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RESEARCH REPORTS

Developing Self-Directed Learning Skills Through Scaffolding in Problem-Based Learning

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ABSTRACT *Problem-Based Learning (PBL) is a valuable educational pedagogy for contextualising a problem to motivate learners to participate in problem-solving and deal with real-life challenges. An action research approach was utilised to demonstrate how scaffolding as a teaching strategy in a PBL module can enhance Self-Directed Learning (SDL) in undergraduate final-year nursing students. Using the scaffolding framework proposed by Van de Pol et al. (2010), the impacts of the interventions were examined using a mixed-method approach. Quantitative data analysis indicated that less than half of the students did not initially consider themselves self-directed learners. After the scaffolding interventions, 57.1% agreed they had greater ownership over their learning. Most students valued peer support and brief instructor guidance for enhancing independence, confidence, and proficiency during PBL projects. Qualitative findings highlighted student experiences, challenges, and how the module supported them in working independently and developing SDL skills.*

Keywords: Self-directed learning, Problem-based learning, Nursing, Scaffolding, Contract learning projects

Introduction

Problem-Based Learning (PBL) is a valuable educational pedagogy for contextualising a problem to motivate learners in problem-solving and actively deal with real-life challenges. PBL, deemed one of the most innovative pedagogies, was adopted and implemented more than five decades ago and is widely used to enhance students' competency and readiness for real-life challenges (Moallem et al., 2019). It provides hands-on learning strategies for students and motivates them to seek relevant knowledge actively, establishing a lifelong knowledge-seeking habit. This, in turn, promotes Self-Directed Learning (SDL). According to numerous studies, PBL has been used in nursing and medicine, encouraging students to become self-directed learners (Zhang, 2014; Tudor et al., 2019; Millanzi et al., 2021).

Self-directed learning is defined as an increase in learners' awareness, initiative, and acceptance of personal responsibility for their learning by acquiring resources and skills to enhance the learning experience (Moallem et al., 2019). SDL is sometimes used synonymously with self-regulated learning (SLR), which refers to learners' abilities to understand and control their learning behaviours and environment to accomplish learning and problem-solving goals (Pandadero, 2017). Research

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indicates that scaffolding can support both SLR and SDL processes (Dabbagh & Kitsantas, 2005; Shapiro, 2008; as cited in Zheng, 2016). Scaffolding can include tools, strategies, prompts, metacognitive feedback, or guides that support learning efforts in open learning environments helping students achieve higher levels of understanding beyond their current abilities (Zhen, 2016).

Scaffolding as a teaching and learning strategy combined with feedback, has been shown to improve critical thinking and learning outcomes, including higher-order constructs for students (Munshi et al., 2023). According to Millanzi et al. (2021), nursing students educated through traditional pedagogical approaches tend to be teacher-dependent, limiting their ability to demonstrate SDL. Thus, instructors must initiate pedagogical transformations to develop nursing students' SDL skills (Millanzi et al., 2021) to overcome this challenge.

As found in scholarly works, one method to promote SDL in students is through learning contracts. These contracts help students stay organised, clarify expectations, and increase communication between the learner and instructor. A learning contract is defined as an agreement between the instructor and student specifying the work the learner will complete within a given timeframe (Robinson & Persky, 2020). These contracts consist of five components: learning objectives, learning resources and strategies, target date for completion, evidence of accomplishment, and criteria for evaluation (Robinson & Persky, 2020).

'Specialised Practice' in the nursing curriculum is a contract learning-learning-based final-year undergraduate module that uses a PBL teaching approach in the School of Nursing, MNU. As the instructor of this module, scaffolding was utilised to promote self-directed and self-regulated learning among students, aiming to improve their academic performance and prepare them as lifelong learners.

In previous classroom teaching practice of the same module, lectures and other task-based teaching approaches were used, with minimal opportunities for students to work in a problem-solving environment. Additionally, although students are in their final semester, they are unfamiliar with a PBL classroom environment. Hence, this action research examines the extent of SDL skills among undergraduate nursing students in their final year of PBL projects and the effectiveness of scaffolding as a teaching strategy in developing these skills.

Action research in the context of this research is defined as teacher-initiated classroom research aimed at enhancing teacher's understanding of classroom teaching and learning to improve classroom practices (Richards & Lockhart, 1994; Richards et al., 2002; as cited in Negi, 2016). Thus, this research was conducted to refine my teaching practices for better quality in the future.

Research Aim

The study aimed to examine SDL skills among undergraduate nursing students in their final year PBL projects and assess the effectiveness of scaffolding as a teaching strategy for developing SDL skills.

The specific objectives of the research were to:

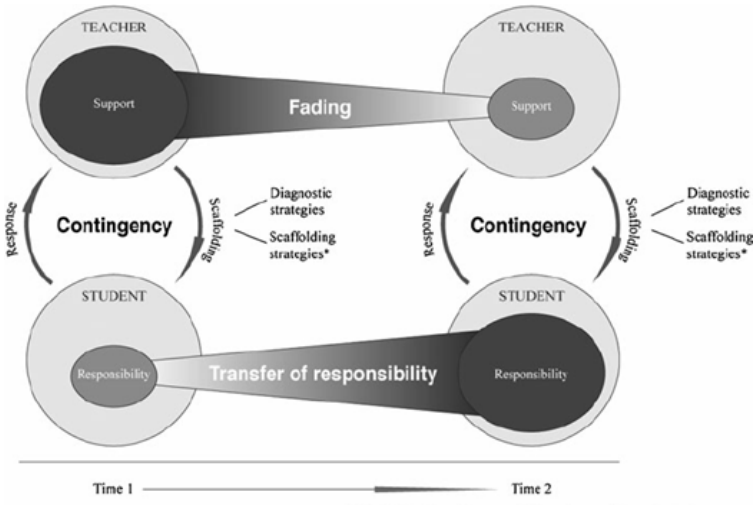
1. Determine the extent of SDL skills among undergraduate nursing students in their final year PBL projects,
2. Explore how scaffolding as a teaching strategy impacts the development of SDL among these students, and
3. Determine what (if any) changes can be made to my teaching practices to

improve teaching quality in a problem-based module (Specialised Practice)?

Theory, Research, and Practice: Scaffolding SDL in a PBL Environment

PBL situates learners in authentic, unstructured, and complex problems, requiring scaffolding to help learners make their thinking visible, manage their inquiries, and evaluate and reflect on their learning (McLoughlin & Luca, 2002; Quintana et al., 2004; as cited in Moallem et al., 2019). In literature, scaffolding is discussed in relation to motivational, cognitive, and metacognitive aspects, as well as the management of epistemic beliefs. This study is guided by a scaffolding model proposed by Van de Pol et al. (2010).

Figure 1 Conceptual Model of Scaffolding (Van de Pol et al., 2010)



According to the model in Figure 1, scaffolding is construed as teacher-provided support when students perform tasks, they might otherwise be unable to accomplish. The first characteristic of this model highlights the necessity for teachers to adapt their support to students' current performance levels, and ensuring it is neither too advanced nor too basic. The teacher provides flexible support by adjusting their guidance based on the needs of individual students or groups. To do this effectively, they use diagnostic strategies to assess each student's current level of understanding. Only by knowing this can the teacher tailor support to match the student's learning level.

The second common characteristic is fading or the gradual withdrawal of scaffolding. The rate of fading depends on the student's development and competence. The role of the teacher fades when the level and/or the amount of support is decreased over time. The fading of scaffolding is strongly linked to the third characteristic, namely, the transfer of responsibility. Through contingent fading or responsibility for the performance of a task is then gradually transferred to the learner. As interpreted in this, responsibility is broadly defined by referring to students' cognitive or metacognitive activities or affect (Van de Pol et al., 2010). Hence, the responsibility for learning is transferred when a student takes increasing learner control.

As Margolis (2020) explains, one of the most influential empirical studies on problem-solving guidance was conducted by Jerome Bruner and his colleagues in 1976. This research introduced the concept of scaffolding, which describes specialised support provided by teachers to students when performing tasks beyond their current capabilities.

Literature Review

Self-Directed Learning in a Problem-Based Learning Environment

Since the introduction of PBL, researchers have explored its impact on student learning and experiences. A fundamental principle of this method is using real-world problems as the foundation for knowledge transfer (Barrows & Tamblyn, 1980; as cited in Moallem et al., 2019). These studies suggest that in a PBL classroom, the students are expected to spend much of their time studying independently, where the use of lectures must be limited, with access to quality learning resources guaranteed. These studies focused on SDL as an integrated process of PBL classroom learning where the students are asked to take charge of what they are learning. As self-directed learners, students develop the ability to organise, critically evaluate, and assess their learning more effectively than their peers, as SDL fosters autonomy, responsibility, and personal growth—core components of higher education (Zhoc et al., 2018; Shafait et al., 2021). A study examining the relationship between SDL and creative performance found the association to be insignificant, contrary to many other research findings (Shafait et al., 2021). The authors attributed this insignificance to the use of puzzling, vague, and ill-structured questions, as well as problems that exceeded the students' abilities. They emphasised the necessity of re-evaluating SDL to enable educators to assess whether students succeed or struggle in comprehending a standardised performance test. Consequently, the literature underscores the importance of reassessing SDL to ensure an accurate evaluation of students' ability to meet learning objectives (Shafait et al., 2021).

Some studies have suggested that Team-Based Learning (TBL) is preferred over PBL in certain contexts, despite high student satisfaction with SDL outcomes (Alzahrani, 2024). However, literature has demonstrated various benefits of utilizing PBL in the classrooms to enhance SDL skills in students. According to Ni'mah et al. (2024), some of the benefits of implementing PBL methods in classrooms include increased student engagement and motivation, improved problem-solving abilities, and enhanced critical thinking skills. By applying SDL skills to manage their learning process, students can organise study schedules, seek resources, and monitor their progress. These skills enable students to work independently, set priorities and preserve challenges, ultimately preparing them for professional environments (Ni'mah et al., 2024). A systematic literature review by I'is Nadiyah et al. (2024) also identified these benefits finding a positive relationship between PBL and students' SDL following implementation of PBL models that promote of problem-solving and critical thinking skills. The review further concluded that PBL is a valuable instructional approach for enhancing students' SDL and its overall impact.

Studies suggest that teachers play a crucial role in fostering SDL by creating a supportive learning environment that encourages autonomy, self-motivation, and critical thinking (Sukkamart et al., 2023). Boelt and Clausen (2023) further

support this, noting that supervisors or teachers often mediate SDL to formulate learning goals. However, students remain responsible for most aspects of the learning process. According to the authors, SDL is both a central theoretical and practical component of PBL, with a strong emphasis on student-centred learning. However, they caution against equating student-centredness with complete autonomy, explaining that it is limited to the initiation of problems, depending on the local interpretation and implementation of PBL. A similar finding was reported by Robinson and Persky (2020), who stated that, SDL fosters a sense of autonomy and mastery in learners, along with a sense of purpose in the educational process. Moreover, they highlight that in a well-structured SDL environment, students' motivation, sense of control, confidence, and self-belief are significantly enhanced.

Scaffolding and Self-Directed Learning

Developing self-directed learners requires a scaffolded approach. In a scaffolded teaching approach, more self-paced or teacher-directed activities can be introduced early on helping students to become more self-regulated in their self-directedness (Robinson & Persky, 2020). According to Robinson and Persky, learning contracts are an important educational tool for fostering SDL, as they help students stay organised, clarify expectations, and enhance communication between learners and instructors. These independent contracts consist of five components: learning objectives, learning resources and strategies, target dates for completion, evidence of accomplishment, and criteria for evaluation. Literature suggests that learning is enhanced when students use scaffolding-based supervision strategies in independent learning projects. One study found that students who were supervised using scaffolding demonstrated greater proficiency than those engaged in directed independent study (Onah et al., 2024). Moreover, Esparcia et al. (2024) highlight that educators can enhance students' learning experiences across various academic disciplines by adopting scaffolding techniques.

Nursing students trained through traditional pedagogical approaches are often considered teacher-dependent in their learning, making them less able to demonstrate SDL. This necessitates a pedagogical transformation as a foundation for developing nursing students with self-directed learning skills (Millanzi et al., 2021). Implementing pedagogical strategies such as scaffolding and small group learning has prepared nursing students for essential roles in healthcare (Haanes et al., 2024). A study by Millanzi and Kibusi (2021) found that problem-based facilitatory pedagogy is a key factor in enhancing motivation to learn among nursing students. They further explain that through this approach, nursing students develop the ability to identify what to learn, complete learning activities, and experience continuous motivation to expand their knowledge.

A study investigating the impact of integrated conflict resolution lesson materials within a problem-based pedagogy on SDL readiness among undergraduate nursing students found that nursing students demonstrated self-management in their learning by developing schedules (Millanzi et al., 2021). Additionally, students showed a desire to learn by actively asking and answering questions about unclear concepts. They were also enthusiastic and eager to seek clarification from facilitators and other relevant sources to solve the assignment problems. Another study by Croxen et al. (2024) indicated that scaffolded learning in small groups positively influenced information literacy skills and social development in first-year

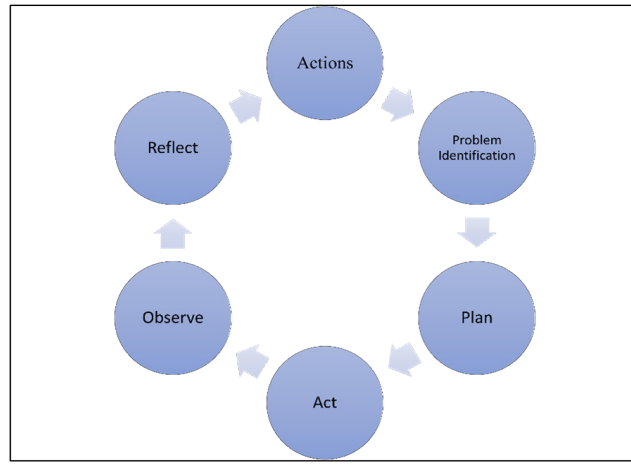
nursing students. Properly designed scaffolds can foster self-regulation, increase engagement, and reduce frustration (Lepper & Chabay, 1985; Shute, 2008; as cited in Munshi et al., 2023). It can be concluded that a structured process of adaptive scaffolding can guide students towards effectively utilising scaffolded content in their learning and problem-solving processes.

Methodology and Action

To achieve the study objectives, a mixed-method action research design was employed, integrating both quantitative and qualitative approaches. The study focused on real-time interventions within a PBL classroom to enhance the teaching and learning environment. Additionally, this approach served as a practical tool for reflective practice and self-evaluation, facilitating improvement, modification, and reform within the teacher's professional repertoire (Negi, 2016). A group of undergraduate nursing students enrolled in a contract learning-based module (Specialised Practice) in the School of Nursing, MNU, was selected for the study. The classroom consisted of 15 final-year students (14 female and 1 male), with the boy dropping the module halfway through the semester, leaving only 14 girls included in the study.

Experts in action research have designed models or stages involving a cyclic process of planning, acting, observing, and reflecting (PAOR) (Negi, 2016). In the first stage, teaching was conducted according to the daily lesson plan. Based on problem identification, a teaching-practice-related issue was formulated. The causes of the issue were then discussed with an experienced teacher who had previously taught the same module. According to Almahdi (2019), initial discussions and negotiations among interested parties, such as teachers, are considered important in drafting the issue in the action research process. Initial data were collected during the first four weeks of the academic period. The data were then analysed to identify changes and improvements. New solutions were sought, and the plan was implemented. Further data were then collected to assess whether the new practice (solution) was effective. A reflection was then carried out, evaluating the effects of the actions to determine their success. Changes in teaching practice were anticipated on the findings.

Figure 2 Action Research Cycle (Negi, 2016)



Description of the Cycle and Data Collection

Phase 1: Planning

In the first phase of the Action Research Cycle, as shown in Figure 2, an area was identified for improving the classroom teaching experience. The aim and research questions were formulated, identifying key concepts and the phenomenon under study. The main concepts included PBL, SDL, and scaffolding. Participant observations, field notetaking, and survey interviews were primary data collection methods. During this initial phase (first four weeks), a general assessment of students' needs was conducted. Literature suggests that the first step in the action research process is assessing students regarding the identified issue. Thus, during these initial weeks, observation and assessment of students' work during classroom activities were used to evaluate the current state of SDL skills. Additionally, the learning objectives of the module and specific assessment tasks in the PBL classroom were redefined for students. Clear explanations were provided regarding the difference between research work and a problem-based contract learning project. Students were asked to generate ideas and insights into areas of interest to develop their own PBL projects. In this initial phase, more guidance was given, including feedback on the rejected topics and a thorough explanation of assessment guidelines. Initial feedback was provided on selected topics during class until students identified a satisfactory area for their project. Towards the end of the planning phase, guidance was gradually reduced, requiring students to take on more self-directed roles.

Phase 2: Implementation (Acting)

This phase introduced changes based on initial observations and classroom field notes. Various forms of support were provided during the initial weeks of planning, including marking guidelines, sample assessments, and access to additional resources. The sessions were conducted in a computer laboratory, with the main intervention being the scaffolding teaching approach. This ensured students had access to all necessary resources for writing and developing their projects. According to the scaffolding model illustrated in Figure 1, support was gradually reduced, encouraging students to take more initiative by making their own decisions and self-assessments using the rubrics provided. However, challenges arose during the implementation of research interventions. The main issues encountered included student frustration due to a lack of available literature on their chosen topics. Guidance was provided on using appropriate search terms and various search strategies including backward and forward citation approaches to locate relevant literature. Students also struggled with contextualising their problems to the Maldivian setting. To address this, guidance was given on identifying appropriate resources. All challenges were documented through the field notes.

Phase 3: Data Collection (Observing)

In this phase, as a first step, approval to conduct the study was obtained from the MNU research committee. Before data collection, informed consent was obtained from all the study participants. According to Karunarathna et al. (2024), researchers must obtain informed consent from participants ensuring they fully understand the purpose of the research, their participation requirements, and any potential risks. The impact of the interventions was examined using a mixed-method

approach incorporating qualitative and quantitative data collection methods. Mixed-methods studies typically provide precise measurements alongside in-depth qualitative data (Clark et al., 2020). Qualitative research focuses on collecting relational, interpretive, subjective, and inductive data, whereas quantitative studies collect deductive, statistical, and objective data (Gläser-Zikuda et al., 2024; Clark et al., 2020). According to Ivankova and Wingo (2018), combining quantitative and qualitative methods within action research "can produce more scientifically sound and more transferable results" (p. 2) (as cited in EL-Asri & El Karfa, 2024). Data were collected pre- and post-intervention through observations, reflective journaling, assessment marks, and student feedback surveys. Students' progress was monitored, and interventions were applied as needed. Opportunities for improvement and reflection were provided throughout the process. Continuous encouragement, motivation, and constructive feedback on students' drafts enhanced self-directed learning skills. By using multiple data collection methods, triangulation was achieved, enhancing the trustworthiness of the study. This approach facilitated cross-verification of evidence from multiple sources. Formative assessments were conducted in the classroom to measure progress and adjust teaching strategies accordingly. These included self-assessment and peer feedback sessions, guided by rubrics.

Scores from summative assessment tasks were used to gain an overall picture of students' learning and development. A post-intervention survey was conducted via a Google questionnaire form. Literature suggests that surveys and questionnaires are widely preferred as research instruments due to their ease of distribution and collection particularly with modern online applications (e.g., Google, Facebook, etc.). According to Clark et al. (2020), surveys can take various forms, including closed-ended, open-ended, or a combination of both. The survey used in this study included five closed-ended questions and two open-ended questions. These focused on students' perception of their level of self-directedness, the role of facilitator instructions, and peer collaboration. Students were also asked to describe how scaffolding as a teaching strategy influenced SDL and their ability to take ownership of their learning. Closed-ended questions provided structured data, while open-ended questions encouraged participants to share detailed perspectives in the form of short answer responses. Although open-ended responses require more effort to analyse, they offer richer insights. The goal of qualitative data collection is to build a nuanced description of social or human problems from multiple perspectives. Using various data collection techniques allows flexibility in research (Clark et al., 2020).

In addition to the survey, participant observations were also used. As both researcher and instructor, an active role was taken during the data collection process. Observations helped determine the degree of researcher involvement in the study. Field notes played a crucial role in writing the analysis of findings. Literature highlights that observational methods are valuable for evaluating various aspects of a study, including progress (formative evaluation) and its success (summative evaluation). Direct observation minimises biases associated with self-reported data. During observations, filed notes were taken as part of reflective journaling. According to Clark et al. (2020), field diaries or notes are typically valuable when researchers begin writing about their project because they allow them to draw upon their authentic voice.

Phase 4: Reflecting

Following analysis, a reflection was conducted based on the findings. Results indicated that while scaffolding is an effective tool for developing self-directed learning during PBL projects, students were not prepared for this approach. Many struggled to comprehend the aim of a contract learning project and remained passive learners, requiring substantial instructor guidance. Since this was their first experience with a PBL module, students faced challenges during the initial weeks, especially in identifying relevant issues and contextualising problems within the Maldivian context. Areas for improving teaching strategies were also identified.

Data Analysis & Findings

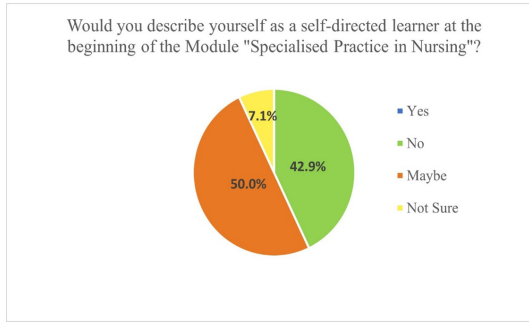
Action research brings both action and reflection together in the pursuit of practical solutions directly related to classroom teaching. It encourages teachers to collect and examine data about their teaching for critical reflection and improvement in education (Richards & Lockhart, 1994; as cited in Negi, 2016) fostering a culture of continuous learning within the classroom.

Before conducting data analysis, the intended research aims and questions were revisited. Additionally, the literature review was reassessed in relation to the research questions to ensure a clear vision of the study's objectives. This section aims to explore themes and patterns to provide evidence for the claims generated from the findings. In doing so, data collected from various sources were examined in relation to the expected outcomes of the research. Data analysis was performed using descriptive statistics for quantitative data and thematic content analysis of qualitative data.

Quantitative Results

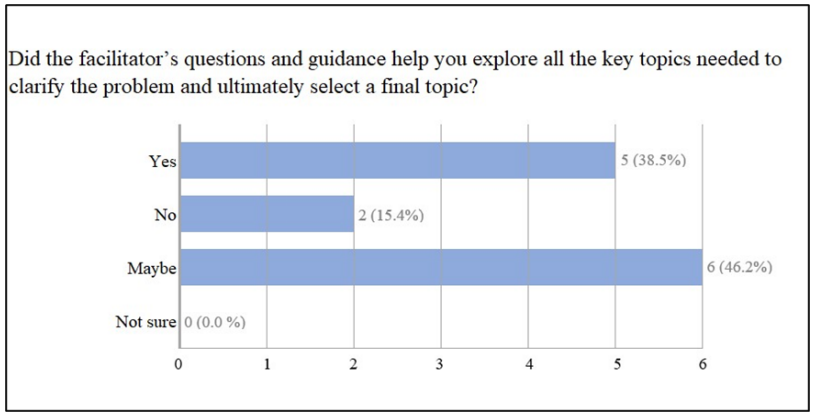
Upon completion of the interventions, the survey was carried out during the 13th academic week. To analyse the quantitative data, percentages generated from the Google questionnaire were used, as only descriptive statistics were considered. Ordinal levels of measurement were employed (i.e., yes= 1, no=2, maybe= 3, not sure= 4) for all five closed-ended questions. According to the results shown in Figure 3, 42.9% of the 14 students who participated in the survey did not consider themselves self-directed learners at the beginning of the module. Additionally, 50% neither agreed nor disagreed with it. The rest of the 7.1% of participants were not sure if they had self-directed learning skills or not.

Figure 3: Students' awareness of self-directedness at the beginning of the module



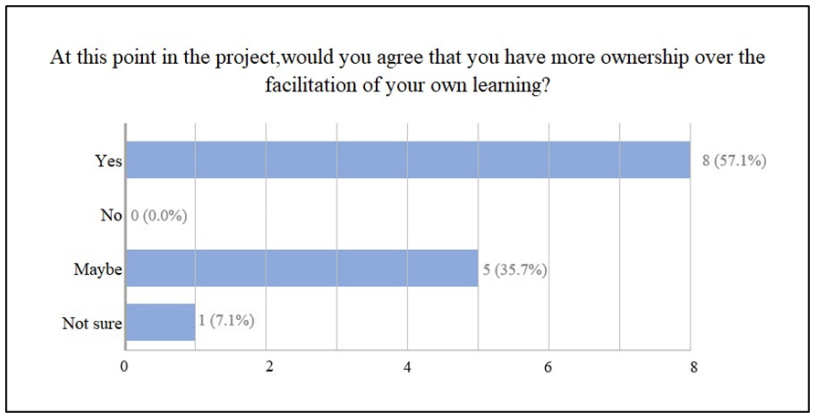
The next question asked whether questions posed by the facilitator and the guidance provided during the classroom sessions helped students identify key topics necessary for solving the problem and selecting a final topic. As shown in Figure 4, 38.5% of participants believed that the teacher, in the role of facilitator, was not helpful, while 46% neither agreed nor disagreed.

Figure 4: Student's perception of facilitator guidance



As shown on Figure 5, upon completion of the interventions, 57.1% of participants agreed they had gained greater ownership over their learning while 35.7 % neither agreed nor disagreed. The remaining 7.1% remained uncertain about their ability to take ownership of their learning.

Figure 5: Level of agreement of student's ownership of learning at the end of the 13th week



Additionally, as illustrated in Figure 6, 92.7% of students agreed that peer collaboration played a key role in their PBL project, contributing to their development as self-directed learners. The final closed-ended question examined the effectiveness of the scaffolding teaching approach in fostering independent learning and confidence. Students were asked if the facilitation of temporary support

of participants agreed that facilitation and temporary support helped them work independently and build confidence and proficiency. In contrast, 7.1% disagreed, 28.6% neither agreed nor disagreed, and 7.1% were unsure.

Figure 6: Role of peer collaboration to promote SDL

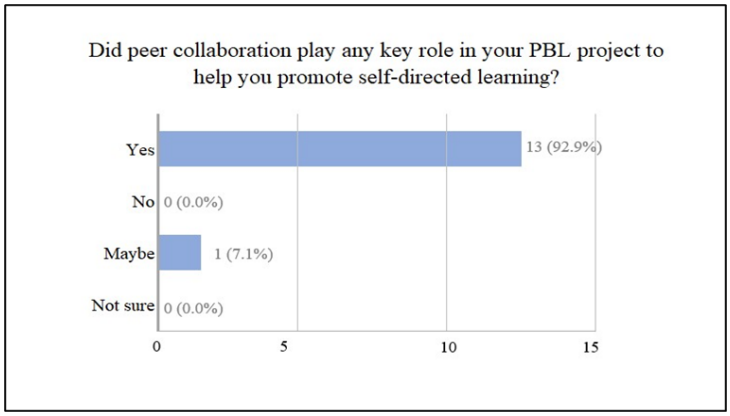
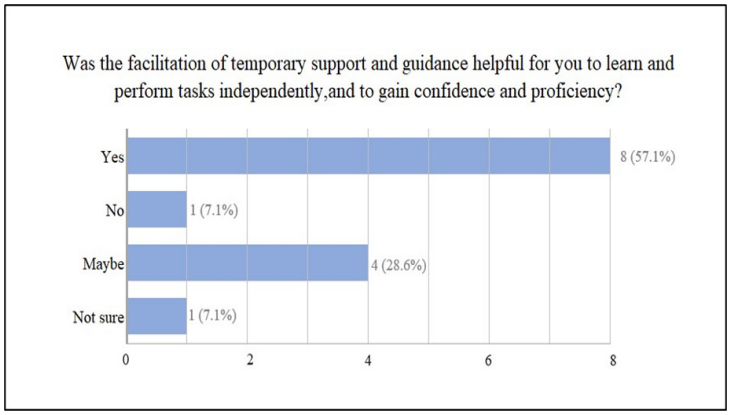


Figure 7: Student's agreement on temporary support to gain confidence and proficiency



Overall, the quantitative findings suggest that the scaffolding approach in the PBL classroom positively influences the students' self-directed learning behaviours. These results align with prior studies by Millanzi et al. (2021), Alzahrani (2024), and Ni'mah et al. (2024). Additionally, facilitators' support and guidance were identified as crucial aspect of scaffolding, consistent with the findings of Sukkamart et al. (2023). The results also underscore the significant role of peer collaboration in enhancing self-directed learning, mirroring conclusions from Subasman (2024).

Qualitative Findings

Open-ended responses were analysed to identify themes and patterns. The data were cross-checked with notes and personal journals maintained during data collection, primarily based on participant observations. As responses were collected through a Google form, no transcription was required; instead, the data were extracted into a Microsoft Word file and subsequently printed. According to Gray et al. (2017),

qualitative data analysis involves coding and assigning meaning to the responses (Corbin & Strauss, 2015). To fully engage with the data, it was read multiple times alongside the journal notes and classroom observations records. Immersion in the data requires extensive time for reading and reflection (Gray et al., 2017).

During this process, coding was performed alongside data reduction, by assigning meaning to specific data elements using words, symbols, or phrases. Coding is a process of deep reflection, analysis, and interpretation of the data's meanings (Miles et al., 2014; Gray et al., 2017). Selective and interpretive coding were employed to construct a narrative that connected the emerging categories (as suggested by Creswell (2007, as cited in Gray et al., 2017). Data were then categorized into abstract terms representing merged codes. Categories were compared, and a core category was identified. Statements linking the categories were developed, forming themes consistently observed in the data. Once coding was completed, content analysis was used to classify the text into categories and identify recurring ideas or thought patterns (Gray et al., 2017). Participant excerpts were included to support the themes.

Theme 1: Independent Learning & Critical Thinking

Many participants indicated that scaffolding as a teaching strategy helped them discover their abilities and to work more independently. The tasks increased students' confidence in performing independently with minimal guidance. Classroom observations and journal notes further revealed that students became more autonomous over time and developed self-directed learning skills. This was demonstrated by the quality of their submissions on Moodle page. The following are key excerpts taken from participants' feedback.

- Participant 1: ….to try out new things and discover our own abilities
- Participant 2: ….gained an interest in doing it further on my own
- Participant 5: …..learn to work more independently while using own methods…..
- Participant 8: …..led me to learn things on my own
- Participant 9: helped to work independently……
- Participant 10: ….was able to perform tasks independently

Three of the participants described how the project and the experience enhanced their critical thinking skills while also developing self-directedness.

- Participant 3: It allowed me to think critically and make important decisions….
- Participant 6: It helped me to develop critical thinking skills and helped me….
- Participant 14: …..it enhanced my critical thinking and self-directed learning skills

Theme 2: Experiences and Challenges

Despite being in their final year and final semester, this was the first time many students encountered a contract learning/problem-based project. Several students found it challenging to begin and described the experience as overwhelming or confusing. Classroom journal notes highlighted that two students, in particular,

initially struggled but gradually became more confident and autonomous as the weeks progressed.

- Participant 7: overall it was a very challenging but a good experience
- Participant 8: the overall experience was confusing as I was not able to fully comprehend…
- Participant 11: this module challenged me in so many ways that….
- Participant 12: ….it was good but so many challenges were faced…..
- Participant 13: This module was challenging and stressful as this was the first time studying a subject with….
- Participant 14: Prior to this module, we were not familiar with the process of self-directed learning. At the start of the subject, it was challenging and confusing to understand….

According to most students, the biggest challenge was during the initial phase of topic selection for their project. Those who described the whole experience faced the same issue initially. However, they believed that continuous feedback was very helpful for them to overcome those challenges. During the first 3 weeks, students were struggling to select a topic.

- Participant 1: …good overall however choosing a topic was the tough part…
- Participant 7: ...for me the most difficult part was selecting a topic.
- Participant 9: ...At the start it's hard to decide on the topic since we have no idea…
- Participant 12: …many challenges were faced during the initial phase of topic selection…in my experience throughout the project many challenges in understanding the topic was faced

Although most participants described the experience as a challenge, few highlighted it as a good experience that they found easy to comprehend through the scaffolding process and the continuous feedback provided during the sessions. At the final session, students were asked about their overall experience of the module, and almost all seemed to be happy with their work, and enthusiasm was seen on their faces.

- Participant 2: I really like how the module was taught and I found it very easy to comprehend
- Participant 9: Overall, the experience was good.
- Participant 10: It was a good experience.
- Participant 7: … Continuous feedback which helped me to identify areas that require more effort
- Participant 8: …appropriate feedback and guidance allowed me to stay on track
- Participant 11: Throughout the project the lecturer provided us with feedback on what we were doing…
- Participant 12: Continuous feedbacks allowed me to identify areas to improve.

Theme 3: Feedback and Guidance

Since this was a new experience, most participants recommended additional guidance during the initial phase of the project and topic selection. Although continuous feedback was provided, students suggested extending feedback sessions and submission timelines. However, time constraints and module requirements, limited these opportunities.

- Participant 3: …it is recommended to give all the necessary instructions at the start of the module so that students get an idea of what the subject was about.
- Participant 5: …I would recommend giving more time for feedback and submission of final work.
- Participant 6: …It is recommended to give all necessary instructions at the beginning so it would be easier to do the project.
- Participant 8: …I think providing a clearer picture of the end goal would have prevented this. Keeping up the current feedback would also be beneficial
- Participant 9: …I would recommend to encourage students to take topic soon as possible and…
- Participant 11: …I would recommend to give more straight forward feedback.
- Participant 12: …if we are taught of how the recommendations should be written it could have helped eased topic selection…
- Participant 13: …Providing an overall guide from the start of the subject at the beginning to plan activities systematically.

Content analysis revealed interesting themes and identified areas of improvement in quality teaching practices for a problem-based module.

The results of the current study highlight the extent of SDL skills perceived by undergraduate nursing students in their final year PBL projects. Moreover, the study provided insights into how scaffolding as a teaching strategy impacted the development of SDL from the student's perspectives. Using the conceptual scaffolding model, the results emphasised that instructors must adapt the support provided to students based on their level and performance. Initially, students required complete guidance from teachers throughout the implementation process of the interventions. As facilitation and scaffolding gradually faded, students progressively took responsibility for their learning.

The findings of this study align with recent research by Haanes et al. (2024) and Onah et al. (2024), suggesting that scaffolding can enhance learning in nursing education by engaging students in critical research tasks such as writing a literature review. The literature emphasises that re-evaluating self-directed learning is essential to determine whether students succeed or struggle in comprehending a standardised performance test (Shafait et al., 2021). Hence, it is crucial to re-evaluate these findings from similar research.

Trustworthiness of the study

Trustworthiness was ensured through data triangulation and the inclusion of rich descriptions of participants' experiences from multiple data sources, including surveys, observations, and reflective journaling. The study's transferability was somewhat constrained due to the small, homogenous sample size, though the detailed findings may enhance their applicability. Participants were female, and little

variation was observed in terms of age, education, and life experiences. Although member checking or participant validation was not conducted, dependability was reinforced by providing a comprehensive description of the study procedure and data collection techniques.

Reflection

This reflection addresses the research question regarding the changes that can be made to my teaching practices to enhance teaching quality in a problem-based module. Utilising an action research approach facilitated the examination and ultimate improvement of the pedagogy and practices employed in a PBL environment. In this way, action research extended the reflection and critical self-reflection that I, as an educator, engage in daily within the classroom. When students are actively engaged in learning, the classroom can be dynamic and uncertain, demanding the constant attention of the educator (Clark et al., 2020). Given the various demands throughout the process, reflection was necessarily brief while also considering adjustments, modifications, or formative assessments throughout the module. My teaching practices was briefly reflected upon during the first two phases of the action research cycle (plan and implement).

Although I had some experience teaching a PBL module in the School of Nursing, delivering the current module was somewhat challenging, as students had never been exposed to such an approach. During the initial sessions, key questions arose, such as how to make teaching more meaningful and how to best support students in becoming self-directed learners. Research skills and experience gained through teaching other modules made the process more manageable. Additionally, some of the difficulties encountered were resolved through discussions with colleagues, particularly the module's previous coordinator.

The action research project underscored the need for greater teacher engagement with study participants. The experience was overwhelming due to my unfamiliarity with the concept of action research, prompting me to consult several books and other resources for a more comprehensive understanding. I also reviewed sample action research papers to assess report format and quality. It would be beneficial for teachers to have access to model action research reports prepared by experienced educators for guidance and inspiration. Additionally, teacher training and workshops should be organised to review teacher-prepared reports and update research skills and knowledge. Encouraging teachers to integrate their teaching and research activities would further enhance professional development. Regular reflection generates new knowledge for educators and informs classroom practices. The implementation of scaffolding pedagogy in the classroom led to the development of unique reflective knowledge, deepening my understanding of the process. This experience also provided a means to formalise the knowledge gained through interventions, allowing it to be utilised and disseminated within the teaching profession.

Limitations of the Study

The findings of this study suggest that the SDL skills of undergraduate nursing students in PBL projects are enhanced through scaffolding as a teaching strategy. However, a known limitation of action research is the limited generalisability of its findings. The use of surveys and observations as data collection methods may

have introduced biases in interpretations, affecting the reliability of the results. Karunarathna et al. (2024), identified that the presence of an observer can influence the participants' behaviour, while an observer's own biases may impact data interpretation. Additionally, in surveys, participants may provide socially desirable responses, particularly on sensitive topics, further affecting data reliability. To strengthen the findings, incorporating mixed-methods into the action research cycle would provide more robust insights into the development of SDL skills and the effectiveness of scaffolding as a teaching strategy in final-year undergraduate nursing students' PBL projects.

Conclusion

The action research study explored the extent of SDL skills in undergraduate nursing students' final year PBL projects and examined the effectiveness of scaffolding as a teaching strategy fostering SDL. The research also identified areas for improvement in teaching and assessed the interventions implemented during the sessions.

The conceptual model used in the study defines scaffolding as the support provided by a teacher to help a student perform a task that they might otherwise be unable to accomplish. The model highlights the importance of adapting teacher support to the student's current level of performance, ensuring that it remains at the same or a slightly higher level. The research followed a cyclical process of planning, acting, observing, and reflecting (PAOR). The impacts of the interventions were assessed using a mixed-methods approach, incorporating both qualitative and quantitative. Data were collected through pre- and post-intervention observations, reflective journaling, assessment marks, and student feedback surveys. Quantitative data analysis was conducted using descriptive statistics while qualitative data were analysed using thematic content analysis.

Less than half of the students initially considered themselves self-directed learners. However, by the end of the 13th week, 57.1% reported having greater ownership over their learning, aided by scaffolding strategies. Additionally, most students agreed that temporary support and guidance were beneficial in helping them learn, perform tasks independently, and build confidence and proficiency. Qualitative analysis provided further insights into students' experiences, challenges, and the ways in which the module helped them develop self-directed learning skills. Many students recommended offering more guidance and support during the initial phase of the module to better address challenges. Overall, the results highlighted the extent of SDL skills perceived by undergraduate nursing students in their final year PBL projects and provided valuable insights into how scaffolding as a teaching strategy impacted SDL development.

Through this action research, it was possible to examine how my teaching influenced student learning and how I could work more effectively with students as an instructor. Furthermore, by incorporating research-based instructional practices, I supported students in developing an inquiry-driven approach and fostering self-directed learning skills. A further cycle of action research could have strengthened the study's findings and adjustments to the process may benefit future cohorts undertaking the same module. Moreover, for an instructor, the results offer insights into collaboration with more experienced academic colleagues, ultimately contributing to the improvement of teaching practices.

Declaration

This paper was originally submitted to Postgraduate Diploma in Higher Education/ EST461 as part of a course requirement at Faculty of Education, The Maldives National University on November 2023. As a result, it appears in the Moodle, which has contributed to the current similarity index of 53%.

I confirm that I am the original author of this work, and the content is entirely my own. All external sources used have been properly cited according to the journal's required citation style. This work has not been previously published or submitted to any other journal.

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