

EVALUATING THE EFFECTIVENESS OF THE STEP-BY-STEP GUIDE MODULE IN ENHANCING WORKING DRAWING MASTERY AMONG ARCHITECTURE STUDENTS

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ABSTRACT

Objective: This research aims to analyze the effectiveness of a step-by-step learning module in improving the mastery of working drawings among Semester 2 Diploma in Architecture students for the course DCA20333: Working Drawing 1. The primary focus of the study is to evaluate the extent to which this module assists students in mastering the transition between manual drawing skills and CADD applications, which form the core of the course assessment. A common problem faced by students at this stage is confusion in understanding technical symbolism, annotation standards, and the logic of drawing arrangement that complies with industry practices.

Research Method: This study utilizes a survey method involving the distribution of questionnaires to obtain student feedback on the effectiveness of the module regarding their assessment achievement

Findings: The results are expected to show that the systematic use of the module significantly enhances technical understanding and accelerates the process of completing quality drawings.

Originality: The research findings will serve as a solid foundation to support the publication of the book Step-By-Step Guide: Working Drawing 1 as a primary reference material for the DCA20333 course, thereby bridging the gap between academic theory and practical requirements in the field of architecture.

Keywords: working drawing, CADD, architecture, technical

1. INTRODUCTION

Course DCA20333: Working Drawing 1 is essential for establishing a foundation in construction documentation. Mastery of manual drafting is mandatory before progressing to CADD, ensuring students grasp technical details thoroughly. As noted by Ibrahim et al. (2019), this proficiency signifies the capacity to interpret structural logic and maintain industry compliance. Therefore, it is crucial to equip students with systematic workflows to ensure the production of high-quality, comprehensive architectural drawings.

2. PROBLEM STATEMENT

Second-year students often encounter significant challenges in adapting to the working drawing phase, which demands high technical precision. Based on observations, the identified issues include:

2.1 Procedural Confusion: Students demonstrate an inability to organize drawing elements according to the correct hierarchy, a critical requirement as discussed by Wakita et al. (2022).

2.2 Digital Adaptation Constraints: There is a notable gap in applying technical understanding derived from manual methods into the digital CADD environment (Hamzah & Yusof, 2021).

2.3 Lack of Specific Reference Materials: The limited availability of structured reference materials aligned specifically with the DCA20333 curriculum increases student over-reliance on continuous lecturer guidance. This situation reinforces

Hassan's (2021) argument regarding the urgent need for more systematic, phased teaching aids.

3. OBJECTIVES

- 3.1 To identify the level of student understanding regarding the sequence of working drawing production through the step-by-step module.
- 3.2 To evaluate the effectiveness of the module in assisting students to complete manual drawing and CADD assessments.
- 3.3 To examine student perceptions of the necessity of the "Step-By-Step Guide: Working Drawing 1" guidebook as a self-referenced learning tool.

4. LITERATURE REVIEW

4.1 SIGNIFICANCE OF WORKING DRAWINGS AND LEARNING CHALLENGES

Within the architectural discipline, working drawings serve as critical communication instruments and legal documents essential for translating design visions into physical execution on-site. Wakita et al. (2022) emphasize that failure to adhere to technical drawing standards is not merely an aesthetic issue but poses a significant risk of serious structural errors. For novice students, mastering fundamental elements—such as line weight hierarchy, material symbols, and dimensional accuracy—frequently presents a substantial challenge. In this regard, Ching (2014) asserts that the effectiveness of reference materials depends on their visual clarity, which enables students to project three-dimensional components into a two-dimensional format. The absence of organized guidance in the DCA20333 course often subjects students to cognitive load due to the complexity of technical details that must be managed simultaneously.

4.2 PEDAGOGICAL APPROACH

To address these learning constraints, the application of Vygotsky's scaffolding theory is identified as the most practical methodology. This theory emphasizes phased support to assist students in achieving higher competency levels through systematic guidance. In this context, a chunking strategy is employed to break down complex drawing processes into smaller, more manageable units. According to Miller (1956), human information processing limits can be optimized through the incremental organization of data. Through the step-by-step module, students can build a robust foundational understanding—ranging from grid establishment to intricate technical detailing—without being overwhelmed by disorganized information overload.

4.3 SYNERGY OF MANUAL SKILLS AND DIGITAL ADAPTATION

Contemporary architectural education demands a sustainable integration between hand-drawing skills and digital technology. Hamzah and Yusof (2021) demonstrate that robust manual drafting skills are a primary prerequisite for proficiency in CADD software operations. Students who deeply understand "construction logic" through manual methods are found to be more organized in managing digital components, such as layer structures and software commands. This finding aligns with Hassan's (2021) argument that dynamic teaching aids can effectively bridge the gap between academic syllabi and practical industry requirements. Consequently, the development of a module focusing on this manual-to-digital transition not only supports the achievement of DCA20333 course objectives but also fosters technical professionalism consistent with Malaysian construction industry standards.

5. METHODOLOGY

This study adopts a mixed-methods approach, integrating both quantitative and qualitative data collection to achieve a comprehensive analysis of the results.

5.1 RESEARCH DESIGN

The study utilizes Action Research design. The researcher introduced the module as a structured intervention during the lecture and studio sessions of the DCA20333 course.

5.2 POPULATION AND SAMPLING

The research sample consists of 27 second-semester Diploma in Architecture students enrolled in the DCA20333: Working Drawing 1 course (Session 2: 2025/2026). A purposive sampling technique was employed to ensure respondents were directly engaged in both manual drafting and CADD-based assessments.

5.3 RESEARCH INSTRUMENTS

i. Questionnaire (Survey): A 5-point Likert scale was utilized to measure student perceptions regarding the module's effectiveness in terms of understanding, ease of reference, and increased confidence.

ii. Portfolio Review (Observation of Work): The researcher conducted a comparative analysis of task quality before and after the introduction of the module.

5.4 DATA ANALYSIS

Quantitative data were analysed using Microsoft Excel software. Meanwhile, qualitative data obtained from the open-ended comment section of the questionnaire were categorized thematically to substantiate the research findings.

6. DATA ANALYSIS AND FINDINGS

6.1 CATEGORIES OF MODULE EFFECTIVENESS

Based on the 5-point Likert scale (1: Strongly Disagree, 5: Strongly Agree), the following are the mean scores for each primary section of the module.

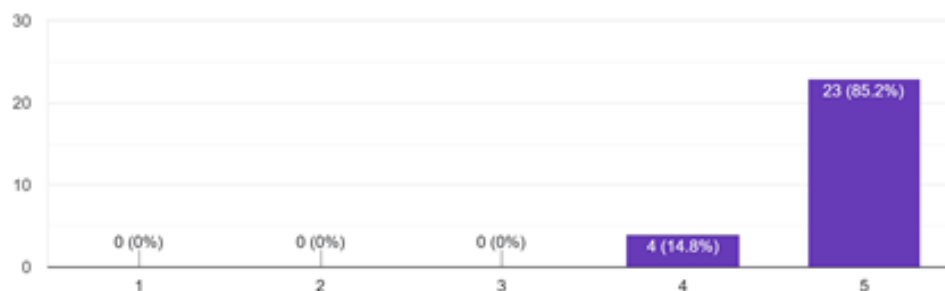


Figure 1: Student Perception of the Module's Effectiveness in Clarifying Working Drawing Workflows

Figure 1 illustrates the high level of effectiveness of the module. A vast majority (85.2%) of respondents awarded the maximum score, indicating that the module successfully and clearly elucidates the workflow sequence, from grid establishment to wall detailing. While, Figure 2 demonstrates that the module is highly beneficial. A total of 77.8% of respondents agreed that the incremental steps facilitate the processing of complex technical information.

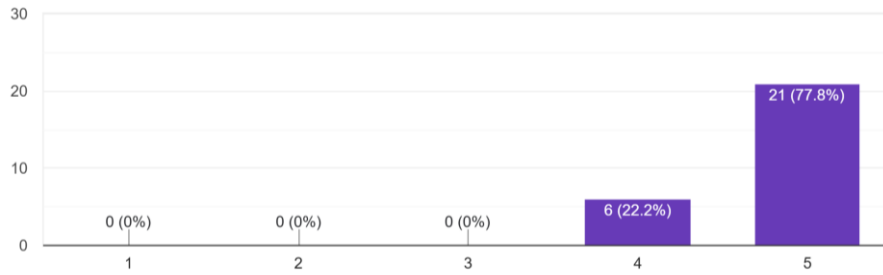


Figure 2: Impact of Incremental Learning Steps on Facilitating Technical Information Processing

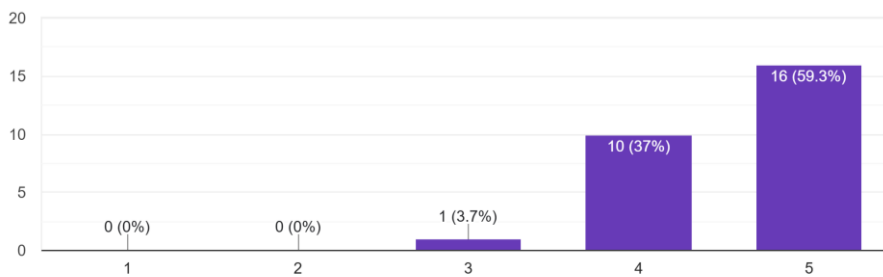


Figure 3: Effectiveness of Visual Diagrams in Enhancing Mastery of Line Weight Hierarchy

Figure 3 shows that 59.3% of respondents awarded a score of 5, while 37% gave a score of 4. This indicates that the diagrams within the module effectively enhance visual understanding regarding line weight hierarchy.

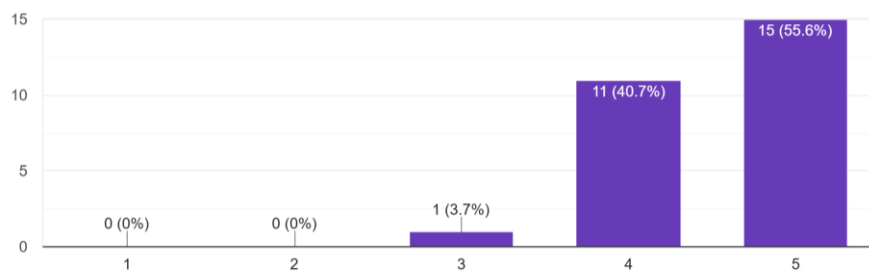


Figure 4: Student Confidence Levels in Initiating Manual Drawing Tasks Post-Module Intervention

Figure 4 indicates that while a small minority (3.7%) remained at a moderate level (score 3), over 96% of respondents felt more confident in initiating manual drawings after referring to the module.

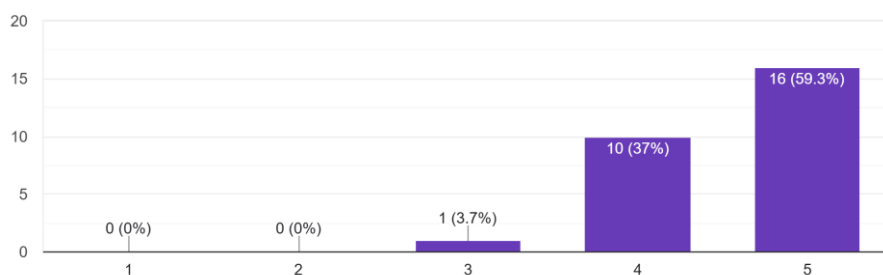


Figure 5: Student Perception of Error Reduction in Drawing Documentation

Figure 5 shows that the majority of respondents (59.3% with a score of 5) felt that the module helped reduce errors in technical symbols and annotations within their drawings.

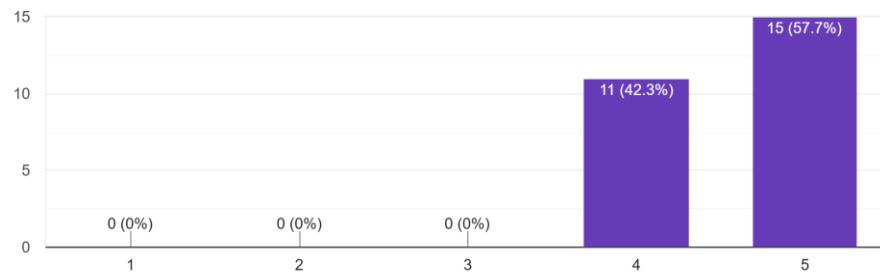


Figure 6: Effectiveness of the Module in Facilitating the Transition from Manual to Digital Formats

Figure 6 depicts that the module not only facilitates manual drafting but also assists 57.7% of respondents in translating that understanding into a digital format more clearly.

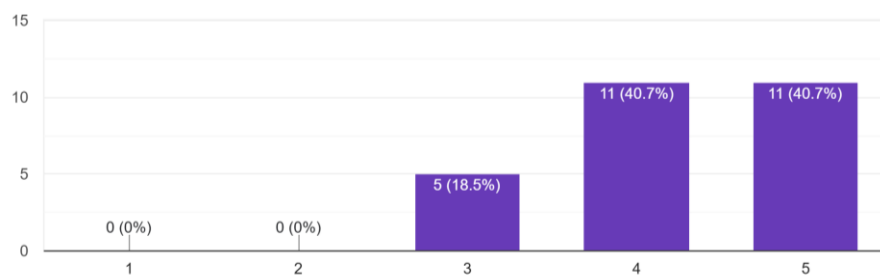


Figure 7: Effectiveness of the Module in Facilitating the Transition from Manual to Digital Formats

Figure 7 reveals that a total of 81.4% of respondents agreed (scores 4 and 5) that the module fosters greater independence. Although 18.5% remained at a moderate level, these findings indicate that the module is sufficiently comprehensive and user-friendly, significantly reducing the students' need for frequent lecturer consultation.

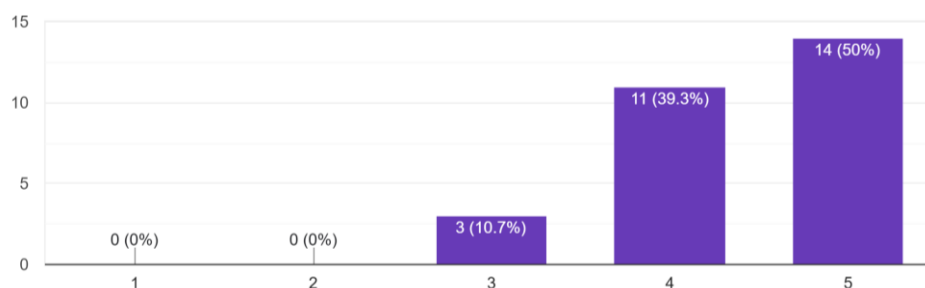


Figure 8: Effectiveness of the Module in Enhancing Student Time Management Skills

Figure 8 shows that majority of respondents (89.3%) awarded scores of 4 and 5. This demonstrates that the module serves as a highly effective reference in assisting students with better time management. Only a small minority (10.7%) remained at a moderate level.

Table 1: Analysis of Students' Perceived Mean Scores on the Effectiveness of the Step-By-Step Guide: Working Drawing 1 Module

No.	Evaluation Category	Mean Score	Interpretation
1.0	Module Structure and Content		
1.1	Clarity of workflow sequence (Grid to Wall)	4.85	Very High
1.2	Effectiveness of incremental steps (Chunking)	4.78	Very High
2.0	Mastery of Manual Drawing		
2.1	Understanding of line weight hierarchy	4.56	Very High
2.2	Confidence in initiating manual drawings	4.48	High
2.3	Reduction of errors in symbols and annotations	4.56	Very High
3.0	Digital Application		
3.1	Assisting transition to digital format (CAD)	4.42	High
4.0	Efficiency & Self-Directed Learning		
4.1	Reducing dependency on lecturers	4.22	High
4.2	Completing tasks within the stipulated time	4.39	High
OVERALL TOTAL MEAN SCORE		4.53	VERY HIGH

Overall, the Step-By-Step Guide: Working Drawing 1 Module achieved a Very High level of effectiveness, with an overall mean score of 4.53. Key Strengths (Technical Aspects): The module performed exceptionally well in clarifying the workflow sequence (mean: 4.85) and the use of incremental steps (mean: 4.78). This demonstrates that the chunking strategy is highly successful in assisting students to comprehend complex work processes. Furthermore, the module has proven effective in fostering student independence. Although the score for reducing dependency on lecturers (mean: 4.22) was the lowest in the list, it remains at a High level, indicating that the module functions effectively as a self-directed reference tool.

6.2 QUALITATIVE FEEDBACK CATEGORIES

Overall, most respondents (out of 16 feedback entries) expressed satisfaction with the existing module, indicating positive acceptance of the Step-By-Step Guide: Working Drawing 1 as an effective instructional tool. The qualitative feedback further supports the three research objectives by providing deeper insight into students' learning experiences, understanding, and perceptions of the module's practical value.

6.2.1 USER SATISFACTION LEVEL

A significant portion of the respondents stated "none" for improvement suggestions or described the module as "completely understandable." These responses directly support the first research objective, which aimed to identify the level of student understanding regarding the sequence of working drawing production through the step-by-step module. The feedback indicates that students were able to comprehend the workflow structure and technical processes more clearly through the systematic organization of the module.

Additionally, the positive responses also support the second research objective concerning the effectiveness of the module in assisting students with manual drawing and CADD assessments. Students' satisfaction suggests that the module successfully facilitated technical comprehension and improved confidence in completing drawing-related tasks.

Furthermore, the findings align with the third research objective, which examined student perceptions of the necessity of the guidebook as a self-referenced learning tool. The absence of major complaints and the perception that the module was "completely understandable" indicate that students viewed the module as sufficiently comprehensive and reliable for independent learning purposes.

6.2.2 SPECIFIC SUGGESTIONS FOR IMPROVEMENT

Several constructive recommendations were identified for future enhancement of the module. Suggestions such as separating critical topics like “line weight” and “symbol types” into dedicated sections directly relate to the first research objective by highlighting students’ need for clearer procedural organization to further strengthen technical understanding and workflow comprehension.

The recommendation to include additional content also supports the second research objective, as students perceived that expanded technical explanations and references could further improve their performance in manual drawing and CADD-related assessments.

Finally, these improvement suggestions reinforce the third research objective by demonstrating that students actively engaged with the module as a self-reference learning tool. Their recommendations for easier navigation and richer content indicate a desire for a more comprehensive and user-friendly guidebook that can better support independent study and long-term learning in architectural working drawing courses.

7. CONCLUSION

Overall, this study demonstrates that the implementation of the Step-By-Step Guide: Working Drawing 1 learning module for the DCA20333: Working Drawing 1 course has a significant positive impact on the academic performance of Semester 2 Diploma in Architecture students at Politeknik Port Dickson. The findings reveal high mean scores in procedural tasks and student confidence, particularly regarding technical precision in manual drafting and CADD digital workflow management. The scaffolding approach applied through this module has successfully reduced students' cognitive load, thereby bridging the gap between theoretical classroom knowledge and practical studio application. Consequently, this research confirms an urgent need to document this module as a formal reference book to ensure the sustainability of high-quality teaching aids.

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