

*Analysis of Practical Learning: Comparative Study of Actual Industry and
Architectural Studio in Higher Institution*

THESIS

Submitted as one of the requirements to obtain a Master of Technology and Vocational
Education



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SEKOLAH PASCASARJANA
UNIVERSITAS PENDIDIKAN INDONESIA
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2023**

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**ANALYSIS OF PRACTICAL LEARNING: COMPARATIVE STUDY OF
ACTUAL INDUSTRY AND ARCHITECTURAL STUDIO IN HIGHER
INSTITUTION**

by

Quienera Nyeon Joshua

B.Arch University of Malaysia Sarawak, 2020

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Degree in Education (M.Pd.) at the Faculty of Technology and Vocational Education

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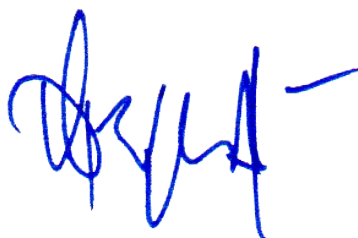
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ABSTRACT

This research highlighted the implementation of practical learning in both industry and in higher institutions. The aim of this study is to analyze the challenges and deficiencies encountered by students in the context of their practical learning. This analysis will encompass various factors, including the course curriculum, studio and internship hour, architectural educator, and studio facilities. The overarching goal is to identify and address the disparities between students' learning experiences and the industry's expectations, ultimately bridging this gap. The analysis considers various aspects, namely the course curriculum, studio and internship hours, the role of architectural educators, and the state of studio facilities. The overarching aim is to identify and rectify the discrepancies between students' educational experiences and the expectations of the industry, ultimately aiming to bridge this gap. The study focuses on Universiti Malaysia Sarawak (UNIMAS) as a case study, employing the convergent parallel design research method. The research includes participation from 50 final-year students and three practicing architects who collaborate with the institution. Data collection methods encompass the use of questionnaires and interviews, with subsequent data analysis involving descriptive quantitative analysis utilizing SPSS and qualitative analysis through thematic exploration using NVivo14. The research findings reveal significant disparities between the practical learning experiences at UNIMAS and the requirements of the industry. Firstly, there is an evident need to realign the course curriculum with industry demands, ensuring that subjects closely relate to industry practices. Secondly, the effective utilization of studio hours is essential for both educators and students to enhance the quality of learning experiences. Thirdly, it is imperative for architectural educators to possess pedagogical skills, irrespective of their prior industry backgrounds. Lastly, the maintenance of studio facilities, despite their adequate number, is crucial to promote a conducive learning environment. This study concludes that there are differences between practical learning at UNIMAS and the industry's expectations. It underscores the necessity for a more harmonious alignment between educational institutions and industry practices to better equip students for their future careers.

KEYWORDS: Architecture Studio, Practical Learning, Architect Competencies

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REFERENCES

- Abdullah, N. A. G., Beh, S. C., Tahir, M. M., Ani, A. I. C., & Tawil, N. M. (2011). Architecture design studio culture and learning spaces: A holistic approach to the design and planning of learning facilities. *Procedia-Social and Behavioral Sciences*, 15, 27–32.
- Anas Bin Othman, M., Ahmad, N. A., & Md Ajis, A. (2017). Daylight strategies for architectural studio facilities: the literature review. *IOP Conference Series: Earth and Environmental Science*, 67(1), 12025.
- Ashkan, M. (2016). The phenomenological evaluation of teaching professionalism in the architecture design studio culture: A case at the University of Kansas. *ArchNet-IJAR: International Journal of Architectural Research*, 10(1), 41.
- Atalan, Ö. (2018). Importance of cultural heritage and conservation concept in the “architectural education.” *Journal of Human Sciences*, 15(3), 1700–1710.
- Baghel, A., Dave, D., & Parikh, S. (2018). *Analysis of Current Internship Practice and its Relevance with Curriculum*.
- Barbarash, D. (2016). Knowledge and Skill Competency Values of an Undergraduate University Managed Cooperative Internship Program: A Case Study in Design Education. *Asia-Pacific Journal of Cooperative Education*, 17(1), 21–30.
- Cenani, Ş., & Aksoy, Y. (2020). An Introduction to Design Studio Experience: The Process, Challenges and Opportunities. *Journal of Design Studio*, 2(2), 57–69.
- Ceylan, S., Şahin, P., Seçmen, S., Somer, M. E., & Süher, K. H. (2021). An evaluation of online architectural design studios during COVID-19 outbreak. *Archnet-IJAR: International Journal of Architectural Research*, 15(1), 203–218.
- Corazzo, J. (2019). Materialising the Studio. A systematic review of the role of the material space of the studio in Art, Design and Architecture Education. *The Design Journal*, 22(sup1), 1249–1265.
- Datey, A. (2023). Decolonising the design curriculum: making “sustainability” accessible, understandable and practicable to second-year undergraduate architecture students. *Archnet-IJAR: International Journal of Architectural Research*.
- Dhadphale, T., & Wicks, B. (2022). Participatory Stakeholder Engagement in Design Studio Education. *International Journal of Art & Design Education*, 41(4), 589–602.

- Domenica Iulo, L., Gorby, C., Poerschke, U., Nickolas Kalisperis, L., & Woollen, M. (2013). Environmentally conscious design—educating future architects. *International Journal of Sustainability in Higher Education*, 14(4), 434–448.
- Duarte, J. P., Celani, G., & Pupo, R. (2012). Inserting computational technologies in architectural curricula. In *Computational design methods and technologies: applications in CAD, CAM and CAE education* (pp. 390–411). IGI Global.
- Erçevik Sönmez, B. (2020). Different Educational Approaches in Design Studio. *ICONARP International Journal of Architecture and Planning*.
- Evans, J. J., Garcia, E., Smith, M., Van Epps, A., Fosmire, M., & Matei, S. (2015). An assessment architecture for competency-based learning: Version 1.0. 2015 *IEEE Frontiers in Education Conference (FIE)*, 1–7.
- Hassanain, M. A., Alhaji Mohammed, M., & Cetin, M. (2012). A multi-phase systematic framework for performance appraisal of architectural design studio facilities. *Facilities*, 30(7/8), 324–342.
- Hermann, M. M., Hermann, H. C., & McGlohn, E. M. (2015). Educating Integrated Project Delivery Educators: A Study on the Source of IPD Knowledge Among Educators. *Proceedings of the Associated Schools of Construction Annual International Conference*.
- Ibrahim, N. L. N., & Utaberta, N. (2012). Learning in architecture design studio. *Procedia-Social and Behavioral Sciences*, 60, 30–35.
- Iftikhar, N., Crowther, P., & Burton, L. O. (2023). Identifying the phases of learning in an Australasian undergraduate architecture design studio model. *Arts and Humanities in Higher Education*, 14740222231156816.
- Indrawan, R., & Yaniawati, R. P. (2014). Metodologi Penelitian Kuantitatif. *Kualitatif, Dan Campuran Untuk Manajemen, Pembangunan, Dan Pendidikan, Bandung: Penerbit PT Refika Aditama*.
- Komarzyńska-Świeściak, E., Adams, B., & Thomas, L. (2021). Transition from Physical Design Studio to Emergency Virtual Design Studio. Available Teaching and Learning Methods and Tools—A Case Study. *Buildings*, 11(7), 312.
- Kurt, S. (2009). An analytic study on the traditional studio environments and the use of the constructivist studio in the architectural design education. *Procedia-Social and Behavioral Sciences*, 1(1), 401–408.
- Kuzmina, M. O., Protas, O. L., Fartushok, T. V., Raievska, Y. M., & Ivanova, I. B. (2020). *Formation of students' competence of tertiary educational institutions by*

practical training aids.

- Lamela, S. (2020). Effect of group tutoring on promoting students independent learning in Architecture Studio. *2020 Sixth International Conference on E-Learning (Econf)*, 92–97.
- Lubis, A. S., Hamid, B., Pane, I. F., & Marpaung, B. O. Y. (2018). Analysis of facility needs level in architecture studio for students' studio grades. *IOP Conference Series: Earth and Environmental Science*, 126(1), 12006.
- Luck, R. (2018). Participatory design in architectural practice: Changing practices in future making in uncertain times. *Design Studies*, 59, 139–157.
- Mari, T. S., Srirangam, S., Gunasagaran, S., Kuppusamy, S., & Ang, F. L. (2019). Architecture graduate work readiness: The gap between learning and employability. *IOP Conference Series: Materials Science and Engineering*, 636(1), 12010.
- Masdéu, M., & Fuses, J. (2017). Reconceptualizing the design studio in architectural education: Distance learning and blended learning as transformation factors. *Archnet-IJAR: International Journal of Architectural Research*, 11(2), 6.
- McLaughlan, R., & Chatterjee, I. (2020). What works in the architecture studio? Five strategies for optimising student learning. *International Journal of Art & Design Education*, 39(3), 550–564.
- Md Noor, A. S., Shaharudin, H., Ahmad, M. A., Bonollo, E., & Wan Omar, W. N. F. (2020). A study of studio environment on students' project outcome. *Voice of Academia (VOA)*, 16(1), 57–65.
- Mutaqi, A. S. (2018). Architecture studio learning: Strategy to achieve architects competence. *SHS Web of Conferences*, 41, 4004.
- NOOR, M. Z. M. (n.d.). The Future of Architectural Education in Malaysia: Introducing a New Theory of Studiogogy using SOLE Module1. *E-PROCEEDINGS*, 81.
- Obeidat, A., & Al-Share, R. (2012). Quality learning environments: Design-studio classroom. *Asian Culture and History*, 4(2), 165.
- Oliveira, S., Marco, E., & Gething, B. (2018). Towards an energy 'literate' architecture graduate? UK educators' and students' evaluation. *Architectural Engineering and Design Management*, 14(4), 317–329.
- Oluwatayo, A. A., Aderonmu, P. A., & Aduwo, E. B. (2015). Architecture students' perceptions of their learning environment and their academic performance.

Learning Environments Research, 18(1), 129–142.

Pattacini, L. (2018). Experiential Learning: the field study trip, a student-centred curriculum. *Compass: Journal of Learning and Teaching*, 11(2).

Pelsmakers, S., Donovan, E., Moseng, K., & Eyebye, B. (2020). Developing architecture studio culture: peer-peer learning. *Education, Design and Practice—Understanding Skills in a Complex World AMPS, Architecture MPS; Stevens Institute of Technology New Jersey/New York: 17-19 June, 2019*.

Podhalański, B. M. (2016). Practical training for architecture students from an employer's point of view. *Global Journal of Engineering Education*, 18(3).

Pons-Valladares, O., Hosseini, S. M. A., & Franquesa, J. (2022). Innovative Approach to Assist Architecture Teachers in Choosing Practical Sessions. *Sustainability*, 14(12), 7081.

Prince, M. (2004). Does active learning work? A review of the research. *Journal of Engineering Education*, 93(3), 223–231.

Raji, A. U., & Gafar, M. (2018). AN ASSESSMENT OF ARCHITECTURE STUDENTS' PERCEPTION ON THE SOFT AND PRACTICAL SKILLS INTEGRATION INTO THE CURRICULUM STRUCTURE FOR SUSTAINABLE DEVELOPMENT IN NIGERIA. *Journal of Technology Management and Business*, 5(2).

Riratanaphong, C. (2022). Designing an accommodation strategy: Findings from an architecture school. *Facilities*, 40(7/8), 413–434.

Rodriguez, C., Hudson, R., & Niblock, C. (2018). Collaborative learning in architectural education: Benefits of combining conventional studio, virtual design studio and live projects. *British Journal of Educational Technology*, 49(3), 337–353.

Şekerci, Y., Kahraman, M. U., & ÇAKMAK, A. (2021). Internship Experience in Architecture and Interior Architecture Departments from Students' Point of Views. *Online Journal of Art & Design*, 9(2).

SEVİNÇ KAYIHAN, K., ÖZÇELİK GÜNEY, S., & Ünal, F. C. (2018). Biophilia as the Main Design Question in Architectural Design Studio Teaching. *Megaron*, 13(1).

Sgambi, L., Kubiak, L., Basso, N., & Garavaglia, E. (2019). Active learning for the promotion of students' creativity and critical thinking: an experience in structural courses for architecture. *Archnet-IJAR: International Journal of Architectural Research*, 13(2), 386–407.

- Sidawi, B. (2012). The impact of social interaction and communications on innovation in the architectural design studio. *Buildings*, 2(3), 203–217.
- Smilovsky, N., Hargrove, A., Azevedo, J., & Brooks, K. (2019). *Visual Resource Analysis and Management Pedagogy Evaluation*.
- Soliman, A. M. (2017). Appropriate teaching and learning strategies for the architectural design process in pedagogic design studios. *Frontiers of Architectural Research*, 6(2), 204–217.
- Soliman, S., Taha, D., & El Sayad, Z. (2019). Architectural education in the digital age: Computer applications: Between academia and practice. *Alexandria Engineering Journal*, 58(2), 809–818.
<https://doi.org/10.1016/J.AEJ.2019.05.016>
- Suresh, D. (2015). Important of SPSS for social sciences research. *Available at SSRN 2663283*.
- Tian, C., Liu, X., & Qin, Z. (2022). Research and Practice on the Practical Teaching System of Architecture Specialty in Local Universities Under the Background of Application-Oriented Talents Training. *Journal of Education and Development*, 6(1), 59.
- Utaberta, N., Hassanpour, B., Abdullah, N. G., Tahir, M. M., & Spalie, N. (n.d.). *Reconstructing Sustainable Approaches in Architecture Education*.
- Utaberta, N., Hassanpour, B., & Bahar, M. A. (2012). An overview of architecture education in Malaysia: a critical analysis of assessment and critique session in 2nd year of architecture design studio at Architecture Department, The National University of Malaysia. *Procedia-Social and Behavioral Sciences*, 60, 221–227.
- Utaberta, N., Hassanpour, B., Surat, M., Ani, A. I. C., & Tawil, N. M. (2012). Architecture from teaching to learning to practice: authentic learning tasks in developing professional competencies. *International Journal of Educational and Pedagogical Sciences*, 6(7), 1809–1812.
- Van der Velden, M., & Mörtberg, C. (2015). Participatory design and design for values. *Handbook of Ethics, Values, and Technological Design: Sources, Theory, Values and Application Domains*, 41–66.
- Veloso, L., & Marques, J. S. (2017). Designing science laboratories: learning environments, school architecture and teaching and learning models. *Learning Environments Research*, 20(2), 221–248.
- Vowles, H., Low, J., & Doron, H. R. (2012). Investigating architecture studio culture in the UK: A progress report. *Journal for Education in the Built Environment*,

7(2), 26–49.

- Wahid, J., Abdullah, A. Bin, Salleh, B., & Arar, M. (2021). Classification of Malaysian Architecture Revisited. *RUAS*, 19(1), 48–56.
- Wong, C. S., & Jusan, M. B. M. (2017). Application of means-end chain research model to explore attributes of architecture studio. *International Journal of Applied Engineering Research*, 12(4), 498–508.
- Zairul, M. (2018). Introducing Studio Oriented Learning Environment (SOLE) in UPM, Serdang: Accessing Student-Centered Learning (SCL) in The Architectural Studio. *Archnet-IJAR: International Journal of Architectural Research*, 12(1), 241–250.