergistic effects on student learning and teacher professional development gains. Evaluation methods crafted for video-supported learning activities successfully reflected a variety of learning outcomes such as content knowledge, technical proficiency, creativity, and collaboration competence.

Collaborative learning communities were especially worthwhile features, producing peer support, sharing of resources, and collaborative problem-solving that improved individual results and maintained implementation efforts (Spante et al., 2018).

Conclusions

This investigation demonstrates that comprehensive digital literacy development significantly enhances secondary vocational teachers' short video pedagogy competence, resulting in improved instructional effectiveness and student learning outcomes across diverse educational contexts. The systematic professional development intervention produced substantial competency gains, with teachers successfully implementing video-enhanced instruction that increased student engagement, motivation, and skill development while preparing learners for contemporary workplace demands.

The research findings contribute important insights to growing literature on educational technology integration in vocational education contexts, extending theoretical understanding while providing practical implementation guidance. Successful integration of video pedagogy approaches across diverse subject areas demonstrates the versatility and effectiveness of these instructional methods when supported by appropriate teacher preparation and institutional infrastructure. The combination of project-based learning methodologies with video technology applications created particularly powerful learning experiences enhancing both technical competency development and subject-specific knowledge application.

Key implications include the critical importance of comprehensive, long-term professional development programs addressing both technical skills and pedagogical knowledge integration through systematic, evidence-based approaches. The action research

methodology provided effective structure for systematic investigation and continuous improvement while facilitating collaborative learning communities supporting sustained implementation efforts and ongoing innovation (Triono Ahmad et al., 2023).

Future studies must address implementation effectiveness with greater, more varied populations and long-term sustainability to enhance understanding of facilitation of ongoing innovation. Educational decision-makers must balance significant strengths demonstrated by whole digital literacy development initiatives against understanding of resource commitments necessary for effective implementation. Investment in teacher professional growth provides a high return on investment in instructional improvement, student engagement, and workplace preparedness in the current era warranting necessary financial and organizational investment.

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