การประเมินความต้องการจำเป็นต่อการพัฒนาแฟ้มสะสมงานอิเล็กทรอนิกส์ สำหรับนักศึกษาวิสัญญีพยาบาล

Needs Assessment of Electronic Portfolio Development for Nurse Anesthetist Students

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บทคัดย่อ

การปรับเปลี่ยนเพื่อนำแฟ้มสะสมผลงานอิเล็กทรอนิกส์มาใช้งานสำหรับนักศึกษาพยาบาลวิสัญญีต้องมีการประเมินความต้องการจำเป็นอย่างเป็นระบบ วัตถุประสงค์ของการวิจัย (1) เพื่อเปรียบเทียบสถานะปัจจุบันและความต้องการสำหรับแฟ้มสะสมผลงาน (2) เพื่อจัดลำดับความสำคัญของความต้องการในการพัฒนา และ (3) เพื่อรวบรวมความคิดเห็นของวิสัญญีพยาบาลผู้สอน รูปแบบการวิจัยผสมวิธีถูกนำมาใช้เพื่อการสำรวจความต้องการจำเป็นกับนักศึกษาพยาบาลวิสัญญี 45 คนและอาจารย์ผู้ฝึกสอน 3 คน เพื่อประเมินสภาพปัจจุบันและสภาพที่ต้องการของแฟ้มสะสมผลงานอิเล็กทรอนิกส์ วิเคราะห์ทางสถิติด้วย paired-sample t-tests รวมถึงดัชนีความสำคัญของลำดับความต้องการจำเป็น (PNI) พบว่ามีความแตกต่างอย่างมีนัยสำคัญระหว่างมุมมองปัจจุบันและมุมมองที่ต้องการของนักศึกษาใน 3 ด้านของแฟ้มสะสมผลงาน: ส่วนประกอบของแฟ้มสะสมผลงาน: M = 3.56, SD = 0.73 (ปัจจุบัน) เทียบกับ M = 4.12, SD = 0.90 (ที่ต้องการ); t(44) = 4.88, p < .001 เทคโนโลยีของแฟ้มสะสมผลงาน: M = 3.25, SD = 1.09 (ปัจจุบัน) เทียบกับ M = 4.35, SD = 0.75 (ที่ต้องการ); t(44) = 5.91, p < .001 ประโยชน์ของแฟ้มสะสมผลงาน: M = 3.71, SD = 0.77 (ปัจจุบัน) เทียบกับ M = 4.18, SD = 0.80 (ที่ต้องการ); t(44) = 5.09, p < .001 นักศึกษาระบุความต้องการจำเป็นที่สำคัญที่สุดในด้านเทคโนโลยี (PNI mod = 0.34) และความต้องการจำเป็นสำคัญน้อยที่สุดในด้านอุปสรรค (PNI mod = 0.12) ผลการศึกษาเน้นย้ำถึงความสำคัญของการแก้ไขช่องว่างเพื่อการพัฒนาระบบที่ใช้งานง่ายและมีประสิทธิภาพ

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Abstract

The transition and implementation of electronic portfolios for nurse anesthetist students requires a systematic needs assessment. This research aims to (1) compare the current status and needs for a portfolio, (2) prioritize requirements for development, and (3) gather opinions from anesthesia educators. A mixed-methods research design was used to survey the needs of 45 anesthesia nursing students and three nursing instructors to assess the current and desired state of the portfolio. Statistical analyses were performed using paired-sample t-tests and the Priority Needs Index (PNI). Significant differences were found between the

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ได้รับทุนวิจัยการศึกษาจากศูนย์ความเป็นเลิศทางการศึกษาด้านวิทยาศาสตร์สุขภาพ คณะแพทยศาสตร์ศิริราชพยาบาล

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students' current and desired views in three dimensions of the portfolio: portfolio components: M = 3.56, SD = 0.73 (current) vs. M = 4.12, SD = 0.90 (desired); t(44) = 4.88, p < .001; portfolio technology: M = 3.25, SD = 1.09 (current) vs. M = 4.35, SD = 0.75 (desired); t(44) = 5.91, p < .001 Portfolio usefulness: M = 3.71, SD = 0.77 (current) vs. M = 4.18, SD = 0.80 (desired); t(44) = 5.09, p < 0.001 Students identified the most critical needs in technology (PNI mod = 0.34) and the less critical needs in obstacles (PNI mod = 0.12). The results underscore the importance of addressing gaps to develop user-friendly and effective systems.

Keywords: Nurse anesthetists, e-Portfolios, Needs assessment

Introduction

Significant educational reforms have emerged since the passage of the National Education Act of 1999. These reforms encompass curriculum development, teaching methodologies, and assessment practices.[1] Nurse anesthesia trainees in a one-year program must develop complex skills within a short period.[2] To align with the learning styles of digital-native Generation Z, adding electronic portfolios (E-portfolios) to their training can make the experience more engaging and personalized.[3] A portfolio is valuable for nurses as it enables them to reflect on, develop, and assess their clinical competencies.[4] It provides a structured way to demonstrate compliance with professional standards and outlines goals for future growth.[5,6] Allowing nurses to reflect on their practice and compare their skills with well-known standards supports self-assessment, identifies learning needs, and creates targeted learning plans.[7] Portfolios can be in paper or electronic format. Electronic portfolios (e-portfolios) offer several benefits, such as greater accessibility, easier sharing and storage, improved portability, enhanced interactivity, the ability to include multimedia content, and more opportunities for personal expression.[8,9] However, e-portfolios are still emerging in nursing education, requiring further evaluation of their effectiveness in clinical practice.[4] Challenges in implementing e-portfolios include varying levels of computer literacy and accessibility to technology and the Internet.[8,10,11] Therefore, creating a user-friendly platform for e-portfolio design is essential.

The annual report from a nurse anesthesia training center outlines the instructional methods used to educate Thai nurse anesthesia students.[12] They have portfolios, compile work, and show nursing students' cognitive and skill test results recorded on paper. The paper portfolio includes an introduction with a cover, history, learning work areas from all 16 anesthesia service units, case discussions, and an appendix of documents related to the academic year. For over five years, nurse anesthetist staff have systematically managed these portfolios as instructors, the training committee as assessors, and the students as learners. A critical issue is that paper formats are inconvenient, leading to overlapping workloads when duplicating data in other forms. Current portfolios have complicated patient details and lack engagement due to excessive written content. The current portfolio also lacks a vital evaluation section for self-assessment and feedback from instructors and peers, which is essential to the teaching portfolio. Additionally, digital data recording is now more accessible. Some nursing students have suggested incorporating images related to patients to enhance interest. However, paper versions face the risk of getting lost due to portability issues. To avoid evaluation discrepancies, a portfolio with images and animations is needed.

The challenges in nurse anesthesia training regarding portfolio adaptation have not been studied extensively. A key area for improvement is the transition from traditional paper portfolios to electronic formats. Electronic portfolios enable the systematic collection and organization of various media types—text, audio, images, and video—encouraging student engagement and self-reflection. Hyperlinks can enhance these portfolios by connecting works based on criteria, effectively showcasing student development and achievements.[13,14] Currently, nurse anesthesia portfolios may not effectively align with classroom realities or meet the needs of students and instructors. Transitioning to electronic portfolios offers an opportunity to improve the educational experiences for nurse anesthesia students.

Needs assessment in education serves as a systematic approach to identifying and addressing the requirements of both learners and stakeholders.[15] As a foundational framework, it guides the development of targeted strategies aimed at improving educational outcomes by aligning curriculum design, instructional practices, and resource distribution with specific learner needs. The following sections explore the core principles and applications of this approach. At its core, needs assessment involves recognizing gaps between existing conditions and desired educational outcomes.[16] Its primary purpose is to gather data that informs decision-making processes and supports school improvement initiatives. Common methods used in conducting a needs assessment include surveys, focus groups, and qualitative evaluations—each selected based on the context and goals of the assessment.[17] When effectively implemented, needs assessments inform curriculum planning and resource management to better serve diverse student populations. This process integrates both quantitative tools, such as data analysis, and qualitative inputs, including stakeholder perspectives, to support evidence-based decisions in educational programming.[18]

The authors of this work want to study needs assessment. Therefore, information collected from people can support decision-making and planning, leading to improved work development and positive changes. A needs assessment is crucial for developing innovations for the electronic portfolio. A comprehensive needs assessment is divided into three parts: 1) Identifying Needs, which involves figuring out emerging needs; 2) Analyzing Needs[19], which investigates what causes those needs in the first place; 3) Finding a Solution, which involves deciding how to tackle the problems in a way that fits the situation. it is essential to see if the opportunity portfolios currently used for nursing anesthesia students are missing any key elements or processes that could create obstacles in teaching and learning.[16,20] A needs research process can help prioritize these issues. Understanding the differences between current aspects and how they should be It is vital for the existing portfolio. Participants' feedback can help us make better decisions, create plans, and set guidelines for work development, leading to positive and creative changes.

Objective

To compare the current state and desired expectations for portfolios, to prioritize requirements for development, and to gather nurse anesthetist students' opinions on the development of electronic portfolios.

Methodology

This descriptive study involves a mixed-methods approach as a sequential design, combining quantitative data analysis with qualitative insights from nurse anesthetists.

Sample size and calculation

The sample size for a t-test, a statistical test comparing two dependent means (matched pairs), was determined using power analysis. The power analysis was conducted in G*Power[21] using an alpha of 0.05, a power of 0.95, and a medium effect size (0.05); the required sample size was 45. This study involved 45 nurse anesthesia students from a training institute affiliated with the Faculty of Medicine at Siriraj Hospital for the academic years 2022-2024. We used a simple random sampling method. The inclusion criteria were: 1) being a post-graduate nurse anesthesia student enrolled at a Royal College of Anesthesia of Thailand–certified institution; 2) over 6 months of portfolio experience in training. For the qualitative part of the study, totally three nurse anesthesia training committee members were interviewed, who were chosen through purposive sampling based on the following qualifications: 1) at least three years of service as committee members; 2) Expertise in using portfolio methods for measurement and evaluation; and 3) A minimum of three years of experience teaching nurse anesthesia students.

Protection of Research Participants' Rights

The Siriraj Institutional Review Board (SIRB) at the Faculty of Medicine, Siriraj Hospital, approved the research study to collect quantitative and qualitative data (COA no. Si 521/2024) approval date July 4, 2024. All eligible participants consented, understanding they could withdraw at any time. They were assured of data confidentiality and anonymity.

Research Tools and Instrument Quality

This study used the concept of needs assessment to assess the current and desired conditions regarding on the principles of an electronic portfolio.[13,22,23] The adaptations were made from previous questionnaires for the perception of the benefits of using a portfolio, consists of four sections: content, technology, benefits, and obstacles. Therefore, needs assessment questionnaire utilized a five-level rating scale to measure respondents' perceptions in dual responses as current and desired on content, technology, benefits, and obstacles in using portfolio.[24]

Structured interviews were conducted with nurse anesthesia training committee to clarify the content and technology for portfolio. The framework for the electronic portfolio informs the development of research tools aligned with the objectives of the study. Three anesthesiologist experts assessed the content validity of this needs assessment questionnaire and Index of Consistency (IOC), revising for clarity and appropriateness. The IOC questionnaire exhibited a content validity index ranging from 0.67 to 1.0. Finally, the questionnaire was administered to ten anesthetists who had graduated from the nurse anesthesia training program within the past year, confirming the relevance of the sample group. The internal consistency reliability, measured by Cronbach's alpha, was 0.75.

Data Collection

The research aimed to explore nursing anesthesia students' perceptions of electronic portfolios, providing opportunities for enhancement. Questionnaires were distributed to 45 randomly selected students for broad feedback. Additionally, structured interviews with three nursing anesthesia training committee members gathered in-depth perspectives. The data from the questionnaires and interviews helped understand students' experiences and suggestions. The researchers analyzed this data and presented a comprehensive overview of feedback. A comparison was made between the current state of electronic portfolios and students' expectations, identifying areas for improvement and development.

Data Analysis

SPSS software version 18 (SPSS Inc., Chicago, IL, USA) was used to thoroughly analyze the collected data. The students' demographic information was presented through descriptive statistics, with categorical variables expressed as counts and corresponding percentages. Mean and standard deviation were employed to evaluate students' attitudes toward using electronic portfolios. A dependent-sample t-test was performed to compare the desired performance with the current performance levels for evaluation of students' needs regarding electronic portfolio assessment. A significance level of .05 was established. In addition, the Priority Needs Index (PNImod) was applied to systematically prioritize teachers' needs related to student portfolio assessment. The PNImod was calculated using the following formula

PNImodified = (I – D) / D

where I represents the importance or desired performance, and D denotes the degree of success or current performance. PNImod values of 0.3 or higher were deemed critical.20

Results

A total of 45 nursing students participated in the study. Most participants were women (75.6%), and their mean age was 28.76 ± 1.84 years.

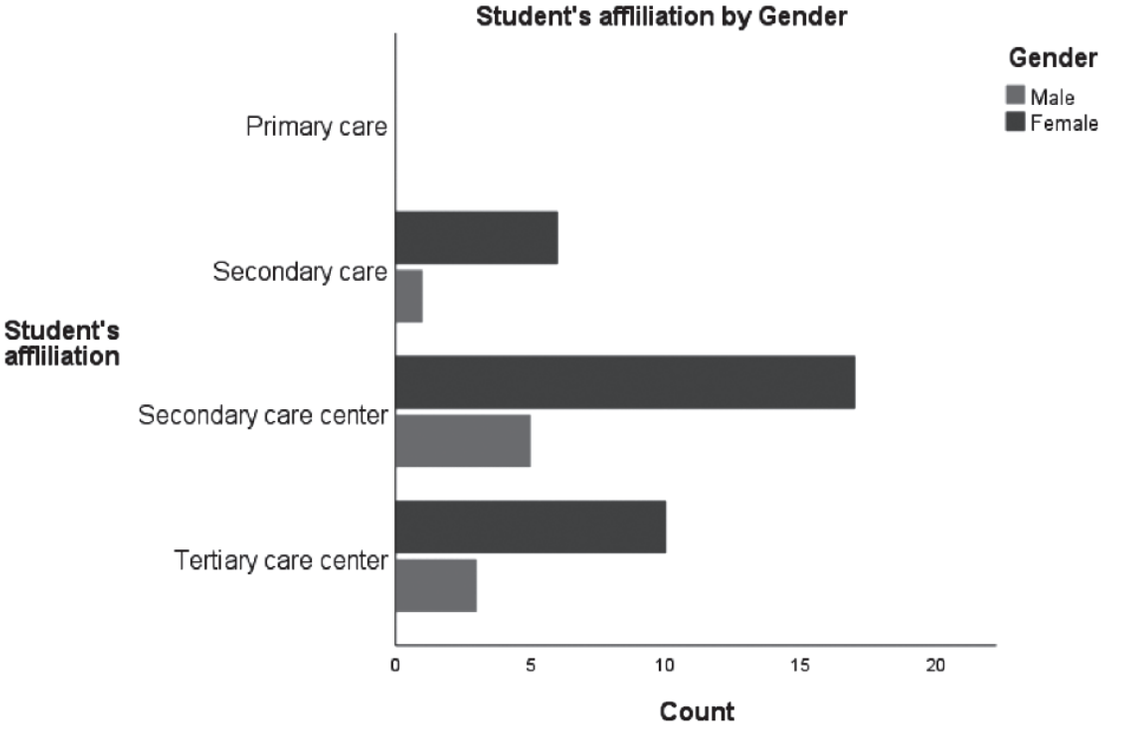

Figure 1. Student affiliation by gender

The double-bar graph in Figure 1 illustrates students and their affiliations in four categories. Seventeen females and five males comprise the majority of students from secondary care centers, while no participants are from primary care units.

Table 1. Mean Students' Ratings on Desired and Current States of Electronic Portfolio for Nurse Anesthetist Students (n=45)

Modalities	Desired (I)		Current (D)		t	p	PNI modified	Ranking
	M	SD	M	SD				
Portfolio content	4.12	0.90	3.56	0.73	4.88	.000	0.16	2
Portfolio technology	4.35	0.75	3.25	1.09	5.91	.000	0.34	1
Portfolio benefits	4.18	0.80	3.71	0.77	5.09	.000	0.13	3
Portfolio obstacles	3.19	1.04	2.86	0.82	2.51	0.016	0.12	4

Overall, the differences in students' desired versus current viewpoints on portfolio modalities (content, technology, benefits, obstacles) were statistically significant ($p < .01$). Current perceptions for portfolio revealed that students rated portfolio benefits the highest (M = 3.71, SD = 0.77), followed by contents (M = 3.56, SD = 0.73), technology (M = 3.25, SD = 1.90), and obstacles (M = 2.86, SD = 0.82). For desired perceptions, students rated technology as the most desired modality (M = 4.35, SD = 0.75), followed by benefits (M = 4.18, SD = 0.80), content (M = 4.12, SD = 0.90), and obstacles (M = 3.19, SD = 1.04).

Additionally, students' needs regarding portfolio modalities were prioritized using the Modified Priority Needs Index (PNImod), as shown in Table 1. Students identified the most critical needs in technology (PNI mod = 0.34), followed by content (PNI mod = 0.16), benefits (PNI mod = 0.13), and obstacles (PNI mod = 0.12).

Structured interviews revealed key aspects of the portfolio in its current (D) and desired (I) states, as reported by the nurse anesthesia training committee. Participants noted overlap with lecture material and a need for refinement. One remarked, "The content and topics in the portfolio overlap with lecture teaching. There are too many topics. It should be reduced to only important topics in the discussion content between anesthesia nurses and anesthesia nurse students" (Participant 03). Another added, "The content and topics in the portfolio are well covered, but it should be revised to include only the necessary topics to reduce the discussion period" (Participant 01).

Regarding portfolio technology, both current (D) and desired (I) states were described. Concerns about the limitations of the paper-based format were raised. As one noted, "The adjustment page of the paper-based portfolio to A4 size is still insufficient for recording content. If improved to be electronic, the increase in storage space and engagement may be better" (Participant 01). Another stated, "The current portfolio assesses knowledge in each operational unit. If changed to an electronic backup system, it will be more convenient for storage and retrieval" (Participant 02).

For portfolio management, the committee noted alignment between the current (D) and desired (I) states. Suggestions included more frequent assessments and digital tools to reduce workload and enhance participation. One suggested, "The examination for the completeness and scoring of portfolios should be done three times per academic year. If developed into an electronic system, it will reduce the workload of the examiners" (Participant 02). Another commented, "Management by future

examiners, if further developed using clear portfolio scoring criteria, will help studentscooperate and participate more in collecting their works" (Participant 03).

Summary and Explanation

The research entails revising portfolio components to better align with educational objectives, utilizing advanced technology to enhance usability and accessibility, and ensuring that portfolios offer tangible benefits for both students and practitioners. By addressing these areas, educators can create more effective tools for assessing competencies and fostering professional growth in nursing.

For desired perceptions, students rated technology as the most desired modality, followed by benefits, content, and obstacles. This implies that students prefer transforming a traditional portfolio with technological concern first, followed by their benefits and contents. As the Portfolio Need Index (PNI) ranged from 0.12 to 0.34, indicating a moderate need for development. Students identified the most critical needs in technology. The gap between current and desired portfolio components reveals the need for a comprehensive revision of the evidence and documentation included. This may involve various assessment methods, such as reflective journals, peer evaluations, and patient feedback. Recent research shows the importance of aligning components with professional competencies, with some works highlighting competency-based portfolios in advancing nursing education.[25] E-portfolios promote metacognition by allowing students to document clinical experiences, self-assess, and link theory to practice. Research indicates they improve critical thinking and decision-making in nursing.

The gap between current and desired technology levels highlights the urgency of transitioning to efficient, accessible electronic portfolios integrated with educational and clinical systems. Research shows e-portfolios enhance student engagement and support continuous assessment, emphasizing the need for a robust digital infrastructure.[26] A key consideration for nurse anesthetist students is choosing an appropriate platform. While specialized software exists, research suggests prioritizing accessible, user-friendly options.[27] For programs considering implementation, the platform must allow multimedia uploads for documentation, facilitate feedback between students and preceptors, and integrate with existing learning management systems.

Nurse anesthetist preceptors likewise recommended revising portfolio components before transitioning to electronic formats. The implementation recommendations include prioritizing user-friendly platforms and utilizing free, device-diagnostic tools like Google Docs to minimize technical barriers.28 Structured training programs should provide workshops for students and preceptors to tackle technophobia and incorporate weekly self-assessments and mentor reviews to align with clinical milestones. The suggestion for communication formats that are proper for nurse anesthetist students, the generation Z people are using widely, is informal communication from online media.[29]

Implications for this study

Research shows anesthesia programs must update portfolio systems to meet standards. The gap between student views on current and desired outcomes shows that current systems are inadequate. Therefore, investment in technology and digital literacy is needed. Portfolios should be more user-friendly and student-focused, with proper resources for technology and training. Before shifting to electronic formats, portfolio components should

be revised, as technology can't fix design flaws alone. Programs should verify content validity through audits, remove irrelevant parts, and focus on competency before digitization.

Implications for future study

It is suggested to study in other stakeholder groups, larger sample sizes, a quantitative study design, and at the national policy level.

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