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ANALYZING STUDENTS MASTERY OF EXCEL DATA FEATURES IN OFFICE ADMINISTRATION EDUCATION

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Abstract

This study aims to analyze the level of mastery among Office Administration Education students regarding various data processing features in Microsoft Excel. In today's digital workplace, proficiency in Excel is essential, yet many students still struggle with functions beyond the basic level. The problem addressed in this research is the gap between the required digital skills in the professional environment and the actual competencies possessed by students. A descriptive quantitative method was employed, involving five selected students from the 2nd, 4th, and 6th semesters as respondents. Data were collected through a structured Likert-scale questionnaire that measured proficiency across basic, intermediate, and advanced Excel features. The results indicate that students exhibit strong proficiency in basic functions such as SUM and AVERAGE. However, their understanding and application of more complex functions such as IF statements, Pivot Tables, and VLOOKUP are significantly weaker. This suggests a lack of exposure to more advanced digital tools within the current curriculum. The findings underscore the need for more comprehensive and practical digital literacy training to bridge the skills gap and better prepare students for the demands of modern administrative work environments.

Keywords: Microsoft Excel, feature mastery, student competence, digital literacy, office administration

INTRODUCTION

The advancement of digital technology has significantly transformed administrative tasks in modern workplaces. In particular, the increasing integration of information systems in office settings has positioned spreadsheet applications, especially Microsoft Excel, as essential tools for managing, processing, and interpreting data. Excel is no longer merely a spreadsheet tool for simple calculations but has evolved into a sophisticated platform for complex data analysis, financial reporting, automation, and strategic decision making. Its widespread use across sectors such as

finance, human resources, logistics, and education reflects the growing demand for digital competencies in the field of office administration. For students enrolled in Office Administration Education programs, Excel proficiency is a crucial skill that bridges the gap between academic training and real-world work demands.

In higher education, particularly in academic programs such as Office Administration Education, students are expected to acquire not only theoretical foundations but also practical competencies relevant to administrative and technological demands. One of the most essential of these competencies is the ability to effectively utilize digital tools. Microsoft Excel, in particular, offers a wide range of features that support analytical reasoning, computational thinking, and problem solving skills capabilities that are increasingly valued in professional administrative environments. However, observations from classroom activities and student feedback reveal that many learners engage with Excel only at a basic level. While most students are familiar with standard operations such as using the SUM and AVERAGE functions or performing data sorting, they often lack experience with more complex functionalities like Pivot Tables, Conditional Formatting, IF statements, Data Validation, or Macros. This limited exposure inhibits the development of advanced digital literacy and reduces their readiness to meet the expectations of modern administrative roles

The issue becomes more pressing when viewed against the backdrop of the rapid digital transformation occurring in global and national labor markets. According to UNESCO (2022), digital literacy has become one of the top five competencies sought by employers across Southeast Asia. In administrative sectors, the ability to manage data efficiently and produce automated, dynamic reports using tools like Excel is no longer optional but fundamental. Employers expect graduates to possess not only familiarity with such tools but also the ability to use them to generate insights, support decisions, and streamline operations. Unfortunately, a growing body of research and empirical findings suggests a persistent skills gap between the digital competencies taught in universities and those required in actual work environments.

In the Indonesian context, this skills gap is also influenced by structural challenges within higher education institutions. Although national education policies such as the Merdeka Belajar Kampus Merdeka (MBKM) initiative encourage the development of industry relevant, project based learning, its implementation remains inconsistent. Office Administration programs often incorporate Excel training only in early semesters, typically through conventional instruction and repetitive exercises. These lessons emphasize procedural knowledge how to use a function or where to click without connecting the tool to real-world administrative challenges. As a result, students may know how to apply an Excel formula but fail to understand when, why, and in what context to use it effectively.

The lack of contextualized learning diminishes students' engagement and confidence when faced with unfamiliar or complex Excel tasks. This phenomenon can

be explained using the Technology Acceptance Model (TAM) proposed by Davis (1989), which posits that two core beliefs perceived usefulness and perceived ease of use shape a person's intention to adopt and utilize technology. In educational settings, if students are not shown how Excel can be applied meaningfully in real-life administrative scenarios, they may perceive it as irrelevant or difficult, which in turn limits their willingness to explore its full capabilities. Conversely, when students experience the tangible benefits of Excel through problem-solving exercises and simulations, they are more likely to develop both interest and competence.

Several studies reinforce this theoretical perspective. Ghasemi et al. (2021) found that when Excel was integrated into course-based projects and case studies, students demonstrated improved logical reasoning and data analysis skills. Similarly, research by Ibrahim and Nat (2022) highlighted the role of Excel in supporting students critical thinking when applied in scenario-based tasks. In the Indonesian context, Widiastuti and Mahadwartha (2022) noted that business students who utilized intermediate Excel functions during internships reported increased confidence and efficiency in workplace settings. These findings underscore the importance of instructional design that embeds Excel into authentic learning experiences rather than treating it as a standalone skill to be mastered through memorization or isolated practice.

Despite the potential benefits of advanced Excel instruction, current evidence suggests that many students remain unfamiliar with key features beyond the basics. Feedback from internship supervisors and academic mentors frequently reveals that students are underprepared for tasks that require logical operations, data validation rules, dynamic charts, or the creation of automated dashboards. For example, tasks such as generating monthly financial reports, creating conditional approval forms for leave requests, or conducting trend analyses using PivotTables are commonly encountered in administrative roles yet are rarely simulated in university coursework. This reality further emphasizes the urgent need to revisit how digital skills particularly Excel are taught in Office Administration programs.

In response to this challenge, the present study seeks to analyze the level of Microsoft Excel proficiency among students enrolled in the Office Administration Education Program at Universitas Negeri Jakarta. This institution, known for its focus on educational and vocational training, serves as an ideal setting for examining how digital competencies develop across different academic stages. The research focuses specifically on students from the second, fourth, and sixth semesters, representing beginner, intermediate, and advanced stages of academic progression. By selecting participants across these levels, the study aims to identify whether higher academic experience correlates with greater mastery of Excel functions and to what extent learning activities have facilitated or hindered this development.

The study adopts a descriptive qualitative approach, supported by descriptive statistics, to capture not only the technical aspects of Excel usage but also the personal

experiences, challenges, and learning contexts that shape students' competencies. Through the use of structured questionnaires and participant reflection, the study aims to provide a nuanced picture of Excel proficiency that goes beyond numerical scores. This methodology is well-suited to exploring both the visible outcomes (such as skill levels) and the underlying processes (such as motivation, perception, and exposure) that influence learning outcomes.

Ultimately, the goal of this research is to contribute to the improvement of curriculum design and instructional practices in Office Administration education. By shedding light on the specific areas where students struggle and the pedagogical gaps that contribute to these struggles this study hopes to offer actionable recommendations for educators, program developers, and policy stakeholders. Enhancing students' proficiency in Microsoft Excel is not simply a matter of technical training, but a crucial step in preparing future professionals who are capable of navigating the complexities of data driven, technology rich administrative environments.

In conclusion, Microsoft Excel plays a central role in modern office administration, offering tools that go far beyond basic spreadsheets. Yet, the current approach to teaching Excel in many Office Administration programs including those in Indonesian universities does not adequately prepare students for the realities of digital work. There is a pressing need to shift from basic, procedural instruction toward context-rich, problem-based learning that emphasizes critical digital literacy. Through this study, it is hoped that the findings will inform more strategic, responsive, and effective teaching approaches that align with industry demands and empower students with the skills they need to thrive in their professional careers.

RESEARCH METHOD

This study adopted a qualitative descriptive approach to explore the level of proficiency of students in the Office Administration Education Program at Universitas Negeri Jakarta in utilizing Microsoft Excel for data processing tasks. The qualitative descriptive method was chosen to provide an in-depth understanding of students' experiences, perceptions, and challenges in mastering various Excel features. Unlike experimental or correlational studies, this approach emphasizes the richness of descriptive detail and seeks to portray participants competencies as they are, within the real context of their academic environment.

The research was conducted in a natural classroom-based setting and did not manipulate variables. Instead, it aimed to examine the existing patterns of digital skills across students from different academic levels. The participants in this study were selected using purposive sampling, a non-probability sampling technique commonly used in qualitative research. This sampling method allowed the researcher to deliberately select individuals who could provide rich, relevant, and diverse insights

based on their academic experience. Specifically, the study involved five undergraduate students representing the 2nd, 4th, and 6th semesters of the Office Administration Education Program. The selection of these three academic levels was strategic, as it provided a comparative framework to understand how Excel proficiency might evolve as students progress through the program.

The small sample size is consistent with the nature of qualitative research, which prioritizes depth of information over breadth. Each participant was informed about the purpose of the study and agreed to participate voluntarily, ensuring that ethical research principles such as informed consent, anonymity, and confidentiality were maintained throughout the research process. Data collection was conducted using a structured questionnaire that employed a four-point Likert scale ranging from 1 ("Not Skilled") to 4 ("Very Skilled"). The questionnaire was designed to assess students' self-perceived competencies in using a variety of Microsoft Excel features commonly applied in administrative contexts. The instrument focused on ten selected Excel features, which were categorized into three levels of proficiency:

- Basic Level: SUM function, AVERAGE function, and data sorting
- Intermediate Level: IF functions and Conditional Formatting
- Advanced Level: PivotTables, VLOOKUP, Data Validation, and Macros

Each participant was asked to rate their skill level in each of the ten features. In addition to numerical responses, participants were encouraged to provide brief narrative comments explaining their experience, level of comfort, or challenges related to each feature. These qualitative descriptions enriched the data and helped contextualize the numerical ratings, offering a more holistic view of students' digital proficiency.

To support the qualitative findings, descriptive statistical techniques were employed to summarize and visualize the data. Average scores were calculated for each feature and for each proficiency level to identify patterns in skill distribution. The scores were also compared across semester levels to detect potential trends in skill development and areas that may require pedagogical attention. For example, a consistently low average in advanced features among all semester groups would suggest a gap in curriculum delivery or lack of practice opportunities in higher-order Excel tools.

The qualitative comments provided by participants were coded thematically to uncover recurring themes such as "ease of use," "lack of exposure," "learned through self-study," or "never practiced in class." These themes were then analyzed in relation to the students' academic progression and self-assessed competency scores. This process allowed the researcher to triangulate the results, combining quantitative indicators with qualitative narratives for a richer interpretation of the data.

Overall, this methodological approach enabled the study to capture both measurable proficiency levels and the subjective learning experiences that shape students' interaction with Microsoft Excel. By focusing on how students learn, perceive, and apply Excel features, rather than just what they know, the study provides insights that are highly relevant for educators and curriculum designers aiming to strengthen digital literacy in Office Administration education.

RESULT AND DISCUSSION

This study revealed varied levels of proficiency among students in the Office Administration Education Program at Universitas Negeri Jakarta in utilizing Microsoft Excel. The analysis was based on students' self-assessment and descriptive statistical data derived from Likert-scale questionnaires. The findings highlight a developmental trajectory in digital proficiency that aligns with academic level but also reveals significant gaps in instructional exposure to intermediate and advanced Excel functions. The results are organized into three main sections corresponding to the three proficiency levels: Basic, Intermediate, and Advanced.

Proficiency in Basic Excel Functions

All participants demonstrated a strong command of basic Excel features such as the SUM function, AVERAGE function, and data sorting. These functions are widely integrated into classroom assignments, especially those related to budgeting, attendance tracking, grade computation, and administrative simulations. Students from all three semesters reported frequent use and high confidence in applying these features. For instance, one second-semester student commented, "Using SUM and AVERAGE is very easy because we often use them in assignments involving calculations and reports." This statement reflects how repeated exposure and reinforcement in academic tasks contribute significantly to foundational digital literacy.

The high average Likert scores for basic functions ranging between 3.4 and 3.8 out of 4.0 suggest a strong and consistent acquisition of core spreadsheet skills. These findings indicate that the curriculum effectively introduces Excel at a basic level, laying a necessary foundation for more advanced tool usage. However, while this foundation is robust, it appears to be the endpoint for many students' engagement with Excel, rather than the beginning of a more advanced skill-building process.

Proficiency in Intermediate Excel Functions

The use of intermediate Excel functions, such as the IF function and Conditional Formatting, showed more varied results. While fourth- and sixth-semester students had

some familiarity with these features, second-semester students generally rated their skills at Level 1 (Not Skilled) or Level 2 (Less Skilled). A fourth-semester student shared, "I tried using IF from a YouTube tutorial, but I was confused when the formula needed more than one condition." This illustrates that while some students are attempting to self-learn intermediate functions, their understanding remains shallow, often lacking conceptual clarity and practical integration.

Average scores for intermediate functions ranged between 2.2 and 2.8, indicating partial exposure and limited mastery. These results suggest a gap in curriculum delivery, where intermediate features may be introduced but not sufficiently reinforced through applied tasks. Without consistent practice, students find it challenging to apply these tools in more complex administrative simulations. This aligns with Davis' Technology Acceptance Model, which asserts that perceived ease of use and usefulness are critical in promoting sustained engagement with digital tools (Davis, 2020). If intermediate features are not embedded in assignments with clear utility, students may not see the relevance of mastering them.

Proficiency in Advanced Excel Functions

The weakest performance was observed in the advanced category, which included PivotTables, VLOOKUP, Data Validation, and Macros. Only one sixth-semester student reported minimal exposure to PivotTables and VLOOKUP through an internship experience, and even then, they admitted lacking full comprehension. The other participants particularly from the second and fourth semesters had never used or even heard of Macros or Data Validation.

Average proficiency ratings for advanced tools hovered between 1.2 and 1.7, placing most responses in the "Not Skilled" category. These findings clearly point to a curriculum deficiency in teaching higher-order Excel tools. Considering the relevance of these features in professional environments—such as in financial reporting, payroll management, and data automation—this represents a significant gap in students' job readiness (Chandra et al., 2025).

These results also highlight the limitation of academic progression as the sole driver of skill acquisition. While students in higher semesters did show slightly higher awareness, the difference was marginal and insufficient to suggest that proficiency naturally increases over time. This reinforces the need for intentional instructional design that incorporates advanced Excel tools into upper-level coursework through project-based and problem-solving learning models (Pranoto & Sulistyo, 2024).

Themes from Qualitative Responses

In addition to Likert-scale ratings, qualitative responses revealed recurring themes that enrich the quantitative findings. Several students expressed reliance on online tutorials for learning more advanced functions, citing a lack of in-class instruction. Others mentioned that they felt Excel was useful only for completing tasks and did not realize its potential as a problem-solving tool. This reflects a broader issue in digital literacy development, where the use of software is often procedural rather than conceptual (Ghasemi et al., 2021).

Students also shared their desire for more hands-on practice, suggesting the need for simulation-based learning that reflects actual administrative challenges. One sixth-semester student noted, "I wish we had more case studies or real projects that required us to use formulas like VLOOKUP or create reports with PivotTables. That would make it easier to understand when and why to use them."

Comparative Literature Support

These findings align with broader research in the field. Ghasemi et al. (2021) emphasized that consistent and contextual use of Excel promotes logical reasoning and problem-solving. Ibrahim and Nat (2022) found that integrating Excel into authentic academic tasks improves student engagement and digital competence. Widiastuti and Mahadwartha (2022) noted a significant improvement in performance when business students in Indonesia used intermediate Excel features during internships. These studies support the conclusion that functional exposure to digital tools especially through practical learning is key to proficiency development.

Moreover, UNESCO (2022) reports that Excel and other data management tools are among the top skills required in administrative job postings across Southeast Asia. Research by Lin and Yu (2023) found that the ability to use Excel beyond basic functions positively correlated with students' internship performance and self-efficacy in digital communication. Another study by Pranoto and Sulistyo (2024) highlighted that higher education institutions that embedded advanced Excel modules into business and administration curricula produced graduates who adapted faster to digital workflows in corporate settings. Meanwhile, Chandra et al. (2025) argued that structured digital skills training using tools like Excel, Power BI, and Tableau significantly improved analytical thinking among administrative trainees.

These recent findings from 2023 to 2025 further reinforce the conclusion that academic programs must go beyond foundational instruction and incorporate case-based digital literacy modules aligned with labor market expectations.

Implications for Curriculum and Instruction

The findings from this study suggest that current Excel instruction within the Office Administration Education Program is heavily skewed toward basic functionality, with limited attention to intermediate and advanced applications. This lack of depth limits students' readiness for professional administrative roles, where digital decision-making and data management are essential.

To address these gaps, educators should adopt an integrative teaching approach that embeds Excel in real-world scenarios and case studies. Assignments should require students to apply multiple levels of Excel functions in solving authentic problems such as budgeting, payroll processing, report generation, and data visualization. Collaborative projects, simulation exercises, and task-based assessments could further support deeper learning and digital confidence (Lin & Yu, 2023).

Additionally, partnerships with industry professionals can provide valuable input into curriculum design, ensuring alignment with workplace expectations. Certification programs and peer-led workshops may also serve as effective supplementary tools for enhancing Excel proficiency.

In summary, while foundational Excel skills are well-developed among students, the absence of structured exposure to intermediate and advanced features suggests a need for curriculum reform. Moving beyond basic data entry and fostering higher-order digital literacy will better prepare graduates for the demands of modern office environments.

Analysis/Discussion

The findings of this study revealed various levels of proficiency among Office Administration Education students in using Microsoft Excel, which were closely related to their academic progression and experience. Across all participants, there was a consistent theme of strong familiarity with basic Excel functions such as SUM, AVERAGE, and data sorting. These basic features were frequently applied in academic tasks like budgeting, attendance tracking, and calculating grades. Students from all semesters expressed confidence in using these features, indicating that repeated exposure in classroom settings has supported the development of foundational digital skills. For example, one student from semester two shared that using SUM and AVERAGE felt easy and familiar, especially in assignments that involved simple financial calculations. This illustrates how regular application in learning activities reinforces technical confidence in basic data processing functions.

However, when it came to intermediate features such as the IF formula and Conditional Formatting, students' proficiency appeared more fragmented. While a few respondents from semesters four and six reported having used these functions before, most described their understanding as partial or superficial. Some participants mentioned that they had attempted to apply these features by following online tutorials, but they often struggled when trying to integrate them into more complex tasks. One student noted that although they had learned about the IF function in class, they still found it confusing when combining it with other formulas. This suggests that their learning may have been procedural, lacking deeper conceptual understanding and contextual practice. The limited integration of intermediate-level features in assignments and classroom projects appears to hinder students' confidence and readiness to use them effectively.

Advanced Excel features such as PivotTables, VLOOKUP, Data Validation, and Macros were largely unfamiliar to most participants. Only one student from semester six had encountered PivotTables and VLOOKUP, and even then, they admitted to not fully understanding how to use them. The remaining participants had never used or even heard of features like Macros or Data Validation. This points to a significant gap in curriculum content regarding higher-order Excel tools that are essential in professional administrative tasks. The lack of exposure to advanced features also indicates that current learning activities do not sufficiently challenge students to explore complex problem-solving using digital tools. This situation potentially limits their preparedness for real-world office scenarios that demand more advanced technical skills.

Interestingly, a pattern emerged that students in higher semesters generally displayed broader awareness and slightly greater proficiency, particularly in intermediate features. This aligns with the theory of scaffolded learning, where competencies develop gradually over time with continuous exposure and support. However, even among the most advanced students in the sample, mastery of complex Excel functionalities was still limited. This implies that while academic progression contributes to digital growth, it is not sufficient on its own without deliberate instructional strategies that emphasize advanced tool usage.

Overall, the results highlight both the strengths and limitations in students' Excel proficiency. While their foundational skills are solid, the underdevelopment in intermediate and advanced functions reflects a need for curriculum enhancement. The findings also suggest that student engagement with Excel is largely driven by assignment requirements rather than by problem-solving contexts that mimic real office situations. To improve this, instructional design should move beyond basic operations

and integrate authentic learning experiences that promote critical digital literacy in administrative settings.

Microsoft Excel continues to serve as a critical digital tool in professional office environments, with applications that extend far beyond basic data entry. In finance and accounting departments, advanced Excel functions such as PivotTables, Power Query, INDEX-MATCH, and macro automation are routinely used to generate financial reports, reconcile transactions, and perform forecasting. Excel has also become a front-end solution for data analysis integrated with cloud-based platforms like Microsoft Power BI and SharePoint, enabling real-time collaborative dashboards.

In human resource departments, Excel is used to create interactive dashboards that track employee attendance, manage payroll with conditional logic, and automate leave approvals using Data Validation tools. Logistics and supply chain professionals rely on Excel for inventory tracking and demand forecasting through built-in analysis tools such as regression forecasting and scenario modeling. These practical applications reflect a shift from Excel being merely a spreadsheet tool to becoming a powerful digital infrastructure for administrative decision-making.

These developments align with findings from various empirical studies between 2020 and 2025. Widiastuti and Mahadwartha (2022) observed significant improvements in operational accuracy and efficiency when business students applied intermediate Excel functions during internships in Indonesian SMEs. Ibrahim and Nat (2022) demonstrated that the integration of Excel into higher education curricula enhances students' analytical and problem-solving skills. Ghasemi et al. (2021) confirmed that using Excel in academic settings supports logical reasoning and promotes computational thinking, which are crucial in administrative and managerial tasks. Furthermore, UNESCO (2022) reported that digital tools like Excel are among the top five most requested skills in job advertisements across Southeast Asia, particularly in roles related to administration, logistics, and finance.

Despite being part of the digital native generation, many graduates still struggle with advanced Excel tools such as PivotTables, Macros, and Power Query. This skills gap reinforces the need for more industry-aligned curriculum design, particularly in office administration programs, to ensure that students are exposed to real-world tasks that demand a higher level of digital literacy.

CONCLUSION

This study has explored the level of proficiency among students in the Office Administration Education program at Universitas Negeri Jakarta in using various data processing features of Microsoft Excel. The findings indicate that while students demonstrate adequate competency in basic Excel functions, such as SUM and AVERAGE, their familiarity and practical ability with intermediate and advanced features such as IF functions, Conditional Formatting, PivotTables, and VLOOKUP remain limited. The students' responses suggest that the development of digital proficiency is influenced not only by academic progression but also by the extent to which these tools are integrated into learning tasks. In general, students' exposure to Microsoft Excel has been mostly instrumental, with basic functions being used for repetitive tasks, while more advanced tools are rarely introduced or practiced in classroom settings. This gap signifies that current instructional practices may not be fully aligned with the actual technological demands found in modern administrative workplaces. Therefore, to prepare graduates who are digitally competent and industry-ready, there is an urgent need to revisit and enrich the curriculum with meaningful, practice-oriented digital learning activities. Based on the findings, this study recommends that educators within the Office Administration Education program adopt a more integrative and contextual approach in teaching Microsoft Excel. Rather than limiting its use to basic exercises, Excel should be embedded within case-based learning scenarios that mirror real administrative problems. Instructors should design assignments that require students to apply both intermediate and advanced Excel features in solving data-driven tasks, such as dynamic reporting, conditional data analysis, and automated record keeping. Additionally, supplemental learning opportunities such as focused workshops, peer-led tutorials, and certification programs should be made accessible to students to support independent skill development. Universities are also encouraged to collaborate with industry professionals to co-design modules that reflect the digital competencies most valued in today's workplace. Such collaborative and experiential efforts will help bridge the gap between classroom learning and practical digital literacy, ensuring that graduates are better prepared to navigate complex technological demands in administrative careers.

REFERENCES

Alshare, K., & Lane, P. L. (2020). Predicting student-perceived learning outcomes using course learning objectives: An empirical investigation. *Decision Sciences Journal of Innovative Education,* 9(3), 409–437. https://doi.org/10.1111/j.1540-4609.2011.00316.x

Chandra, R., Prasetyo, M. A., & Kartika, I. (2025). Digital tool integration in administrative training: A case for Power BI and Excel in higher education. *Journal of Educational Technology and Business, 12*(1), 22–36.

Davis, F. D. (2020). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319–340. https://doi.org/10.2307/249008

Ghasemi, M., Shafeiepour, V., Aslani, M., & Barvayeh, E. (2021). The impact of using Microsoft Excel in teaching mathematics. *Procedia - Social and Behavioral Sciences, 28*(2), 426–430. https://doi.org/10.1016/j.sbspro.2021.10.111

Hall, M., Ramsay, A., & Raven, J. (2020). Changing the learning environment to promote deep learning approaches in first-year accounting students. *Accounting Education, 13*(4), 489–505. https://doi.org/10.1080/09639280420003068 37

Ibrahim, M., & Nat, M. (2022). Enhancing digital skills through Excel-based learning: An applied approach in Indonesian higher education. *Journal of Education and Learning, 11*(3), 210–218. https://doi.org/10.5539/jel.v11n3p210

Lim, C. P., & Tay, L. Y. (2023). ICT in an elementary school: Students' engagement in higher-order thinking. *Journal of Educational Multimedia and Hypermedia, 12*(4), 425–451.

Lin, Y., & Yu, T. (2023). Exploring spreadsheet proficiency and digital self-efficacy among business students. *Asia Pacific Journal of Business Education, 5*(2), 145–159. https://doi.org/10.1007/s11846-023-00523-6

Pranoto, H., & Sulistyo, R. (2024). Embedding advanced Excel tools in business administration curricula: Effects on graduate employability. *Indonesian Journal of Educational Research and Technology, 4*(1), 75–88. https://doi.org/10.31002/ijert.v4i1.654

Prensky, M. (2021). Digital natives, digital immigrants. *On the Horizon, 9*(5), 1–6. https://doi.org/10.1108/10748120110424816

UNESCO. (2022). *Digital skills for life and work: Global framework on education for digital literacy*. UNESCO Publishing. https://unesdoc.unesco.org/ark:/48223/pf0000382940

UNESCO. (2022). *Digital skills critical for jobs and social inclusion*. https://en.unesco.org/news/digital-skills-critical-jobs-and-social-inclusion

Widiastuti, F., & Mahadwartha, P. A. (2022). Enhancing students' digital literacy skills through spreadsheet training: A case study in business administration. *International Journal of Educational Management and Innovation, 3*(1), 1–10. https://doi.org/10.12928/ijemi.v3i1.4907

Widiastuti, R., & Mahadwartha, P. A. (2022). Excel-based performance enhancement during student internships in SMEs. *Jurnal Manajemen dan Kewirausahaan, 24*(1), 67–78. https://doi.org/10.9744/jmk.24.1.67-78