

Systematic Literature Review: Pengembangan Video Pembelajaran Perawatan CVT Sepeda Motor Matic pada Pendidikan Vokasi

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Abstract: Perawatan sistem *Continuously Variable Transmission* (CVT) sepeda motor matic 4 tak menuntut penguasaan keterampilan prosedural yang sistematis dan kemampuan troubleshooting yang akurat, namun keterbatasan waktu praktik dan variasi kemampuan peserta didik sering menghambat pencapaian kompetensi. Penelitian ini bertujuan mensintesis bukti empiris mengenai efektivitas video pembelajaran (*instructional video/video-based learning*) dalam mendukung pembelajaran keterampilan prosedural pada pendidikan teknik dan vokasi sebagai dasar pengembangan video perawatan CVT. Metode yang digunakan adalah *systematic literature review* dengan protokol PRISMA 2020. Data diperoleh dari database Scopus (n = 1087) dan diseleksi melalui tahap identifikasi, penyaringan judul dan abstrak, penilaian kelayakan, hingga diperoleh 50 artikel untuk dianalisis secara tematik. Hasil sintesis menunjukkan bahwa efektivitas video pembelajaran ditentukan oleh penerapan prinsip desain instruksional berbasis multimedia, seperti segmentasi, signaling, dan pengelolaan beban kognitif, serta implementasi melalui pendekatan blended dan flipped learning untuk mengoptimalkan waktu praktik. Kesimpulannya, pengembangan video CVT berbasis bukti dengan demonstrasi prosedural terstruktur dan integrasi aktivitas belajar berpotensi meningkatkan kompetensi otomotif serta relevansi pembelajaran dengan kebutuhan industri bengkel.

Keywords: Pembelajaran berbasis video, pendidikan vokasi, perawatan CVT, PRISMA 2020

PENDAHULUAN

Perawatan dan troubleshooting sistem *Continuously Variable Transmission* (CVT) pada sepeda motor matic 4 tak merupakan kompetensi prosedural yang menuntut ketelitian urutan kerja, pemahaman fungsi komponen, dan standar keselamatan. Dalam praktik pembelajaran otomotif, demonstrasi instruktur sering dibatasi oleh waktu praktik, rasio alat-peserta didik, serta kebutuhan pengulangan langkah kerja pada peserta didik dengan kemampuan awal yang beragam (Suharno et al., 2020). Secara lebih umum, pendidikan teknik dan vokasi (TVET) menghadapi kebutuhan media yang mampu memvisualisasikan keterampilan prosedural secara konsisten dan dapat dipelajari berulang. Video pembelajaran (*instructional video*) menjadi salah satu media yang paling banyak digunakan karena mampu menyajikan demonstrasi langkah demi langkah, dapat diputar ulang, dan mudah diintegrasikan dalam pembelajaran daring maupun blended (Sablić et al., 2021). Di sisi lain, perkembangan riset video-

based learning menunjukkan bahwa efektivitas video tidak hanya ditentukan oleh keberadaan video, melainkan oleh kualitas desain instruksional (mis. segmentasi, isyarat visual/cues, dan pengaturan beban kognitif) serta strategi implementasi (mis. flipped learning dan dukungan self-regulated learning) (Mayer et al., 2020). Karena itu, diperlukan pemetaan bukti ilmiah yang sistematis sebagai pijakan pengembangan video pembelajaran perawatan CVT.

Meskipun berbagai studi telah membahas penggunaan video pembelajaran dalam konteks pendidikan secara umum, temuan-temuan tersebut masih tersebar pada beragam disiplin, pendekatan desain, dan strategi implementasi. Kondisi ini menyulitkan pendidik dan pengembang media untuk menarik kesimpulan komprehensif mengenai prinsip-prinsip yang paling relevan dan aplikatif, khususnya untuk pembelajaran keterampilan prosedural di bidang teknik dan vokasi. Oleh karena itu, diperlukan suatu telaah sistematis yang mampu mengintegrasikan hasil-hasil penelitian terdahulu

secara terstruktur guna mengidentifikasi pola, kecenderungan, serta celah riset yang ada.

Berdasarkan latar tersebut, artikel ini bertujuan melakukan SLR menggunakan PRISMA 2020 terhadap literatur Scopus untuk menyeleksi dan mensintesis 50 artikel yang paling relevan mengenai video pembelajaran pada konteks pendidikan teknik/vokasi, sehingga menghasilkan implikasi desain dan implementasi untuk pengembangan video pembelajaran perawatan CVT sepeda motor matic 4 tak.

TINJAUAN LITERATUR

Video-based learning dan video instruksional

Video-based learning mengacu pada pemanfaatan video sebagai sumber belajar utama atau pendukung untuk meningkatkan pemahaman konsep dan keterampilan. Pada keterampilan prosedural, video instruksional efektif bila menampilkan langkah kerja secara jelas, menggunakan sudut pengambilan yang mendukung observasi detail, serta menyertakan penekanan pada titik kritis dan kesalahan umum. Literatur juga menyoroti pentingnya prinsip desain berbasis bukti untuk mengurangi beban kognitif dan mengoptimalkan perhatian peserta didik (Mayer et al., 2020).

Implementasi video pada pembelajaran teknik dan vokasi

Dalam konteks TVET, video pembelajaran sering dipadukan dengan blended learning atau flipped classroom. Strategi ini memindahkan fase pengenalan prosedur ke pembelajaran mandiri, sehingga sesi tatap muka/praktik difokuskan pada latihan, umpan balik, dan troubleshooting. Bukti empiris menunjukkan dukungan self-regulated learning pada video flipped learning dapat meningkatkan hasil belajar (Van Alten et al., 2020), sementara studi persepsi mahasiswa selama pembelajaran daring menunjukkan penerimaan video-based learning dipengaruhi oleh aspek kemudahan dan kesesuaian tugas (Pal & Patra, 2021).

Pengembangan media video (R&D)

Pengembangan video pembelajaran umumnya menggunakan pendekatan penelitian dan pengembangan (R&D) seperti ADDIE atau

4D yang mencakup analisis kebutuhan, perancangan storyboard, produksi, validasi ahli, serta uji kepraktisan dan efektivitas. Pada keterampilan otomotif, pengembangan sebaiknya mengacu pada standar kerja bengkel, keselamatan kerja, serta kriteria kinerja praktik agar media yang dihasilkan tidak hanya menarik tetapi juga akurat dan aplikatif.

METODE

Desain Studi

Penelitian ini merupakan Systematic Literature Review (SLR) dengan pedoman PRISMA 2020. Sumber data berasal dari database Scopus yang diekspor dalam bentuk tabulasi Excel (n = 1087).

Strategi Pencarian

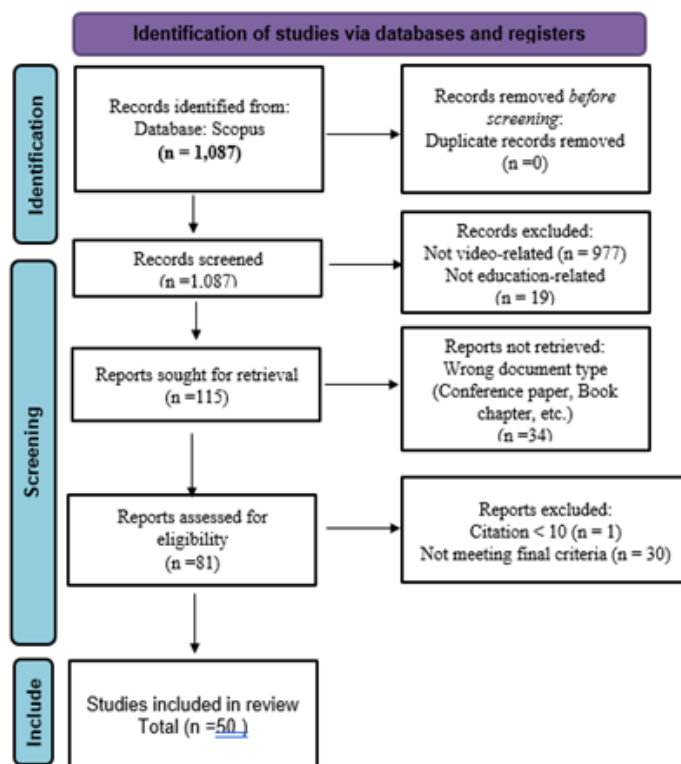
Kata kunci inti (English) yang digunakan mencakup kombinasi: “instructional video” OR “learning video” OR “video-based learning”; “maintenance” OR “repair” OR “troubleshooting”; “vocational education” OR “TVET” OR “technical education”; serta kata kunci spesifik domain “continuously variable transmission” OR “CVT” dan “automatic motorcycle/scooter motorcycle”.

Kriteria inklusi dan eksklusi

Kriteria inklusi: (1) terindeks Scopus; (2) relevan dengan video pembelajaran/video-based learning; (3) berfokus pada konteks pendidikan/pelatihan; (4) jenis dokumen artikel jurnal atau artikel konferensi yang relevan; (5) tersedia metadata memadai untuk sintesis. Kriteria eksklusi: (1) tidak terkait video atau tidak terkait pendidikan; (2) fokus murni computer vision/representation learning tanpa konteks pembelajaran; (3) tidak sesuai tipe dokumen untuk sintesis akhir.

Proses Seleksi PRISMA

Seleksi mengikuti alur PRISMA 2020: identifikasi rekaman dari Scopus, deduplikasi, penyaringan judul/abstrak, penilaian kelayakan, hingga inklusi akhir. Diagram PRISMA 2020 disajikan pada Gambar 1.



Gambar 1. Diagram Analisis PRISMA

HASIL DAN PEMBAHASAN

Ringkasan seleksi studi

Proses seleksi literatur dalam penelitian ini dilakukan secara sistematis dengan mengikuti tahapan yang direkomendasikan dalam protokol PRISMA 2020, yaitu identifikasi, penyaringan (screening), penilaian kelayakan (eligibility), dan

inklusi akhir. Setiap tahapan dilakukan secara bertahap untuk memastikan bahwa artikel yang disintesis benar-benar relevan dengan fokus penelitian, memiliki kualitas akademik yang memadai, serta sesuai dengan kriteria inklusi dan eksklusi yang telah ditetapkan. Ringkasan jumlah rekaman pada setiap tahapan seleksi disajikan pada Tabel 1 berikut.

Tabel 1. Ringkasan Tahapan Seleksi Studi Menggunakan Protokol PRISMA 2020

Tahap PRISMA	Jumlah (n)
Records identified from Scopus	1087
Duplicate records removed	0
Records screened	1087
Records excluded (not video-related)	977
Records excluded (not education-related)	19
Reports sought for retrieval	115
Reports not retrieved (wrong document type)	34
Reports assessed for eligibility	81
Reports excluded (citation < 10)	1
Reports excluded (not meeting final criteria)	30
Studies included in synthesis	50

Berdasarkan alur PRISMA 2020, dari 1087 rekaman awal (Scopus) diperoleh 50 studi yang memenuhi kriteria untuk disintesis. Eksklusi terbesar terjadi pada tahap screening karena banyak rekaman tidak terkait video

pembelajaran atau tidak berada dalam konteks pendidikan.

Karakteristik dan tema sintesis

Sintesis tematik terhadap 50 studi menunjukkan lima pola utama: (1) prinsip desain

video instruksional berbasis bukti; (2) video-based learning dan engagement; (3) flipped/blended learning berbasis video untuk mengoptimalkan waktu praktik; (4) dukungan teknologi pelengkap (mis. chatbot/peer feedback) untuk meningkatkan performa; dan (5)

pemanfaatan video learning analytics untuk memahami perilaku belajar. Secara konsisten, studi-studi kunci menegaskan bahwa kualitas desain dan integrasi aktivitas belajar merupakan determinan utama efektivitas video (Mayer, 2021).

Tabel 2. Daftar Terpilih dan Sumber Publikasi dalam Sintesis Systematic Literature Review

No	Authors	Year	Title	Source
1	(Daniel, 2020)	2020	Education and the COVID-19 pandemic	Prospects
2	(Lövdén et al., 2020)	2020	Education and Cognitive Functioning Across the Life Span	Psychological Science in the Public Interest
3	(Soori et al., 2023)	2023	Artificial intelligence, machine learning and deep learning in advanced robotics, a review	Cognitive Robotics
4	(Baduge et al., 2022)	2022	Artificial intelligence and smart vision for building and construction 4.0: Machine and deep learning methods and applications	Automation in Construction
5	(C. Wang et al., 2020)	2020	Machine learning in additive manufacturing: State-of-the-art and perspectives	Additive Manufacturing
6	(Çınar et al., 2020)	2020	Machine learning in predictive maintenance towards sustainable smart manufacturing in industry 4.0	Sustainability Switzerland
7	(Chan et al., 2020)	2020	Deep Learning in Medical Image Analysis	Advances in Experimental Medicine and Biology
8	(Y. Wang et al., 2020)	2020	Fundamentals, materials, and machine learning of polymer electrolyte membrane fuel cell technology	Energy and AI
9	(Shehab et al., 2022)	2022	Machine learning in medical applications: A review of state-of-the-art methods	Computers in Biology and Medicine
10	(Salehi et al., 2023)	2023	A Study of CNN and Transfer Learning in Medical Imaging: Advantages, Challenges, Future Scope	Sustainability Switzerland
11	(Zafar et al., 2020)	2020	How renewable energy consumption contribute to environmental quality? The role of education in OECD countries	Journal of Cleaner Production
12	(Pérez et al., 2020)	2020	Rediscovering the use of chatbots in education: A systematic literature review	Computer Applications in Engineering Education
13	(Zhang & Aslan, 2021)	2021	AI technologies for education: Recent research & future directions	Computers and Education Artificial Intelligence
14	(Barragán-Montero et al., 2021)	2021	Artificial intelligence and machine learning for medical imaging: A technology review	Physica Medica
15	(Mayer et al., 2020)	2020	Five ways to increase the effectiveness of instructional video	Educational Technology Research and Development
16	(Al-Emran et al., 2020)	2020	A Survey of Internet of Things (IoT) in Education: Opportunities and Challenges	Studies in Computational Intelligence
17	(Antonietti et al., 2022)	2022	Can teachers' digital competence influence technology acceptance in vocational education?	Computers in Human Behavior
18	(Ndofirepi, 2020)	2020	Relationship between entrepreneurship education and entrepreneurial goal intentions: psychological traits as mediators	Journal of Innovation and Entrepreneurship

No	Authors	Year	Title	Source
19	(Brown, 2020)	2020	A Review of the PubMed PICO Tool: Using Evidence-Based Practice in Health Education	Health Promotion Practice
20	(Kaup et al., 2020)	2020	Sustaining academics during COVID-19 pandemic: The role of online teaching-learning	Indian Journal of Ophthalmology
21	(Pal & Patra, 2021)	2021	University Students' Perception of Video-Based Learning in Times of COVID-19: A TAM/TTF Perspective	International Journal of Human Computer Interaction
22	(Sablíć et al., 2021)	2021	Video-Based Learning (VBL)—Past, Present and Future: an Overview of the Research Published from 2008 to 2019	Technology Knowledge and Learning
23	(Mayer, 2021)	2021	Evidence-Based Principles for How to Design Effective Instructional Videos	Journal of Applied Research in Memory and Cognition
24	(Hasan et al., 2020)	2020	Predicting student performance in higher educational institutions using video learning analytics and data mining techniques	Applied Sciences Switzerland
25	(Cattaneo et al., 2022)	2022	How digitalised are vocational teachers? Assessing digital competence in vocational education and looking at its underlying factors	Computers and Education
26	(Suharno et al., 2020)	2020	Vocational education in Indonesia: History, development, opportunities, and challenges	Children and Youth Services Review
27	(Dahalan et al., 2024)	2024	Gamification and Game Based Learning for Vocational Education and Training: A Systematic Literature Review	Education and Information Technologies
28	(Van Alten et al., 2020)	2020	Self-regulated learning support in flipped learning videos enhances learning outcomes	Computers and Education
29	(Das et al., 2020)	2020	VPN: Learning Video-Pose Embedding for Activities of Daily Living	Lecture Notes in Computer Science Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics
30	(Goulart et al., 2022)	2022	Balancing skills in the digital transformation era: The future of jobs and the role of higher education	Industry and Higher Education
31	(J. Wang et al., 2020)	2020	Does visual attention to the instructor in online video affect learning and learner perceptions? An eye-tracking analysis	Computers and Education
32	(Tabatabai, 2020)	2020	COVID-19 impact and virtual medical education	Journal of Advances in Medical Education and Professionalism
33	(Wu et al., 2023)	2023	DayDreamer: World Models for Physical Robot Learning	Proceedings of Machine Learning Research
34	(Fidan & Gencel, 2022)	2022	Supporting the Instructional Videos With Chatbot and Peer Feedback Mechanisms in Online Learning: The Effects on Learning Performance and Intrinsic Motivation	Journal of Educational Computing Research
35	(Syauqi et al., 2020)	2020	Students' perceptions toward vocational education on online learning during the COVID-19 pandemic	International Journal of Evaluation and Research in Education
36	(Beer & Mulder, 2020)	2020	The effects of technological developments on work and their implications for continuous vocational education and training: A systematic review	Frontiers in Psychology
37	(Seo et al., 2021)	2021	Active learning with online video: The impact of learning context on engagement	Computers and Education

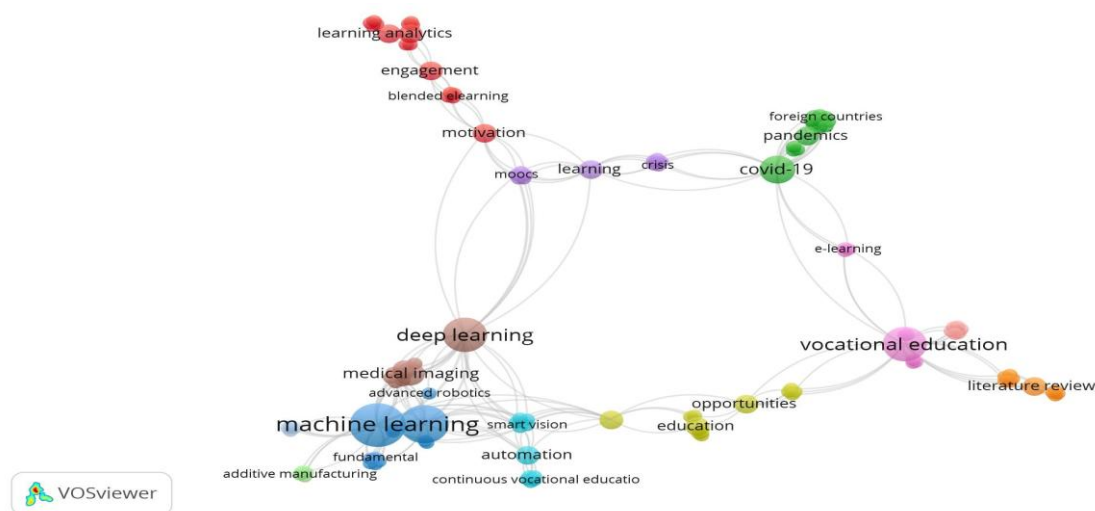
No	Authors	Year	Title	Source
38	(Li & Pilz, 2023)	2023	International transfer of vocational education and training: a literature review	Journal of Vocational Education and Training
39	(Yoon et al., 2021)	2021	Video learning analytics: Investigating behavioral patterns and learner clusters in video-based online learning	Internet and Higher Education
40	(Horovitz & Mayer, 2021)	2021	Learning with human and virtual instructors who display happy or bored emotions in video lectures	Computers in Human Behavior
41	(C et al., 2023)	2023	Self-Supervised Learning for Videos: A Survey	ACM Computing Surveys
42	(Sharma et al., 2020)	2020	Eye-tracking and artificial intelligence to enhance motivation and learning	Smart Learning Environments
43	(Jayalath & Esichaikul, 2022)	2022	Gamification to Enhance Motivation and Engagement in Blended eLearning for Technical and Vocational Education and Training	Technology Knowledge and Learning
44	(Niyozov et al., 2023)	2023	AI-powered learning: revolutionizing technical higher education institutions through advanced power supply fundamentals	E3s Web of Conferences
45	(Ralston, 2021)	2021	Higher Education's Microcredentialing Craze: a Postdigital-Deweyan Critique	Postdigital Science and Education
46	(George et al., 2024)	2024	Utilization of industry 4.0 technologies in nigerian technical and vocational education: A conundrum for educators	Examining the Rapid Advance of Digital Technology in Africa
47	(Durairaj et al., 2023)	2023	Utilization of digital tools in the indian higher education system during health crises	Multidisciplinary Approaches to Organizational Governance During Health Crises
48	(Patrick et al., 2021)	2021	Support-Set Bottlenecks For Video-Text Representation Learning	Iclr 2021 9th International Conference on Learning Representations
49	(Chen, 2020)	2020	AR videos as scaffolding to foster students' learning achievements and motivation in EFL learning	British Journal of Educational Technology
50	(Ana, 2020)	2020	Trends in expert system development: A practicum content analysis in vocational education for over grow pandemic learning problems	Indonesian Journal of Science and Technology

Pembahasan sintesis (naratif)

Secara umum, 50 artikel yang disintesis menunjukkan bahwa instructional video/video-based learning efektif untuk pembelajaran keterampilan prosedural ketika video dirancang dengan prinsip segmentasi, penekanan isyarat (signaling/cues), dan integrasi aktivitas seperti pertanyaan pemantik, umpan balik, atau dukungan regulasi diri. Literatur desain video menekankan pentingnya mengelola beban kognitif dan menjaga fokus atensi pada informasi relevan (Mayer et al., 2020). Pada implementasi, pendekatan flipped learning dan blended learning memperkuat dampak video dengan memindahkan fase orientasi prosedur ke pra-

kelas, sehingga sesi tatap muka dapat memaksimalkan latihan praktik dan troubleshooting (van Alten et al., 2020). Selain itu, sejumlah studi menunjukkan bahwa teknologi pelengkap seperti chatbot dan peer feedback dapat meningkatkan performa dan motivasi ketika diintegrasikan dengan video pembelajaran (Fidan & Gencel, 2022). Walaupun bukti pada pendidikan teknik/vokasi relatif kuat, literatur yang secara spesifik membahas pengembangan video perawatan CVT sepeda motor matic masih terbatas, sehingga pengembangan video CVT yang berbasis bukti dan berorientasi kompetensi bengkel menjadi agenda riset yang relevan.

Analisis Bibliometrik dan Pemetaan Kata Kunci (VOSviewer)



Gambar 2. Analisis Network VOSviewer

Berdasarkan analisis bibliometrik menggunakan VOSviewer, peta ko-occurrence kata kunci menunjukkan beberapa kluster utama yang saling terhubung. Kluster teknologi didominasi oleh machine learning dan deep learning yang terhubung dengan berbagai aplikasi, menandakan kuatnya peran teknologi digital sebagai fondasi riset lintas bidang. Dalam konteks pendidikan, vocational education muncul sebagai simpul penting yang berasosiasi dengan e-learning, education, dan opportunities, menunjukkan meningkatnya perhatian terhadap integrasi teknologi dalam pembelajaran kejuruan. Kluster pembelajaran digital yang mencakup learning analytics, engagement, blended learning, dan motivation merefleksikan fokus riset pada peningkatan kualitas pembelajaran berbasis video dan keterlibatan peserta didik. Selain itu, kluster COVID-19 memperlihatkan percepatan adopsi pembelajaran daring, khususnya pada pendidikan vokasi. Secara keseluruhan, peta ini menegaskan bahwa meskipun riset video pembelajaran dan pendidikan vokasi berkembang pesat, kajian yang secara spesifik membahas pengembangan video pembelajaran perawatan sistem CVT sepeda motor matic masih terbatas, sehingga menguatkan adanya celah riset yang menjadi dasar pengembangan media pembelajaran dalam penelitian ini.

KESIMPULAN

SLR ini menggunakan PRISMA 2020 untuk menyeleksi literatur Scopus (n = 1087) dan

menghasilkan 50 artikel untuk sintesis. Hasil sintesis menegaskan bahwa efektivitas video pembelajaran ditentukan oleh kualitas desain instruksional serta strategi implementasi seperti flipped/blended learning. Temuan juga mengindikasikan adanya kesenjangan riset pada pengembangan video pembelajaran yang spesifik untuk perawatan sistem CVT sepeda motor matic 4 tak, sehingga pengembangan media pada domain ini berpotensi memberikan kontribusi praktis bagi pendidikan otomotif dan kebutuhan industri bengkel.

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