Reflection and English Learning in Pre-Medical Students' E-Portfolio

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Abstract

An e-portfolio is widely employed in medical education to develop reflective thinking skills among medical students. This study aims to explore pre-medical students' reflective skills and their perceptions of the e-portfolio in English language learning at a private university in Thailand. Data were gathered through the pre-medical students' reflective essays embedded in their e-portfolios and semi-structured interviews via content analysis to analyze the reflective essays and interviews. Findings indicated positive perspectives on the use of the e-portfolio, emphasizing the need for guidelines to enhance reflective and language learning skills in pre-medical students across medical schools. This research provides practical and research-based insights into Thai education. Teachers could concentrate on crafting reflections encouraging students to think more deeply through reflective questions and self-exploration.

Keywords: English language learning, reflection, e-portfolio, medical education

Introduction

An e-portfolio is a collection of artifacts in digital form, which includes work demonstrations, resources, and accomplishments that represent an individual, group, or institution (Lorenzo & Ittelson, 2005). Other similar definitions describe it as a product created by the learner, which includes a collection of digital artifacts that indicate experiences, achievements, and learning (Gray, 2008). Characteristics of the e-portfolio include being authentic, controllable, communicative, interactive, dynamic, personalized, integrative, multi-purposed, multi-sourced, motivational, and most importantly, reflective (Esmaeilee, 2024). Given these characteristics, the benefits of the e-portfolio have been widely used as a new and authentic assessment tool because it provides several positive impacts on students' learning. For instance, it increases students' learning self-confidence, motivation, active participation, collaboration, and interaction between themselves, teachers, and their peers (Erten et al., 2019). In addition, it develops students' self-learning, self-evaluation, self-assessment, and most importantly, self-reflection (Yastibas & Yastibas, 2015).

Due to the importance of self-reflection in the e-portfolio, it has been applied from general to specialized contexts; for example, medical education. In this context, medical education has also utilized the e-portfolio in medical curriculum because medical professional competence does not only include acquiring medical skills and knowledge, but also increases clinical reasoning, and self-reflection (Haffling et al., 2010). In addition, the importance of reflective e-portfolios focusing on 360-degree feedback rounds, clinical performance evaluations, etc., positively impacts case-solving ability and is correlated to improving medical students' academic performance (Heeneman & Driessen, 2017). Similarly, Schrempf et al. (2022) agree that reflective skills in the e-portfolio are fundamental to core clinical competencies which show professionalism such as altruism and empathy.

Likewise in the English language learning context, an e-portfolio improves students' English language skills such as speaking, reading, and writing when it is systematically integrated into meaningful and creative content, activities, and tasks. Further, it helps reduce students' anxiety, and engage and motivate their learning (Kusuma et al., 2021; Ngui et al., 2020; Rou & Yunus, 2020).

Overall, it seems to us that an e-portfolio has been a great tool to improve a student's English skills and has helped the students become self-regulated learners. In addition, it is widely used in medical education to develop medical students' reflective skills, and clinical reasoning as well as improve their academic performances. We strongly agree with how the e-portfolio can help develop and foster medical students' reflective skills. We aim to continue this tradition in our study because the evidence above and in the *previous studies* section below suggests an interesting correlation. However, we surveyed different participants in this study and, in this case, pre-medical students at a private university in Prathum Thani, Thailand because there are several aspects of e-portfolio implementation in pre-medical education that need further investigation. For example, first, how pre-medical students' reflective skills are developed. Second, given the importance of how the e-portfolio helps improve students' English language skills, it seems that research to date has mainly focused on the reflective medical contents, less determined how English language learning is incorporated into the e-portfolio in medical education.

Therefore, the purposes of this study are: 1) to investigate how pre-medical students' reflective skills are developed across different levels of reflection, and 2) to explore the perceptions of pre-medical students towards the role of an e-portfolio in English language learning in medical education. The research questions are the following:

1) How are pre-medical students' reflective skills developed across different levels of reflection in an e-portfolio project?
2) What are the perceptions of pre-medical students towards the role of an e-portfolio in English language learning in medical education?

Literature Review

The Role of Reflection in English Language Learning (ELL)

Reflection is a central feature of experiential learning. Cottrell states, "It is used increasingly in professional and academic contexts. Reflection also involves clarifying our thinking, deepening understanding, and reinforcing learning in ways that, ideally, leads to transformation and change" (Cottrell, 2023, p. 207). Based on what Cottrell suggests, reflection helps students' learning processes, especially their development of English language proficiency.

Reflection plays several important roles in English Language Learning (ELL). Ash and Clayton (2009) point out that reflection is a feedback mechanism where students can express their thoughts, feelings, and opinions about their ELL experiences. It allows them to voice what they find challenging, interesting, or effective. Further, it helps students assess their progress in language learning, identifying strengths and areas for improvement. It encourages self-awareness and accountability for their learning journey. Moreover, it enables students to connect language learning with their specific professional context, especially medical students, by understanding their medical literature and communicating with patients. It helps them see the relevance of ELL to their future careers (Ash & Clayton, 2009). With these mentioned advantages, reflection can serve as a key strategy for enhancing medical students' ELL explained in the next section.

Reflections to Develop Medical Students' ELL

To develop an effective ELL program for medical students at a tertiary level, incorporating reflection can significantly enhance their learning experience (Mitchell, 2017). Reflection activities, for instance, can help medical students connect English language skills to practical medical scenarios, such as patient communication, reading medical literature, or presenting case studies in English (Chan et al., 2022). When students reflect on how they apply English in medical contexts, such as through role-playing patient interactions, they can develop a deeper understanding of language use, ultimately improving their accuracy and effectiveness in professional settings (Nestel & Tierney, 2007). Additionally, reflection encourages students to view language learning as a continuous process, an essential mindset for medical students who will need to stay updated with global research and collaborate with international colleagues throughout their careers (Hargreaves, 2016). Reflection on role-play scenarios and peer interactions also fosters empathy, a critical skill for medical professionals, by prompting students to consider the perspectives and emotions of patients when communicating in English (Kaplan-Liss et al., 2018). Finally, reflecting on the cultural nuances in language use is particularly beneficial for Thai medical students, who may work with diverse patient populations. This awareness of cultural differences can significantly enhance patient interactions (Tawanwongsri & Phenwan, 2019).

In summary, roles of reflection and their benefits discussed above show that they can be applied to enrich ELL experiences among Thai medical students. It is obvious that reflection promotes critical thinking, nurtures a growth mindset, cultivates empathy, and prepares learners for cross-cultural communication. By making reflection a core component of the ELL program, educators can foster a learning environment that is adaptive, student-centered, and aligned with the evolving needs of future medical professionals. The next section suggests ways in which e-portfolios can facilitate these reflective practices to further support English language learning.

E-Portfolios and ELL

The recent issues and challenges in English language learning that teachers have to encounter include how to increase students' speaking performance, how to motivate their reading interests, and how to better utilize technology for better writing and assessment (Kusuma et al., 2021; Ngui et al., 2020; Rou & Yunus, 2020). Further, teachers do not only face challenges to increase students' interests and motivations but also, an effective student assessment process (Muho & Leka, 2021). In addition, the learning assessment has been changed to prepare students for lifelong learning and global challenges because the traditional assessments are not designed to meet such goals (Singh et al., 2022).

Despite several challenges, an e-portfolio has been employed to solve these English language learning issues in ESL/EFL classrooms. For example, Kusuma et al. (2021) suggested that the implementation of the e-portfolio and flipped classrooms in some Indonesian high schools increased students' speaking performance because they had more opportunities to practice regularly with peers which helped reduce their speaking anxiety. In addition, interactive and creative learning contents, activities, and tasks in this combination helped engage students in learning English cognitively and effectively. For reading skills, Rou and Yunus (2020) revealed that reading activities in Seesaw, a shared e-portfolio, where students can complete reading activities that their peers and parents can view, and provide comments and feedback on the students' progress, increased students' reading motivation. The negative attitudes towards reading also decreased to 52%. Further, the percentage of students preferring reading books over watching TV increased from 30% to 34%. Similarly, Ngui et al. (2020) found that Malaysian university students viewed classmates' e-portfolios as well as classmates' and teachers' comments as beneficial because these were factors to motivate them to perform better. The teachers also had positive attitudes toward e-portfolios because they offered authentic writing assessment experience.

An e-portfolio has not only enhanced students' English speaking, reading, and writing skills but has also positively increased students' and teachers' attitudes toward e-portfolio usage. For instance, Muho and Leka (2021) investigated students' and teachers' perceptions towards the use of e-portfolios in English as a foreign language classroom by conducting in-depth semi-structured interviews with teachers and students in Albanian high schools. The findings suggested that both teachers and students preferred this type of assessment; especially, students, because the e-portfolio reflection helped them

realize their learning strengths and weaknesses. In addition, it helped students become self-regulated learners. Further, Singh et al. (2022) explored how five ESL teachers perceived the new form of assessment, portfolio in English classrooms through class observations and interviews. The results found that while there were some challenges teachers were facing during the e-portfolio implementation, this portfolio assessment provided students, their peers, and teachers opportunities to interact and discuss the challenges all parties faced. This promoted sustainable teaching and learning. With these benefits, the role of e-portfolios in medical education, as discussed in the next section, is particularly valuable for supporting reflective skills.

E-portfolio and Medical Education

Reflective skills are mandatory for medical students. However, some studies (Gomez et al., 2013; Heeneman & Driessen, 2017; Sieben et al., 2021) argued that medical students lacked reflective skills due to several reasons. For example, students found them time-consuming and unhelpful learning. In addition, the medical school culture mostly did not promote self-reflective writing, so students might not be interested in producing reflective observations. Also, the challenges were on teachers and mentors who had poor knowledge of technology and e-portfolios (Gomez et al., 2013). Most medical students perceived reflective writing as difficult because they were not trained to do this, coupled with unclear instructions and too rigid format requirements (Sieben et al., 2021).

However, incorporating both a traditional and an e-portfolio in the medical curriculum is found to be beneficial for developing medical students' reflective skills. Several studies also argued this important point. For example, in traditional portfolios, the reflections made the medical students realize the importance of treating patients as human beings rather than a cluster of symptoms and this improved them to have respect and empathy towards patients (Yielder & Moir, 2016). Similarly, Haffling et al. (2010) showed that medical students in clinical practice improved their patient-centered consultation skills and patient rapport when they did not lose control of the consultation and did not get caught in a flow of less ordered information from patients. Most importantly, they were open and honest about their mistakes and how they had tried to overcome them at that moment, and how they would apply these lessons learned in their future practice. If inexperienced students, however, were anxious about how to use the portfolio, if there were misconceptions and a lack of understanding about the reflective learning part, or if students found the reflective learning process difficult and unhelpful, Ross et al. (2009) recommended that the introductory information, good examples of portfolio, supports from the faculty members and mentors be needed. These are some examples of how traditional portfolios can help enhance medical students' reflective skills.

Currently, most traditional portfolios are digital or electronic forms for easy access and learning evidence complication, so an e-portfolio has been widely used in medical education. The benefits of utilizing the e-portfolio are seen in the medical curriculum. For instance, Sieben et al. (2021) pointed out the satisfactory results in which the medical students' depth of reflection reached 54% of the critique

level followed by 28%, 11%, and 7%, discussion, justification, and description respectively. In addition, the medical students gave feedback that the e-portfolio provided them with practical experience of reflective writing because they had opportunities to select their own meaningful experience and that learning by doing improved their quality of reflection. Schrempf et al. (2022) suggested that mentors' led-conversation and engagements had positive impacts on medical students' learning and trusting relationships, so the combination of study content, reflection in e-portfolio, and mentors' led conversation for reflection was able to significantly increase students' learning motivation and deepen reflection. However, some medical students may have a bias towards the use of the e-portfolio such as a perceived burden, duplicated work with log books, unsure feeling how to navigate, what purposes it served, etc. Vance et al. (2017) argued that it could take time for students to realize the value of self-directed and reflective learning, so early introduction was recommended (Fida & Shamim, 2016).

Overall, most studies above tended to confirm that reflective writing in an e-portfolio of medical education has enhanced medical students' reflective skills. The following section outlines a framework for assessing the quality of reflection to support the implementation of effective reflective practices in our study.

Framework of Reflection Quality

This present study applied the reflection quality framework by Sieben et al. (2021) which denoted four hierarchical levels of reflection "(1) The lowest level is *description* when the reflection consists of descriptive information only. (2) The second level of argumentation is *justification* when a rationale or logic is included. (3) The third level is labeled *critique* when the reflection contains aspects of explanation or evaluation. (4) The highest level of argumentation is *discussion*, which includes suggestions for alternative solutions" (p. 4).

Figure 1

Four Hierarchical Levels of Reflection

Category	Content	Phrasing
Description	Contains only descriptions of actions and/or thoughts and/or emotions; factual information without interpretation or explanation.	Typically using simple past tense, e.g.: 'I did …', 'I felt …', 'I thought …', 'He said …'
Justification	Contains rationale or logic; explanation.	Signal-words: causal adverbs like 'because', 'as', 'thus', 'therefore', etc. Also an arrow in concept map can reflect inference.
Critique	Contains evaluation and/or interpretation of the situation, action or response. Also: expressions of personal values.	Signal-words: First person and referring to some kind of key message. 'I learned …', 'I conclude …', etc.
Discussion	Goes beyond evaluation; contains explanation why change is needed and how this could be achieved. Intention should be concrete, not vague or too general, otherwise level is coded as *critique*.	Forward-looking wording: 'Next time …', 'For future occasions …', 'My plan is …' Also: Link to learning-goal.

Note. This figure was created from four levels of augmentation by Sieben et al. (2021).

Sieben et al. (2021) argued that this framework was a helpful technique for developing undergraduate medical students' reflective skills in their study. Elsewhere, this framework was proven to be useful in enhancing tertiary dance students' skills as well, and Leijen et al. (2012) confirmed that

it was not only applicable to dance and art education but also to higher education in general. Since the reflection quality framework can develop students' reflective skills in the higher education context in general, we employ it as a conceptual framework when we interpret the study findings.

Methods

Research Design and Context

In this study, we adopted an exploratory research design (Maxwell, 2012), which allowed us to explore 1) how pre-medical students' reflective skills developed across different levels of reflection in an e-portfolio project, and 2) their perceptions of the role of the e-portfolio in English language learning within medical education.

The College of Medicine at this private university has accepted around 120 to 130 first-year students each year, commonly known as pre-medical students. This year, 128 students were admitted. Everyone needs to enroll in an integrated English course (ENL 128) focusing on improving speaking, writing, and presentation skills, which takes place every second semester (Term 2) from January to April each year. The integrated English course (ENL 128) was embedded with an e-portfolio project. Usually, there are four sections of this subject and pre-medical students are equally divided for each section.

During Term 2, 2022, pre-medical students studied this course, focusing on strategies for presentations in English. The course included four tasks: 1) a survey presentation, 2) a process presentation, 3) an argumentative presentation, 4) an international conference presentation, and one e-portfolio project. The first three tasks focused on presentation strategies in English. For Task 4, students read a research article and individually presented it in the context of an international conference. The e-portfolio project required each student to document their learning progress through an individual e-portfolio.

The e-portfolio project consisted of two main parts: 1) artifacts and 2) a reflective essay. First, the artifact part included uploading the students' written journals that must reflect anything related to Units 1–5 and Tasks 1–4 (For example, reflections on unit contents, presentation tasks 1–4 processes, recorded presentation practices, own presentation tasks, classmates' presentations, etc.). The reflective essay (200–300 words) reflected pre-medical students' work and work process for the whole semester based on the following four questions: 1) What story did your artifacts tell? 2) What surprised you? 3) What did you learn from these artifacts and about yourself? And 4) what would you have done differently?

Participants and Recruitment

Four male and five female pre-medical students voluntarily participated in the focus group interview, making a total of nine students (around 18–20 years old). Consent forms for the interview

and video recordings were sent to the students before the interview. Their English proficiency levels were B2. When asked before the interview, they mentioned that they had never created an e-portfolio before. The human ethics proposal was approved by the Research Ethics Office of this private university before the data collection and preparation process.

Research Instruments

We conducted the questionnaire analysis (Appendix 1) to inform opportunities for how we improve the e-portfolio instruction in this course. The questionnaire questions were centered around definitions and characteristics of e-portfolios. The focus group interviews were the primary research instrument of this study. They were chosen not only because they reflected students' perceptions and beliefs but also because they benefited group dynamics, relationships, and confidence in sharing information and reaching a consensus on agreements or issues when developing an e-portfolio. In addition, the focus group interview allowed students to direct and lead the discussions (Kitzinger, 1994). The interview questions (Appendix 2) were involved around the perceptions of participants about the e-portfolio in English language learning in Thai universities, and the narrative experience gained from the e-portfolio project.

The questionnaire and focus group interview questions were constructed using the index of item-objective congruence (IOC) by the three English lecturers. It resulted in an overall content congruence index of 0.971. Before Term 2 started, we piloted two out of four sections where pre-medical students enrolled in the integrated English course (ENL 128). Upon receiving the completed questionnaires, Cronbach's alpha coefficient results indicated a range between 0.801 and 0.912. This is greater than 0.70, indicating suitability for data collection and gathering.

Data Collection

A triangulated data method was used incorporating the reflective essays and focus group interviews. By using the combined methods of data collection, we ensured that the data were consistent and dependable to reach the study's reliability (Merriam & Tisdell, 2015).

In the first week of Term 2, 2022, the questionnaire analysis was sent out to 128 pre-medical students from four sections taking an integrated English course (ENL 128). In the same term, the pre-medical students developed their e-portfolio with 1) artifacts and 2) a reflective essay. However, when the semester ended, 113 out of 128 e-portfolios were submitted. The missing numbers resulted from withdrawal, dropping out, and a preference not to submit for research. Students' reflective essays from 113 pre-medical students were expected to be used as first data and the total size was 135,407 words.

Upon the semester's end, due to the issues with the students' interview availabilities, a series of focus group interviews in English (2–3 students per session) was conducted in May 2023 via Zoom with recorded interviews to explore insight into the participants' learning experience.

Data Analysis

Our analytical steps were divided into two steps according to data collection types: 1) pre-medical students' reflective essays, and 2) interview transcription.

Before step 1, the questionnaire analysis was returned, and the data was analyzed by descriptive statistics namely percentage. That is, the questionnaire was automatically analyzed by Google Forms which showed opportunities for how we were going to design, assess, and integrate e-portfolio learning in this course. This allowed us to improve our instructions.

In step one, we identified signal words in excerpts in pre-students' reflective essays that indicated their reflective thinking abilities. The *signal words* were guided by Figure 1: *Four hierarchical levels of reflection* presented in the literature review section; for example; first-person pronoun *I + verbs* in the *past tense* in level 1: description; *causal adverbs* such as and *because* or *so* in level 2: justification; first-person pronoun *I* with *evaluative verbs* such as *learned/learnt*, *chose*, and *was able to*, in level 3: critique; and *forward-looking words* such as *next time* and *will* in level 4: discussion.

The identified signal words were found in a simple, compound, or complex sentence, each considered unique to one excerpt. However, if a sentence contained two signal words, only the main signal word chosen for that level was counted, while the other was disregarded; for example: *"I liked the advice from the teacher after the presentations because I can know what I need to improve, and consequently"* This excerpt is a compound sentence. We coded it as Level 2: Justification because of the signal word *because*, disregarding the signal word *liked*. Some essays may have more than one excerpt if there is more than one different signal word.

At each level, we assessed reflection by presenting numbers of students who gave the same or similar answers (frequency of excerpts). The excerpts were recorded, categorized, and themed. We employed a peer review strategy by asking two other lecturers teaching this course to check the categories and themes for the sake of the study's credibility (Merriam & Tisdell, 2015). This addressed research question 1) *How are pre-medical students' reflective skills developed across different levels of reflection in an e-portfolio project?*

In step two, all interviews were transcribed. Then, we conducted a content analysis in which we did open-coding, categorized, and themed on pre-medical students' transcribed interviews (Saldana, 2014, p. 585). First, we categorized similar or comparable codes into groups for pattern construction and analysis. Next, we reviewed all categories again to ensure we mutually understood the patterns. Then, we themed the patterns of categories and we debriefed all themes. The emerging themes answered the research questions 2) *What are the perceptions of pre-medical students towards the roles of an e-portfolio in English language learning in medical education?* For the study's internal validity of step two, we employed a peer review strategy (Merriam & Tisdell, 2015), in which we asked two other lecturers who also taught this subject to give comments and feedback on our results.

Results

Before step one, 127 (out of 128) questionnaires were returned. Not surprisingly, 96.9% were aware of the definition and characteristics of traditional portfolios. 78% had done the traditional portfolio previously. However, while most students reported that they had not done the e-portfolio before, 62.2% tended to be aware that the e-portfolio was an individual showcase in a digital world consisting of a person's blogs and resumes. Further, 89.8% were not aware of the relationship between the e-portfolio and a reflective skill. These results indicated that we had the opportunity to add our instructions for the e-portfolio and reflective skills in an integrated English course (ENL 128).

RQ 1: How are pre-medical students' reflective skills developed across different levels of reflection in an e-portfolio project?

The pre-medical students' reflective skills were developed across different levels of reflection in an e-portfolio project. This is illustrated in Table 1, which shows the percentage dispersion of excerpts across the four hierarchical levels of reflection. Specifically, Level 1 accounts for 23%, involving the retelling of the pre-medical students' personal experiences. Level 2 represents 23% of the excerpts, indicating that students justify their actions by linking them to skill development and personal growth. Similarly, Level 3 shows 37% of the excerpts, reflecting students' self-discovery. Lastly, Level 4 accounts for 17% of the excerpts, focusing on the students' future aspirations.

Table 1

Percentage of Four Levels

Four Hierarchical Levels of Reflection	Frequency of Excerpts	Percentage
Level 1: Description: Personal Stories	97	23
Level 2: Justification: Skills and Self-improvement	95	23
Level 3: Critique: Self-discovery	153	37
Level 4: Discussion: Future Aspirations	73	17
Total	418	100

In Step One, several patterns of excerpts indicated that pre-medical students were able to describe their experiences using the past simple tense in Level 1, justify their skills and self-improvement in Level 2, critique their self-discovery in Level 3, and discuss their future aspirations in Level 4.

Level 1: Description: Personal stories. After analyzing excerpts containing the first- person pronoun *I + past simple verbs*, a prevalent theme of personal stories among pre-medical students emerged. This theme included two primary categories: extracurricular activities and education. This outcome was not surprising, indicating that at this level, students were expected to write their personal

and academic experiences, with past simple verbs playing a significant role in conveying these narratives. The following excerpts provided examples of students utilizing past simple verbs (underlined) to articulate their personal and academic experiences.

Extra-curricular activities.

Since I was 9 years old, I have studied the piano.

(Student 1)

My friends and I participated in a project to teach children from Banmahamek foster home how to make herbal compresses.

(Student 3)

I had an experience of helping a teacher to write some review paper at that time it quite difficult to find the information about way to find research paper.

(Student 10)

I was the head of the room from high school, which made me gain leadership skill.

(Student 80)

Education.

I completed kindergarten and elementary school at Ek Burapa School.

(Student 32)

From kindergarten to middle school, I studied at Supaluck School, private school, and then…

(Student 36)

After graduation, I moved to Suankularb Wittayalai Nonthaburi School (elementary).

(Student 82)

I was in an MSEP Program, a Mathematics and Science Enrichment Program.

(Student 103)

Level 2: Justification: Skills and self-improvement: Upon reviewing data linked to the causal adverbs, several excerpts with causal adverbs *so* and *because* were located. Therefore, the theme *justification of important skills* emerged and was supported by two categories: the significance of *communication and collaboration* and *self-reminder for room for improvement.* The data indicated that pre-medical students were well aware of the importance of communication and collaboration skills, as these skills facilitated effective interaction with fellow students and teachers. Furthermore, the students demonstrated a developed ability for self-regulated learning. The following excerpts provided examples of pre-medical students using the causal adverbs *so* and *because* (underlined) to justify their important skills.

Communication and collaboration.

This task is quite challenging because we have to persuade the professor to agree with us.

(Student 30)

But what made the event truly special was how it boosted my social skills rapidly because I was required to interact with a group of strangers who hailed from different provinces and parts of the country that I would not have had the opportunity to meet them if I had not attended this event.

(Student 64)

All of this will have to go through group work as well, so I have to work with others and listen to a lot of opinions.

(Student 77)

This semester I am doing group work that has different people from last semester, so I have to adapt my style of working to fit with new groups' friends.

(Student 105)

Self-reminder for room for improvement.

First, after getting the task I thought that it would be difficult because when I present in front of the audience, I usually look at the PowerPoint while talking,

(Student 3)

As the teacher is a foreigner and a native speaker, so I practice communication (on my own) a lot.

(Student 87)

I liked the advice from the teacher after the presentations because I can know what I need to improve, and consequently, I can get more practice.

(Student 94)

Lastly, this activity improved my reading skills a lot because I had to read the whole research and conclude it in a little article.

(Student 15)

Level 3: Critique: Self-discovery: Upon reviewing texts containing the first-person pronoun *I* and the top evaluative words: *learned/learnt*; *chose/chosen*; *decided*; and *was able to*, a prevalent theme of *self-discovery* emerged among pre-medical students. This theme included two primary categories: *self-realization ability* and *enhancement of research skills.* The following excerpts provided examples of pre-medical students using evaluative words (underlined) to describe their self-realization ability and how their research skills were enhanced.

Self-realization ability.

Additionally, I was able to expand my horizons and discover new information, thanks to the research component of the course.

(Student 29)

Surprisingly, each theme I chose can reflect my characteristics. It expresses how much earnestness I have when I must focus on something and the flexibility, I have for being a team-worker.

(Student 61)

From this activity, I learnt that even though it is the same picture, we see that picture differently. Likewise, many issues happen nowadays, it is normal that people are having different opinions. What we should do is accept others.

(Student 58)

I also learned that it is okay to make mistakes and that the feedback I received was not meant to criticize but to help me improve.

(Student 111)

Enhancement of research skills.

I chose an article related to the anxiety of ADHD children with bullying and pretended to be the researcher at a conference. Although it is challenging, I am very proud of myself that I did very well.

(Student 23)

Participating in the Monkeypox research project was an enlightening experience for me. I learned how to navigate the Scopus website and search for credible research from around the world.

(Student 29)

And in task 5, I learned more about medical research that would be helpful for my career in the future.

(Student 90)

I was able to apply my skills in designing and conducting a survey to collect relevant data and analyze it.

(Student 113)

Level 4: Discussion: Future aspirations: After analyzing data associated with the forward-looking words in Figure 1, pre-medical students' theme *future aspirations* emerged which included two categories of *self-improvement* and *self-learning goals*. The following excerpts showed some examples of the pre-medical students using forward-looking words (underlined) to describe their self-improvement and self-learning goals.

Self-improvement.

We forgot some of our scripts because we were a little anxious and excited, but I think we did a great job overall. We also got feedback from the teacher, so we can use it to get better for the next time.

(Student 25)

The last thing is to practice reflecting on our presentation. I was a bit nervous, so I forgot the script. That's why the presentation doesn't look smooth. Which I will try to fix as much as possible next time.

(Student 47)

My group presents this time did a very good job overall except did not pay attention to the audience. Maybe next to I should more be careful.

(Student 54)

After completing this class, I felt that I should keep improving my English skills.

(Student 87).

Self-learning goals.

I hope in the future I will continue to develop myself. I have got many strategies.

(Student 24)

As I conclude, I am excited to apply my newfound skills in future tasks, delivering impactful presentations, and grateful for the valuable experiences and growth opportunities this course provided. I look forward to continuing my journey as a skilled presenter.

(Student 40)

I hope that I will be able to use English more proficiently.

(Student 78)

My goal in the future is to become a doctor. I'm passionate about the functions of the human body and helping people to recover from diseases.

(Student 96)

Overall, in the level of description, the theme of *personal stories* fundamentally showed strong reflective skills in expressing experiences. The level of justification indicated the ability to articulate reasons for *skills and self-improvement*. The level of critique suggested thoughtful *self-discovery* reflecting on reflective thinking abilities. In a level of discussion, engagement in *future aspirations* implied openness to forward-looking perspectives. However, a closer look at the highest number of excerpts in Levels 3 (153 excerpts) compared to Levels 1 (97 excerpts), 2 (95 excerpts), and 4 (73 excerpts) suggests that pre-medical students are more focused on reflecting their self-discovery rather than sharing personal stories, justifying skills and self-improvement, or discussing future directions. This is important because it implies that the pre-medical students' reflective skills have been developed.

RQ 2: What are the perceptions of pre-medical students towards the role of an e-portfolio in English language learning in medical education?

The results for research question 2 were from focus group interview sessions, which indicate an improvement in pre-medical students' language skills, particularly in writing and presenting.

Improvement skills. The perceptions of pre-medical students toward e-portfolios in English language learning in medical education revealed that *improvement skills* were a major theme, including three categories: English writing, presentation, and teamwork skills.

English writing skill. The development of students' English writing ability was apparent through the e-portfolio tasks. Evidence suggested that students wrote more efficiently during various writing assignments. Some mentioned that they had not written proper English in a while, and the e-portfolio motivated them to resume writing. The following excerpts illustrated the students' perceptions of their improvement in English writing.

> *I think my writing skills have really improved. I can see how fast I am using my vocabulary.*
>
> (Student 3)
>
> *For me, I think I've improved along the e-portfolio task in the writing skill. As you know, we actually do a lot of tasks along, you know class like the script and all the presentations it makes me like learn more about doing all the scripts and writing.*
>
> (Student 6)
>
> *OK, say for me during this task, E-portfolio project, I have improved of all of my English here listening, writing, speaking.*
>
> (Student 7)
>
> *I think it's maybe about my writing skills because I have not written proper English for quite a long time.*
>
> (Student 8)

Presentation skills. In addition to improving the English writing skills of pre-medical students, there was a noticeable development in their presentation skills. This was not surprising because ENL 128 was a dedicated subject focused on presentations. Students were required to learn, practice, and present immediately after each unit, exposing them to various presentation techniques. The following excerpts illustrated how the students perceived the development of these skills.

> *I really improved my presentation skills since all of the assignments in the e-portfolio focus on presentations.*
>
> (Student 1)

So, the skills that I think I have improved. By doing task 6 and like every test in the portfolio project is that presentation skills.

(Student 5)

It's obvious that my presentation skills are improved.

(Student 4)

It helps me a lot with presentation skills like there are several technique techniques that it is taught through the course.

(Student 9)

Overall, pre-medical students showed positive perceptions towards the use of e-portfolios in English language learning within medical education. The positive feedback was from the realization that e-portfolios improved their English language abilities, specifically in writing and presenting skills. The presentation skills are associated with speaking skills. Consequently, these positive outcomes provided answers to Research Question 2.

Discussion

In this research, we explored: 1) how pre-medical students' reflective skills were developed across different levels of reflection in an e-portfolio project, and 2) their perceptions of the role of the e-portfolio in English language learning within medical education.

Strengths of Asking the Right Questions

The results from Research Question 1 indicated that the reflective skills of pre-medical students were developed based on the signal words in four levels: 1) description, 2) justification, 3) critique, and 4) discussion. These levels were structured according to Figure 1 *Four hierarchical levels of reflection*. This resulted in the emerging patterns of excerpts resulting in categories and themes. Additionally, the reflective skills of pre-medical students were evident, supported by signal words in levels 2–3, *justification,* and *critique*, suggesting *self-improvement* and *self-discovery* indicative of developing reflective thinking. The pre-medical students' highest level of reflection reached 37% in critique (Level 3) (Table 1). This is similar to Sieben et al. (2021) which found that their medical students' highest level of reflection reached 54% in critique (Level 3).

A closer examination of Table 1, from Levels 1–4, suggested it functioned as a scaffold for the development of reflective skills among pre-medical students. Drawing from the concept of *scaffolding*, as described by Reiser and Tabak (2014), which involves activities designed to support students' learning, the e-portfolio task, embedded in ENL 128, was intentionally designed to scaffold students' reflective skills. To be more specific, at the top level (description: personal stories), the pre-medical students fundamentally showed strong reflective skills in expressing experiences. Then, the next level (justification: skills and self-improvement) indicated their ability to articulate reasons for *skills and self-*

improvement. After that, the critique level suggested thoughtful *self-discovery* suggesting developing reflective ability. At the bottom level (discussion: future aspirations), engagement in *future aspirations* implied openness to forward-looking perspectives.

Practically, students were tasked with composing a reflective essay of 200–300 words, guided by four key reflective questions: 1) What story did your artifacts tell? 2) What surprised you? 3) What did you learn from these artifacts and about yourself? And 4) what would you have done differently? We argued that the use of appropriate and reflective questions is essential for fostering students' reflective skills. Similarly, our argument aligns with the study results of Malthouse et al. (2015) and Mustika et al. (2020), which suggest the importance of questioning techniques in enhancing individuals' reflective skills.

Strengths of Journaling

Pre-medical students showed positive perceptions towards the use of e-portfolios in English language learning within medical education. The favourable feedback was from the realization that e-portfolios enhanced their English language abilities, particularly in *writing and presenting skills*.

Concerning students' improvements in English writing, it is presumed that a short writing reflection task followed each lesson and task presentation in the ENL 128 course. This type of writing involves journaling, which entails noting and recording one's thoughts and feelings (Lara, 2020). Furthermore, Sihite and Simanjuntak (2016) found that participants in an experimental group showed improvement in their English writing skills over time following reflection tasks in an e-portfolio project assignment. This supports the idea that assigning journaling after each study period contributes to the enhancement of students' English writing skills. In addition, not only did the pre-medical students' writing skills improve, but their research reading skills also showed enhancement, as evidenced by the category *Enhancement of Research Skills* of the results.

In addition to enhancing pre-medical students' writing and reading abilities, recording their spoken presentation practices and uploading them to their e-portfolios allows them to review their pronunciation, fluency, and clarity, helping them identify areas for improvement. The e-portfolio is a place for tracking their presentation progress, demonstrating how their presenting skills improve over time. This process has helped pre-medical students enhance their pronunciation and overall fluency. Several studies (Asma & Hum, 2022; Cabrera-Solano, 2020; Qiao et. al., 2023) have also reported similar findings, indicating that e-portfolios significantly improve students' speaking and presenting abilities, particularly pronunciation, and fluency.

Overall, the e-portfolio served as a reflective tool that guided pre-medical students toward deeper self-reflection. The journaling tasks encouraged regular reflection, enhancing their self-evaluation, personal growth, and language development.

Conclusion and Recommendations

The results of this study suggested that pre-medical students showed a multifaceted approach to reflection indicating progress in reflective skills through the development of e-portfolios. The structured framework of four hierarchical levels of reflection suggested that the e-portfolio task served as a scaffold for the intentional development of these skills.

Combining the strengths of posing reflective questions with journaling is an important approach to developing students' reflective abilities. Integrating English language learning into an e-portfolio project has also proven successful in improving students' English writing, and presentation skills.

Despite several positive outcomes being shown, the findings of this study were limited to participants who were a small group of pre-medical students at a private university in Thailand. Applying the study methods and results to other medical contexts may require careful consideration. The study implications can include getting students to think more deeply by designing reflective questions as well as English proficiency development, particularly writing and speaking skills.

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Appendix 1: Questionnaire Questions

1. Do you know 'Portfolio'? Yes/No
2. Portfolio is …..
    a) collections of your showcases that highlight your academic achievements.
    b) collections of your showcases that highlight your work achievements.
    c) collections of your showcases that highlight your academic and work achievements.
    d) None is correct.
3. Have you done 'Portfolio' before? Yes/No
4. How about an e-portfolio? Have you ever done it? Yes/No
5. What is an e-portfolio like in your opinion?
    a) It is a showcase in a digital world.
    b) It is a showcase in the form of blogs.
    c) It is a showcase in the form of resumes.
    d) It is a showcase in the form of reflections.
6. E-portfolio is ...
    a) collections of your blogs in a digital world.
    b) collections of your resumes in a digital world.
    c) collections of your reflections in a digital world.
    d) All is correct.
7. E-portfolio should be done
    a) individually.
    b) in pairs.
    c) in groups.

8. Have you ever done e-portfolio? Yes/No
9. How many e-portfolios have you done so far?

a) 0 c) 2

b) 1 d) More than 3

10. Did you know the relationship between e-portfolio and reflective skill? Yes/No
11. If yes, please explain.
12. Please describe your e-portfolios you have done

Appendix 2: Interview Questions

1. What language skills did you improve from this project? How did you know this if you improved?
2. What are your self-learning techniques for this project?
3. What are your self-learning motivations for this project?
4. What were your self-learning problems or challenges?
5. Why is this a problem?
6. How would you solve this problem?
7. How could you avoid this problem in the future?
8. How did you feel when you were assigned this task and how did you feel after you saw your e-portfolio done?
9. How did you compile your artfifacts or learning evidence/evidence?
10. What were challenges when you compiled e-portfolios? And how did you cope with them?

When you look at your artfifacts, 1) What surprised you? And) what would you have done differently?

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