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Development of a Framework for Promoting the Use of Multiple Assignment Exercises in Basic Nursing Education

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Abstract

New nurses are required to be able to take care of multiple patients at the same time in the clinical setting, observe their conditions and respond to their complaints, while judging their priorities and appropriately resolving multiple issues. However, in basic nursing education, practice in which multiple patients are taken care of is limited to integrated practice in the final year of study, and systematic training is not sufficient. In response to this issue, the "multiple-task exercise," which includes preparation before practice and review after practice, has been developed to enhance the learning effects of integrated practice, and its educational effects have been demonstrated. Despite this, the practice is still limited to a few educational institutions and is not widely used. In this study, we developed an educational framework to support the development of the exercise, inspired by the Software Process Improvement Framework (SPI Framework) used in software process improvement activities, with the aim of promoting and establishing the use of multiple-task exercises. The overall picture and components of the framework are clarified, and the effects of introducing the framework are discussed.

Keywords: Integrated Clinical Practice, Multi-Task Exercise, Nursing Education, Software Process Improvement Framework

1 Introduction

In recent years, with the increasing sophistication of medical care and the growing importance of multidisciplinary cooperation, nursing practice requires the ability to simultaneously deal with multiple patients while determining the appropriate order of priority and developing nursing care according to the situation. In particular, the ability to deal with multiple issues in the clinical setting is attracting attention as an important ability that contributes to preventing new nurses from leaving the profession early and improving job satisfaction, and it is an urgent issue to systematically develop this ability from the basic education stage. In response to this demand, many nursing colleges have established "integrated practical training" in the final year of study to foster practical judgment and the ability to deal with multiple issues. However, the standardization of learning content and the qualitative assurance of learning outcomes in integrated practice are not sufficient, and there are still issues to be addressed to ensure the quality of education.

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Based on these issues, the purpose of this study was to construct a "multiple-task exercise" linked to the integrated practice and to use it as a foundation for cultivating practical skills in basic education. In addition, based on the recognition that it is essential to construct a reproducible and systematic framework in order to effectively and sustainably disseminate and establish the exercise, we attempted to develop an educational framework that supports the continuous operation of the Multiple Subjects Exercise, while supporting the concept of software process improvement. The framework consists of four elements: "ideal model," "promotion system," "activities," and "visualization of effects," each of which is interrelated and complementary to the other, and aims to enable qualitative improvement and sustainable implementation of multiple-task exercises. This paper clarifies the structure and specifics of the framework and discusses its educational significance and practicality.

2 Status of Development of Multiple-task Exercises in Integrated Practice

Since 2021, the authors have developed a framework for "multiple-task exercises" to foster the ability to solve nursing problems required when taking care of multiple patients in pre- and post-integration training, and in 2024, Okamoto et al. formulated and implemented a roadmap (Table 1) for mid- to long-term development [1]. Based on this roadmap, the exercise program has been developed and operated from 2021 in the form of integration into the integrated practice.

Table 1: Roadmap for the Development and Dissemination of Multi-Task Exercises

Phase	Objective.	Fiscal year	Activity	Results
Phase 1	Assessing the current state of integrated practice and planning for development	2021-2022	Current status through web and literature research	Clarification of issues in integrated practice
			Definition of competencies required at the end of the integrated practice	Definition of required competencies
			Evaluation of basic ideas (trial of integrated practice using existing materials)	Idea Validation
			Planning of activities and securing activity budgets	Obtaining Grants-in-Aid for Scientific Research
Phase 2	Design, development and evaluation of integrated practice	2023-2024	Design and development of multi-issue exercises	Teaching materials and guides to be utilized in multi-assignment exercises
			Implementation and evaluation based on developed teaching materials	Clarification of the effectiveness of the developed teaching materials
			Building a Human Infrastructure for Deployment of Multi-Problem Exercises	Identification of personnel for deployment and dissemination of activities
Phase 3	Establishment of a sustainable operational structure and operating environment	2024-2025	Implementation and evaluation at multiple nursing colleges and medical institutions	Establishment of a mechanism to respond to variations
			Build infrastructure environment to maintain and expand deployment	Building a Web site for users
			Activities for sharing practical know-how	Information sharing practices and place settings

The overall structure of the integrated practice is shown in Figure 1. The exercise is designed in the format of two days each in both the pre- and post-instructional periods. The

ability required to respond to multiple issues is defined as "the ability to predict sudden change risks and future situations," and the GOLD method (Goal-Oriented Learning Design Method) is utilized for the acquisition of this ability (Table 2). This method visualizes the thinking process of "able" medical professionals by dividing it into Scenes 1-6, and supports the development of clinical judgment in students [2][3].

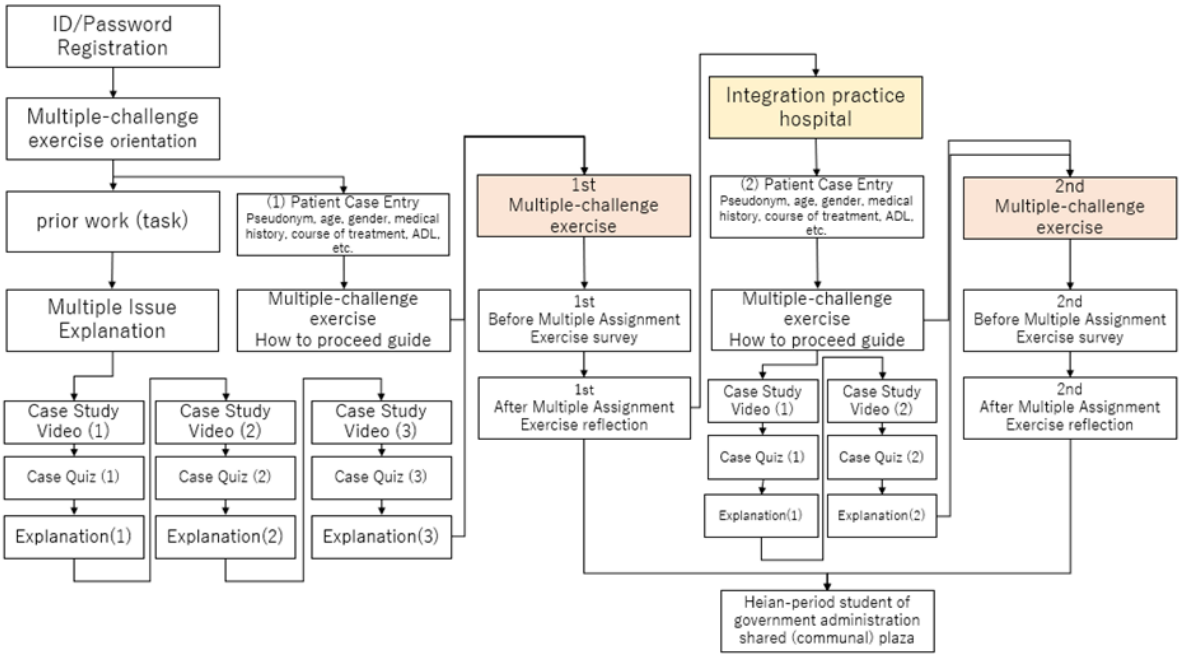

Figure 1: Flow of conducting multiple-task exercises

Table 2: Steps in Nursing Practice and Learning Points

Scene	Steps in Nursing Practice	Learning Points
Scene 1	Set your head in order at the nurses' station. (Forecasting and rehearsal)	① Assessing the situation of multiple patients ② Multiple patient arrange-ments
Scene 2	Go to the patient (pat judgment, general observation)	③ Determination of priorities
Scene 3	Treat patients (initial assessment and determine changes)	
Scene 4	Practice selected nursing (Plan Red, Plan Yellow, Plan Green)	④ Calm response ⑤ Multiple patient safety
Scene 5.	Nursing records and reports (SOAP, I-SBAR-C)	⑥ Facilitated cooperation requests
Scene 6.	Reflection (taste what could be practiced, measures for improvement)	⑦ Overall Reflection

3 A Framework for Promoting Software Process Improvement Activities

In this study, we focused on process improvement methods in the software field in order to achieve

In this study, we focused on process improvement methods in the software field in order to achieve sustainable development and establishment of exercises. Among them, the SPI Framework (Software Process Improvement Framework), a model for promoting software process improvement activities based on CMMI (Capability Maturity Model Integration), is known as a structure that contributes to the continuity of improvement activities and organizational It is known as a structure that contributes to the continuity and organizational establishment of improvement activities[4].

This SPI framework consists of the following six elements: (1) improvement model, (2) promotion structure, (3) acquisition of improvement techniques, (4) introduction of management methods and tools, (5) information sharing, and (6) visualization of effects. By systematically linking these elements, the continuity, reproducibility, and efficiency of activities are said to be enhanced [5].

The authors applied this framework to the field of education, aiming to construct an original educational framework that contributes to the continuous development of multiple-task exercises. In the next chapter, we will organize the correspondence between each element of SPI and multiple-task exercises, and present a specific structure as an educational framework.

4 Purpose of This Study

The purpose of this study is to design an educational framework for stable and effective development of multiple-task exercises and to contribute to quality improvement of practice skill development in basic nursing education. through continuous practice since 2021, the exercise program has been steadily improved. Currently, human networks are being formed through the first and second phases, and other universities and medical institutions have expressed interest in introducing the program. These developments have increased the likelihood of achieving the initial development goals, and it is necessary to build a foundation for the future expansion of activities.

In this study, we propose an educational framework that applies the concept of software process improvement as a framework to enable continuous implementation and operation of exercises. Through this framework, we will address issues such as the development of an implementation system for multiple-task exercises, standardization of teaching materials and evaluation methods, and visualization of implementation effects, in order to realize high-quality educational activities.

5 Proposal of a Framework for Developing and Establishing Multiple Task Exercises

Multitasking exercises are not a one-time effort, but an educational activity that should be conducted continuously and repeatedly throughout the year. To this end, it is necessary to develop a

framework that is easy to use for both educators who are introducing it for the first time (new users) and those who are responsible for its ongoing implementation (continuing users).

Based on the six elements of the SPI framework, this chapter organizes the corresponding relationships in the multiple-issue exercise and reorganizes them into four pillars: "model," "promotion system," "activities," and "visualization of effects" (Figure 2). Dissemination of the exercise is envisioned to be developed in a bottom-up manner based on the practical results of each university and medical institution, with the aim of spreading to other institutions under the leadership of the core institution. The components of the framework are as follows:

- **Model**: visualization and standardization of nursing practice with the GOLD method at its core.
- **Promotion structure**: Cooperation between the activity promotion team and the person in charge at each implementing organization.
- **Activities**: Implementation of multiple-task exercises and support for introduction, provision of teaching materials, post-evaluation, and other mechanisms.
- V**isualization of effectiveness**: Regular reporting and database on implementation and learning outcomes.

The framework is intended to be flexible and reproducible, allowing for application and sustained implementation in a variety of educational settings.

In addition, in order to widely deploy multiple-task exercises, it is important to establish a stable operational system that does not depend on individual differences among those in charge of conducting the exercises and that does not vary in content. For this reason, this study designed a flow for effective and efficient progression of the multiple-task exercise (Figure 1), and established a system that allows for the submission of pre-tasks and the input of information on case patients.

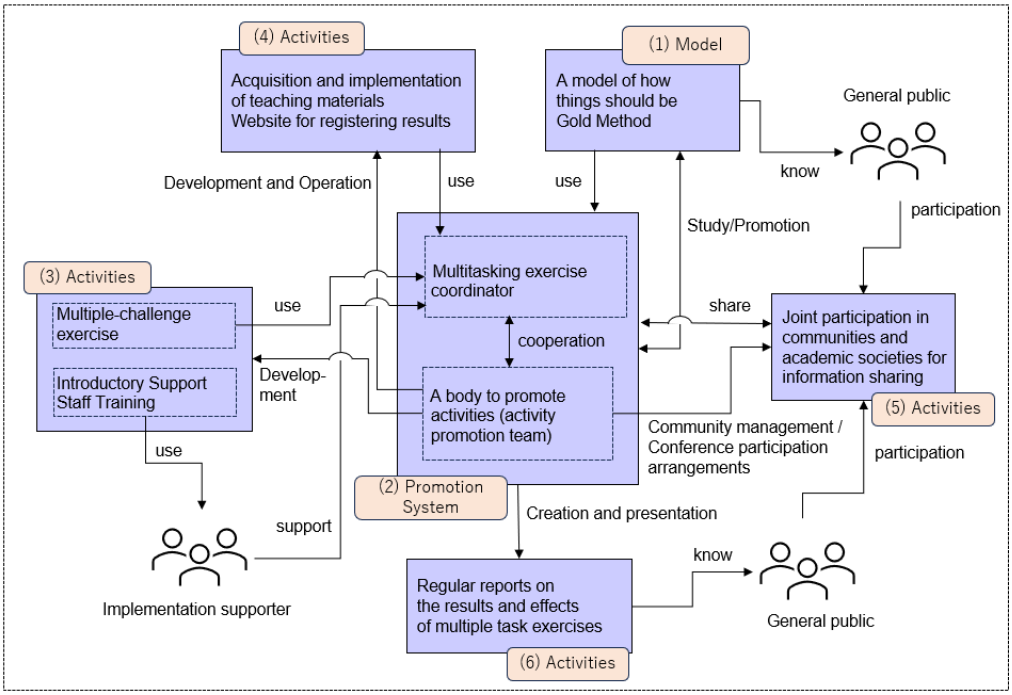

Figure 2: Framework for Dissemination of Multiple Assignment Exercises

6 Results of This Study

Based on the medium- to long-term plan that was formulated, this study has promoted the design, implementation, and evaluation of multiple-task exercises in phases. Currently, the project is positioned in its third phase, focusing on strategic initiatives for dissemination and establishment.

The results of this study can be summarized in the following three points.

1. **Framework for Multiple Assignment Exercise:**
   Supported by the structure of the SPI framework, we designed and proposed an educational framework consisting of four elements: "model of what it should be," "promotion system," "activities," and "visualization of effects.
2. **Educational Practices and Expanded Adoption:**
   Through exercise design centered on the GOLD Method, we have visualized students' clinical judgment skills and implemented educational activities with high exercise effectiveness. In addition, multiple institutions have expressed a desire to introduce the system, confirming its potential for expansion in the educational field.
3. **Infrastructure development that contributes to the quality assurance of education:**
   The maintenance of teaching materials, the introduction of reporting tools, and the accum u-lation and visualization of results data contribute to the improvement of the quality and re-producibility of educational activities.

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Based on the above results, the framework proposed in this study can serve as an effective foundation for establishing multiple-task exercises in basic education.

Note

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