

SINTAKSA Learning Media Innovation as a Simulation of Correspondence and Digital Archiving Workflows to Enhance Student Engagement in Office Management

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Abstract

The low student engagement in correspondence and archiving lessons within secondary vocational education, often exacerbated by digital device facility disparities, demands innovative, inclusive, and contextual learning media. This study aims to develop a digital simulation-based learning medium SINTAKSA (*Sinergi Tata Kelola Surat dan Arsip*) and evaluate its feasibility, practicality, and effectiveness in enhancing multidimensional student engagement. Using a Research and Development (R&D) method based on the systematic ADDIE model, this study involved 33 eleventh-grade Office Management students selected via purposive sampling. Data were collected using expert validation instruments, user practicality questionnaires, and a multidimensional student engagement scale measuring behavioral, emotional, and cognitive dimensions. The results demonstrated that the developed simulation media achieved high feasibility (83.75%) based on media and subject matter experts, and exceptional user practicality (93.71%). Crucially, student engagement significantly increased from a mean score of 71.84 to 84.01, with marked improvements in emotional (70.69 to 84.52), behavioral (71.55 to 83.57), and cognitive dimensions (73.28 to 83.94). These findings confirm that digital workflow simulations designed for multi-device accessibility can bridge infrastructural gaps, lower students' cognitive load, and holistically elevate active learning behaviors in vocational education.

Keywords: Correspondence, Digital Archiving, Learning Media, Student Engagement, Vocational Education.

1. Introduction

The rapid advancement of information technology in the era of the Fourth Industrial Revolution and Society 5.0 has triggered comprehensive digital transformation across global professional workspaces. Modern office administration paradigms demand high efficiency and rapid, integrated system workflows. Within contemporary corporate environments, correspondence and document archiving are no longer treated as isolated, fragmented activities; instead, they constitute an inseparable, continuous lifecycle (Ibrahim et al., 2023). Any document or mail created must be instantly processed, distributed, and systematically archived digitally. Consequently, Technical and Vocational Education and Training (TVET) institutions are under intense pressure to modernize their pedagogical approaches, integrating interactive digital learning media that actively stimulate learning behaviors and facilitate authentic, integrated industrial workflows (Schultheiss & Backes-Gellner, 2022; Setyani & Bukhori, 2022).



However, the implementation of integrated standards within vocational classrooms faces severe systemic bottlenecks. Observational data gathered from secondary vocational classrooms reveals that correspondence and archiving are still predominantly taught using fragmented, conventional, or disjointed digital formats. Students typically complete writing letters conventionally before moving on to unrelated software programs for archiving, which fails to simulate actual administrative lifecycles (Khoimatun et al., 2023). Furthermore, this pedagogical fragmentation is heavily exacerbated by technological infrastructure disparities, creating severe gaps in students' academic behaviors and classroom participation (Zhang et al., 2024). In a typical classroom of 33 students, field data indicates that only 10 own personal laptops. Compounded by limited and rigidly scheduled school computer laboratory hours, students suffer from a severe lack of consistent hands-on digital practical exposure.

This infrastructure disparity directly generates participation inequality. Since classrooms are bound by limited computer hardware, only a small fraction of students can practice simultaneously, turning the majority of learners into passive spectators. This passivity leads to alarmingly low student engagement (Dharma et al., 2024). Traditional digital learning tools developed for office management fail to address this issue, as they either focus on single, isolated administrative tasks (e.g., electronic archiving without mail creation) or demand high-specification computer hardware that is maladaptive for resource-constrained schools (Adam & Mengistie, 2026; Ibrahim et al., 2023). Thus, a critical research gap exists: there is an urgent need for learning media that are not only digitally integrative capturing the continuous mail-to-archive industrial workflow but also technologically inclusive, allowing flexible execution on widely available personal devices such as

To bridge this gap, this study proposes SINTAKSA (*Sinergi Tata Kelola Surat dan Arsip*) as an innovative learning medium. Designed as a web-based, multi-device compatible digital workflow simulation, SINTAKSA replicates the entire administrative lifecycle encompassing mail drafting, agenda logging, disposition routing, digital archiving, file retrieval, and document retention. Because it is optimized for mobile browser performance, it enables all students to participate simultaneously, neutralizing the laptop-ownership disparity.

Active student engagement is a pivotal determinant of vocational mastery, extending beyond physical attendance to encompass behavioral, emotional, and cognitive involvement (Wong & Liem, 2021). When student engagement remains low due to exclusion from hands-on practice, students lose confidence and fail to comprehend the integrated nature of administrative systems (Nütylahti et al., 2021). By introducing an inclusive, gamified digital simulation, this study aims to develop SINTAKSA and empirically analyze its feasibility, user practicality, and effectiveness in enhancing multidimensional student engagement in vocational office management education.

2. Literature Review

2.1. Theoretical Foundation

This study is theoretically anchored in three interconnected frameworks to establish the methodology and evaluate the developed media: the Technology Acceptance Model (TAM), Self-Determination Theory (SDT), and the Multidimensional Student Engagement Framework. First, TAM posits that the adoption of educational technology is primarily determined by two variables: Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) (Samara & Susanti, 2023). In the context of the SINTAKSA methodology, PEOU is operationalized through the platform's multi-device, browser-based accessibility, which

minimizes technical barriers for students lacking high-end hardware. PU is represented by the application's ability to accurately simulate integrated, real-world administrative workflows, thereby allowing students to focus their cognitive capacity entirely on core vocational competencies rather than software navigation.

Furthermore, to foster intrinsic motivation within digital spaces, SDT emphasizes the satisfaction of three basic psychological variables: competence, autonomy, and relatedness (Ryan & Deci, 2020). The SINTAKSA method actively operationalizes these variables: competence is developed via instant corrective feedback and gamified experience points (XP); autonomy is supported through self-paced, exploratory pathways in mail processing; and relatedness is established by casting students in authentic, collaborative corporate roles (Khair et al., 2025).

Lastly, the ultimate dependent variable, student engagement, is defined as a tripartite construct (Wong & Liem, 2021). Within this study, behavioral engagement is measured through active participation and hands-on practice in the simulation; emotional engagement is reflected by the student's interest and positive attitude toward the gamified environment; and cognitive engagement involves the mental investment required to analyze and solve complex archiving workflows. By introducing the methodological architecture of SINTAKSA through these theories, this study establishes a clear conceptual link between technological inclusivity, psychological need satisfaction, and elevated multidimensional learning behaviors (Wong & Liem, 2021).

2.2. Previous Research

Prior innovations in office administration learning media have focused on digitized administrative components in isolation. For instance, Setyani and Bukhori (2022) developed a web-assisted electronic archive system that significantly improved student filing skills but completely omitted the preceding correspondence phase. Conversely, explored e-archive mentoring platforms that highlighted the administrative benefits of digitization but lacked interactive simulation structures for student-centered learning (Pahlevi et al., 2023). Additionally, many existing platforms require high-performance hardware, causing severe implementation friction in under-equipped schools (Adam & Mengistie, 2026). SINTAKSA addresses these limitations by consolidating correspondence and archiving into a singular, cohesive simulation cycle, optimized for mobile device compatibility to ensure classroom-wide, equitable, and active participation.

2.3. Conceptual Framework

The conceptual model of this study assumes that integrating dual vocational competencies into an inclusive, mobile-friendly digital simulation directly influences student engagement. When technological barriers are lowered (increasing PEOU) and the learning task is perceived as highly aligned with professional future careers (increasing PU), students experience reduced cognitive load. This cognitive relief, combined with the motivational triggers of gamification, stimulates a positive reinforcement loop where heightened emotional excitement leads to active behavioral practice, which ultimately fosters deep cognitive processing of complex administrative workflows.

3. Methods

3.1. Research Design and Model

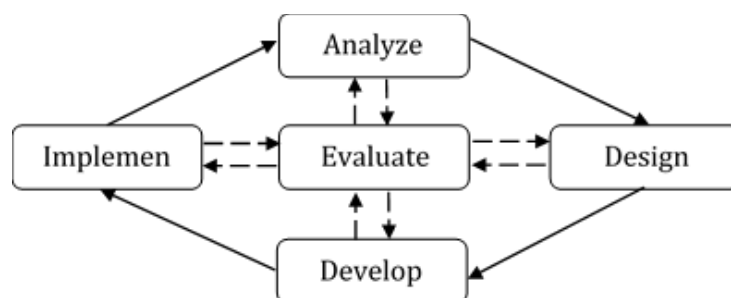


Figure 1. Stages of Research for Developing the ADDIE Model

This study utilized a Research and Development (R&D) methodology aimed at developing, testing, and validating educational products (Slamet, 2022). The instructional design followed the systematic ADDIE model as in Figure 1, consisting of five iterative phases: 1) Analysis: conducting classroom observations to identify physical device constraints, fragmented instructional methods, and baseline student engagement levels; 2) Design: formulating the architecture, user flows, administrative modules, and quantitative assessment instruments for SINTAKSA; 3) Development: building the web-based simulation platform, conducting expert validations (media and subject matter), and performing iterative product revisions; 4) Implementation: deploying SINTAKSA during correspondence and archiving lessons; and 5) Evaluation: analyzing the feasibility, user practicality, and effectiveness of the media in enhancing multidimensional engagement.

3.2. Participants and Context

The study was conducted at SMK Negeri 1 Malang, Indonesia, involving a class of 33 eleventh grade Office Management students. The subjects were selected via purposive sampling because they were currently enrolled in the core digital correspondence and archiving course and actively experienced digital facility constraints.

3.3. Data Collection and Instruments

Data were collected through both qualitative and quantitative instruments. Technical and visual design feasibility was assessed using Media Expert Validation Sheets. Content relevance and linguistic accuracy were evaluated using Subject Matter Expert Validation Sheets. User reception was captured using a User Practicality Questionnaire based on TAM variables (ease of use, usefulness, and attractiveness). Finally, shifts in student engagement were measured using a pre-test and post-test Multidimensional Student Engagement Questionnaire, consisting of 24 items on a 5-point Likert scale, assessing behavioral, emotional, and cognitive engagement.

3.4. Data Analysis and Evaluation Procedures

Quantitative validation and practicality scores were converted to percentages and categorized according to standard educational media criteria. To evaluate the media's effectiveness, student engagement mean scores before (pre-test) and after (post-test) the SINTAKSA intervention were compared. Descriptively, absolute gain scores across behavioral, emotional, and cognitive engagement dimensions were computed and analyzed to map the holistic impact of the simulation.

4. Results and Discussion

4.1. Research Results

4.1.1. Development of the SINTAKSA Application

The development phase successfully produced SINTAKSA (*Sinergi Tata Kelola Surat dan Arsip*), a web-based administrative simulation platform accessible via any browser-equipped device <https://bit.ly/SINTAKSA/>. SINTAKSA features an interactive dual-role system (Teacher and Student) designed to facilitate autonomous yet supervised learning.

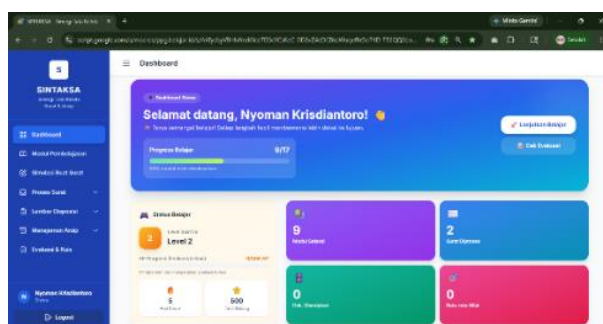


Figure 2. Students Dashboard



Figure 3. Teacher Dashboard

The student interface as seen in Figure 2 consists of a gamified dashboard displaying progress bars, accumulated experience points (XP), learning streaks, and levels. It includes six core operational modules: *Simulasi Buat Surat* (interactive mail creation template), *Buku Agenda* (incoming/outgoing logging), *Lembar Disposisi* (hierarchical mail routing), *Manajemen Arsip* (alphabetic, numeric, and chronological categorization), *Peminjaman Arsip* (file request tracking), and *Penyusutan Arsip* (retention cycle planning).

The teacher interface as seen in Figure 3 provides real-time monitoring tools tracking student login history, module completion status, quiz submissions, and active learning times, enabling immediate, diagnostic pedagogical intervention.

4.1.2. Product Validation and Evaluation Results

To establish technical and pedagogical validity, SINTAKSA was reviewed by media and subject matter experts.

Table 1. Media Expert Validation Results

No.	Aspect	Percentage	Criteria
1.	Graphic Feasibility	80.00%	Feasible
2.	Media Quality	80.00%	Feasible
3.	Media Layout	80.00%	Feasible
Average		80.00%	Feasible

The results of the validation carried out by media experts which summarized in table 1 above show that SINTAKSA media achieved an average score of 80,00% and was categorized as ‘Feasible’ across all three aspects evaluated: graphic suitability, media quality and media layout. This achievement demonstrates that, both technically and visually, the SINTAKSA media has met the minimum standards of suitability as a digital learning resource and is ready for use in the classroom following revisions based on feedback from the validators.

Table 2. Subject Matter Expert Validation Results

No	Aspect	Percentage	Criteria
1.	Content Feasibility	84.00%	Highly Feasible
2.	Contextual Assessment	88.00%	Highly Feasible
3.	Language Appropriateness	87.50%	Highly Feasible
Average		86.67%	Highly Feasible

The overall validation results by the Subject Matter Expert (SME) in table 2 achieved an average percentage of 86.67%, meeting the “Highly Feasible” criterion. All assessed aspects consistently fell into the “Highly Feasible” category, indicating that the content, contextual relevance, and grammar of the developed product met standard feasibility criteria. Consequently, this product is considered highly suitable for use in the learning process and for progressing to the next stage of testing.

Table 3. Combined Feasibility Summary

No.	Aspect	Percentage	Criteria
1.	Technical Media Expert	80.00%	Feasible
2.	Content Subject Matter Expert	86.67%	Highly Feasible
Average		83.75%	Highly Feasible

The combined validation score from table 3 yielded an overall average of 83.75% (Highly Feasible), indicating that SINTAKSA meets the visual-technical and educational-substantive standards required for vocational implementation. Specifically, the strong performance in the Content Subject Matter Expert validation (86.67%, Highly Feasible) highlights the application’s robust alignment with the practical demands of the Office Management curriculum and its capability to simulate authentic workplace environments. Meanwhile, the Technical Media Expert assessment scored slightly lower at 80.00% (Feasible), suggesting that while the digital learning tool is functionally sound, there remain minor opportunities to refine its user interface or interactive elements to further optimize the learning experience.

Following minor revisions, a trial was conducted with the 33 target students to evaluate practicality in real-world learning conditions.

Table 4. Use Practicality Trial Results

No.	Aspect	Percentage	Criteria
1.	Ease of Use	93.57%	Highly Feasible
2.	Usefulness	95.00%	Highly Feasible
3.	Attractiveness	91.43%	Highly Feasible
Average		93.71%	Highly Feasible

The user practicality assessment summarized in table 4 yielded an exceptional average of 93.71% (Highly Feasible), demonstrating high user acceptance across all indicators. Specifically, the Usefulness aspect achieved the highest score at 95.00%, indicating that users found the product highly beneficial and relevant. The Ease of Use aspect also scored very well

at 93.57%, proving that the product is user-friendly. Although the Attractiveness aspect received the lowest score at 91.43%, it still falls firmly within the Highly Feasible criteria, suggesting a generally positive reception with minor room for future visual enhancement.

To evaluate the effectiveness of SINTAKSA in elevating student learning behaviors, multidimensional student engagement was measured pre- and post-intervention.

Table 5. Multidimensional Student Engagement Scores

No.	Aspect	Pre-test	Posttest	Score Gain
1.	Behavioral Engagement	71.55	83.57	+12,02
2.	Emotional Engagement	70.69	84.52	+13,83
3.	Cognitive Engagement	73.28	83.94	+10,66
Average		71.84	84.01	+12.17

As detailed in Table 5, the Multidimensional Student Engagement scores reveal a robust and consistent increase across all three dimensions following the intervention. The holistic average improved notably by 12.17 points, rising from 71.84 in the pre-test to 84.01 in the posttest. Notably, Emotional Engagement demonstrated the most substantial growth with a gain of +13.83 points, suggesting that the applied instructional method was highly effective in fostering students' enthusiasm and positive affective responses. Conversely, while Cognitive Engagement exhibited the smallest absolute gain (+10.66 points), it possessed the highest initial baseline score (73.28) and culminated in a commendable posttest score of 83.94. Alongside a solid +12.02 point increase in Behavioral Engagement, these results confirm that the intervention successfully enhanced student engagement in a comprehensive manner.

4.2. Discussion

The overall validation average of 83.75% provides strong empirical support for SINTAKSA's structural soundness. The high contextual assessment score of 88.00% from subject experts is particularly significant. It demonstrates that SINTAKSA successfully embeds Contextual Teaching and Learning (CTL) principles, aligning abstract theoretical administrative concepts with realistic, simulated industry scenarios (Hyun et al., 2020). By structuring the application to match the actual sequence of corporate mail-processing, the media provides students with authentic mental models of modern office workflows. The slightly lower technical score of 80.00% highlighted the need for minor user-interface (UI) optimizations, such as text scaling for smaller smartphone displays, which was completed prior to classroom deployment.

The outstanding user practicality score of 93.71% represents a critical milestone. Specifically, the highest score was recorded in perceived usefulness 95.00%, showing that students recognized the direct, tangible relevance of SINTAKSA's simulated tasks to their future careers in office management.

Analyzed through the lens of the Technology Acceptance Model (TAM), these high practicality scores confirm that SINTAKSA successfully minimized technological friction (Samara & Susanti, 2023). In traditional computer-based learning tools, students often experience high cognitive load because they must spend substantial mental energy navigating complex software interfaces or troubleshooting compatibility issues on under-powered devices. SINTAKSA's responsive, mobile-friendly design eliminated these obstacles. By reducing non-essential technical barriers, the software lowered the students' extraneous cognitive load. Consequently, students could direct their limited working memory and mental effort entirely toward processing the actual vocational tasks such as evaluating mail urgency, determining correct filing classifications, and analyzing retention dates. This finding supports

the empirical model of Kulkarni et al. (2022), who established that satisfying students' basic psychological needs through structured educational gamification directly mitigates technical friction and sustains intrinsic engagement.

Furthermore, the high attractiveness rating 91.43% validates the psychological integration of gamification elements (XP, streaks, level progression). For vocational students who frequently encounter motivational drops due to inadequate physical facilities, gamification acts as a vital mechanism for extrinsic and intrinsic motivation. It shifts the learning environment from a passive, spectator-based structure to an active, goal-oriented arena, transforming mundane clerical procedures into highly rewarding, micro-progress challenges (Zainuddin et al., 2023).

The significant, well-distributed increase in student engagement from 71.84 to 84.01 confirms SINTAKSA's pedagogical efficacy. The balanced gains across all three dimensions support the interactive multidimensional engagement loop proposed by Wong and Liem (2021). Within this loop, emotional connection stimulates active behavioral participation, which subsequently facilitates deeper cognitive processing and directly translates into improved task performance and problem-solving capabilities in technology-based technical and vocational education (X.-Z. Li et al., 2022; Wong & Liem, 2021).

The highest absolute gain occurred within the emotional engagement dimension (+13.83 points). Evaluated through Self-Determination Theory (Ryan & Deci, 2020), the simulation met students' basic psychological needs: competence was nurtured through instant, gamified visual achievements and step-by-step progress tracking; autonomy was supported by allowing students to navigate through different modules independently; and relatedness was established by casting students in realistic corporate administrative roles.

The +12.02 increase in behavioral engagement signifies a concrete behavioral transformation. Before the intervention, classroom observations revealed a highly passive environment where students without personal laptops were excluded from active practice. SINTAKSA successfully neutralized this facility disparity by offering inclusive smartphone compatibility. By providing universal device accessibility, the tool restored equitable opportunities for hands-on practice, converting passive spectators into active, self-regulated participants who can independently direct their study practices toward creative vocational execution (Dharma et al., 2024; Huang et al., 2020)

Finally, the cognitive engagement increase (+10.66 points) demonstrates that SINTAKSA stimulated higher-order thinking skills (HOTS). Unlike previous disjointed learning software (Setyani & Bukhori, 2022), SINTAKSA's integrated mail-to-archive framework challenged students to analyze the complete lifecycle of a document, fostering the exact cognitive engagement and critical innovation abilities required in complex, computer-servicing and administrative environments (S. Li & Lajoie, 2021). This finding is highly consistent with Rafiq et al. (2022), who observed that active classroom engagement in computer application modules significantly bolsters the analytical and innovative thinking skills of vocational learners. By mastering these integrated steps, students develop robust vocational innovation competencies, enhancing their overall readiness and competitive advantage in the modern digital job market (Xie et al., 2023).

This pedagogical shift aligns with the experiential, work-experience-based learning paradigm advocated in contemporary national vocational curriculum frameworks, which emphasize authentic work scenarios to build professional resilience (Sudira, 2022).

5. Conclusion

This Research and Development (R&D) study successfully engineered and validated SINTAKSA, an inclusive, web-based digital simulation designed to seamlessly integrate correspondence and archiving into a singular, authentic office workflow. Validation results confirmed the platform's robustness, achieving high technical and pedagogical feasibility (83.75%) alongside exceptional user practicality (93.71%). These metrics underscore that SINTAKSA is not only instructionally sound but also highly intuitive, effectively breaking down traditional subject silos to accurately mirror real-world administrative ecosystems.

Furthermore, SINTAKSA demonstrated profound efficacy in elevating student engagement, evidenced by a significant mean score surge from 71.84 to 84.01. This enhancement was comprehensively distributed across emotional (+13.83), behavioral (+12.02), and cognitive (+10.66) dimensions. The pronounced spike in emotional engagement suggests that the simulation's authentic and interactive workflow successfully mitigates learning apathy, fostering a deeply active and meaningful educational experience.

Beyond instructional metrics, the study highlights a critical socio-technological breakthrough. By leveraging advanced mobile-friendly responsiveness, SINTAKSA successfully circumvented severe classroom infrastructure disparities, such as the lack of adequate computer laboratories. This adaptability establishes SINTAKSA as a highly accessible, scalable model for inclusive vocational education, proving that digital simulations can effectively democratize quality practical training across diverse socio-economic contexts.

A major limitation of this study is its implementation in a single classroom with a relatively small sample size. Additionally, the current web-simulation functions as an individual user platform without real-time peer-to-peer collaboration. Future research should implement SINTAKSA on a larger, and incorporate collaborative multi-user roles to simulate teamwork dynamics in corporate environments.

6. References

- Adam, D. B., & Mengistie, B. M. (2026). Challenges and strategies in implementing technical and vocational education subjects in vocationalized secondary schools. *Discover Education*, 5(1), 228. <https://doi.org/10.1007/s44217-026-01203-8>
- Dharma, B. A., Churiyah, M., Suputra, I. N., & Basuki, A. (2024). The Effect of Cloud Tracking-Based Integrated Supply Chain Learning Devices on Critical Thinking Skills, Learning Behavior, Student Career Development with Variable Moderation Learning Media. *Revista de Gestão Social e Ambiental*, 18(8), e06196. <https://doi.org/10.24857/rgsa.v18n8-013>
- Huang, L., Li, S., Poitras, E. G., & Lajoie, S. P. (2020). Latent profiles of self-regulated learning and their impacts on teachers' technology integration. *British Journal of Educational Technology*, 52(2), 695–713. <https://doi.org/10.1111/bjet.13050>
- Hyun, C. C., Wijayanti, L. M., Asbari, M., Purwanto, A., Santoso, P. B., Igak, W., Bernarto, I., & Pramono, R. (2020). Implementation of contextual teaching and learning (CTL) to improve the concept and practice of love for faith-learning integration. *International Journal of Control and Automation*, 13(1), 365–383. <https://sersc.org/journals/index.php/IJCA/article/view/5737>
- Ibrahim, F., Broos, P., Susyana, C. M., & Muthmainnah. (2023). Perancangan Sistem Informasi E-Arsip Dokumen di Bappelitbang Kota Bandung Berbasis PHPRAD. *Jurnal JTIK (Jurnal Teknologi Informasi Dan Komunikasi)*, 7(1), 8–16. <https://doi.org/10.35870/jtik.v7i1.639>
- Khair, S. N., Suhendra, S., & Nurfaizah, N. (2025). The relationship between independent

- learning and mathematical creative thinking ability in vocational high school students. *Jurnal Gantang*, 10(2), 339–349. <https://doi.org/10.31629/do3y1523>
- Khoimatun, K., Rukmini, P., & Padlilah, M. (2023). Upaya Meningkatkan Hasil Belajar dan Keterampilan Menulis Kalimat Saran melalui Model Pembelajaran Multisensori. *Jurnal Riset Pendidikan Dan Pengajaran*, 2(2), 275–288. <https://doi.org/10.55047/jrpp.v2i2.526>
- Kulkarni, P., Gokhale, P., Satish, Y. M., & Tigadi, B. (2022). An empirical study on the impact of learning theory on gamification-based training programs. *Organization Management Journal*, 19(5), 170–188. <https://doi.org/10.1108/omj-04-2021-1232>
- Li, S., & Lajoie, S. P. (2021). Cognitive engagement in self-regulated learning: an integrative model. *European Journal of Psychology of Education*, 37(3), 833–852. <https://doi.org/10.1007/s10212-021-00565-x>
- Li, X.-Z., Chen, C.-C., & Kang, X. (2022). Research on the cultivation of sustainable development ability of higher vocational students by creative thinking teaching method. *Frontiers in Psychology*, 13. <https://doi.org/10.3389/fpsyg.2022.979913>
- Niittylahti, S., Annala, J., & Mäkinen, M. (2021). Student engagement profiles in vocational education and training: a longitudinal study. *Journal of Vocational Education & Training*, 75(2), 372–390. <https://doi.org/10.1080/13636820.2021.1879902>
- Pahlevi, T., Puspasari, D., Muhidin, S. A., Wulandari, S. S., Puspasari, D., & Panduwina, L. F. (2023). Skills and Responses of Student: Improving Learning Through Web-Based Archive Management Learning Media. In *Advances in Computer Science Research* (pp. 111–122). Atlantis Press International BV. https://doi.org/10.2991/978-94-6463-236-1_12
- Rafiq, A. A., Triyono, M. B., & Djatmiko, I. W. (2022). Enhancing student engagement in vocational education by using virtual reality. *Waikato Journal of Education*, 27(3), 175–188. <https://doi.org/10.15663/wje.v27i3.964>
- Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary Educational Psychology*, 61. <https://doi.org/10.1016/j.cedpsych.2020.101860>
- Samara, A., & Susanti, M. (2023). Pengaruh Kemudahan Penggunaan, Pengalaman Pengguna Dan Kepuasan Pelanggan Terhadap Loyalitas Pelanggan Pada Penggunaan Aplikasi Dompot Digital (E-Wallet) di Kalangan Mahasiswa Universitas Buddhi Dharma. *Jurnal Riset Akuntansi*, 1(2), 249–260. <https://doi.org/10.54066/jura-itb.v1i2.700>
- Schultheiss, T., & Backes-Gellner, U. (2022). Does updating education curricula accelerate technology adoption in the workplace? Evidence from dual vocational education and training curricula in Switzerland. *The Journal of Technology Transfer*, 49(1), 191–235. <https://doi.org/10.1007/s10961-022-09971-9>
- Setyani, E. E., & Bukhori, I. (2022). Pengembangan Sistem Arsip Elektronik Berbantuan Web Sebagai Media Pembelajaran Untuk Meningkatkan Keterampilan Pratikum Peserta Didik. *Economic and Education Journal (Ecoducation)*, 4(2), 249–263. <https://doi.org/10.33503/ecoducation.v4i2.1835>
- Slamet, F. A. (2022). *Model Penelitian Pengembangan (RnD)*. Institut Agama Islam Sunan Kalijogo Malang.
- Sudira, P. (2022). *Filosofi & Teori Pendidikan Vokasi dan Kejuruan*. UNY Press.
- Wong, Z. Y., & Liem, G. A. D. (2021). Student Engagement: Current State of the Construct, Conceptual Refinement, and Future Research Directions. *Educational Psychology Review*, 34(1), 107–138. <https://doi.org/10.1007/s10648-021-09628-3>
- Xie, X., Yu, Y., & Wang, W. (2023). Impact of Vocational Core Competencies of Higher Vocational Students on Innovative Behavior: The Mediating Effect of Creative Self-Efficacy and Moderating Effect of Core Self-Evaluation. *Sage Open*, 13(3). <https://doi.org/10.1177/21582440231196661>

- Zainuddin, Z., Rasyidin, R., Zanzibar, Z., Aruni, F., & Nurmasyahyati, N. (2023). Andragogical principles in a gamification concept: how does it work for adult learners in an online class? *Journal of Applied Research in Higher Education*, 15(5), 1632–1648. <https://doi.org/10.1108/jarhe-04-2022-0127>
- Zhang, X., Qian, W., & Chen, C. (2024). The effect of digital technology usage on higher vocational student satisfaction: the mediating role of learning experience and learning engagement. *Frontiers in Education*, 9. <https://doi.org/10.3389/feduc.2024.1508119>