IIAI Open Conference Publication Series
IIAI Letters on Institutional Research
Vol. 005, LIR472
DOI: https://doi.org/10.52731/lir.v005.472

A Trial for Developing Moodle-based E-portfolio for Post Graduate Medical Education in Japan – based on a Nationwide E-portfolio System for Clinical Training

Yoshikazu Asada *

Abstract

This study aimed to develop and trial an e-portfolio system for postgraduate medical education in Japan using Moodle. Building on the national clinical training e-portfolio framework, the system was designed to flexibly manage clinical experiences by integrating multiple Moodle modules: (1) Database module for case recording, (2) Questionnaire module for self-assessment, (3) Quiz module for skill tracking, and (4) Configurable Reports plugin for data aggregation. The system demonstrated strengths in supporting both formative and summative assessments, although operational challenges such as the need for technical expertise and UI improvements were noted. These findings suggest that Moodle offers a scalable and adaptable foundation for e-portfolio development in postgraduate medical education.

Keywords: E-portfolio, Formative Assessment, Moodle, Postgraduate Medical Education

1 Introduction

In Japan, there are two-year postgraduate clinical training program for medical doctor after obtaining a medical license. The program was defined as following [1]: “Residency training must allow residents to cultivate their professional identities as physicians and acquire basic clinical capabilities in appropriately dealing with injuries and diseases commonly encountered in general clinical practice regardless of their future areas of specialization, while also recognizing the role of medicine and medical care in society.”

There are some mandatory items to complete residency training like following:

- Signs and Symptoms to be experienced
- Diseases and Disorders to be Experienced
- Evaluation Forms from Precepting Physicians and Other Healthcare Professionals
  - Fundamental Values as Physician (Professionalism)
  - Competencies and Capabilities
  - Independent Practice Allowed in Conditional Situations

* Jichi Medical University, Tochigi, Japan

- Procedural Skills

Many hospitals use a national common e-portfolio system called “E-POrtfolio of Clinical training for PostGraduates” (PG-EPOC). This system is organized by University Hospital Medical Information Network (UMIN) Center. There are some benefits for hospitals to use PG-EPOC like following:

- collecting the training data easily and summarizing automatically
- users can access to PG-EPOC not only from their PC but their mobile devices
- not only residents and healthcare professionals, but also patients and their families are also able to answer for the questionnaires for assessment by QR code authentication
- if residents used “Clinical Clerkship E-POrtfolio of Clinical training” (CC-EPOC) when they were undergraduate students, the previous data are easily to be connected to the PG-EPOC.

However, PG-EPOC has some problems like following:

- PG-EPOC is worked as e-portfolio, not as Learning Management System (LMS); some learning logs may only be stored in LMS.
- PG-EPOC is able to be used only for clinical training, and not to be used for other e-portfolio, such as daily learning logs.

Although PG-EPOC has a feature to export residents' data for making evidence that residents have accomplished their objectives, the data is only from PG-EPOC. After the COVID-19 pandemic, many lectures and training have been provided with online-based style. If hospitals use LMS such as Moodle for providing their learning materials, several learning logs of residents have been stored in it. Thus, if the residents' learning data / logs which are needed for the evidence of their accomplishment are stored in another system like LMS, these data should be joined into one.

This situation would be occurred since the basic data is stored in PG-EPOC and the other data is stored in LMS. If the whole data is stored in one place such as LMS, then the evidence data can be handled more easily. Since LMS usually have a database on their backend, the data management would be not so hard task.

In this study, author tried to setup the activities of Moodle and to arrange Moodle as e-portfolio for storing residency training data into one place. In the method section, the way of the arrangement of Moodle is described. In the result section and discussion section, the result of usage and user feedback are shown.

2 Methods

2.1 Overall Design with Moodle

As the author wrote in the introduction section, there are mainly four items to be recorded for residency training accomplishment. The first and second items, "Signs and Symptoms" and

"Diseases and Disorders" are usually treated not only by themselves but also with summary information of patients. In PG-EPOC, these items are saved with some other information such as department, clinical setting, and patient outcome. On the other hand, the third and fourth items, "Evaluation Forms" and "Procedural Skills" are treated by simple checklists. In addition, "Evaluation Forms" are needed to submit for each clinical department. "Procedural Skills" are needed throughout the two-year training period, evaluations are conducted using the same evaluation form, and it is sufficient if they are completed by the end of the program.

Thus, we developed Moodle-based e-portfolio as following styles:

- Summary information with "Signs and Symptoms" and "Diseases and Disorders" were designed with database module
- "Evaluation Forms" was designed with questionnaire module, which is additional plugins.
- "Procedural Skills" was designed with quiz module.

One limitation of using Moodle is the difficulty in aggregating input data across different modules, such as the Database and Quiz modules. However, this limitation is due to the lack of a built-in cross-module aggregation feature within Moodle itself, rather than a constraint in the underlying data structure [2]. Therefore, in this project, the Configurable Reports plugin was utilized to perform the necessary data aggregation [3].

From here, the author describes each item.

2.2 Summary Information with Database Module

In this study, a summary information form was designed with database module. The Database module in Moodle enables users to create, maintain, and search a collection of structured records. It is highly customizable and allows educators to design templates for data entry and display, making it particularly useful for managing student portfolios, project submissions, or case logbooks in clinical education settings. In addition, database module has a status of "approve", which is a simple flag by teachers that each entry of database is approved of not.

Since "approved" entries are displayed to other residents, the "separate groups" mode was also used. "Separate groups" is a grouping option in Moodle that allows course participants to be divided into distinct groups, where each group can only see and interact with its own members. By assigning each trainee to a separate group and enabling the “Separate Groups” setting in Moodle, it becomes possible to prevent trainees from accessing or viewing information related to other trainees. This setup ensures privacy and confidentiality within the shared platform, while still allowing individualized data management and evaluation.

2.3 Evaluation Forms with Questionnaire Module

Evaluation forms were designed with questionnaire module. The questionnaire module, which is an additional plugin, provides advanced survey capabilities beyond the default offerings. It allows for the creation of flexible questionnaires aimed at collecting both quantitative and quali-

tative feedback from users. In postgraduate medical education, it is particularly effective for gathering trainees' self-assessments.

An evaluation of program effectiveness is also surveyed with questionnaire module.

2.4 Procedural Skills Forms with Quiz Module

Procedural skills forms with quiz module. The Quiz module facilitates the creation of online assessments, including various question types such as multiple-choice. The reason why the questionnaire module was not used and quiz module was used is to use the feature that "each attempt builds on the last". When this option is enabled, the last answers of quiz attempt is automatically set when residents start another attempt. Although there are more than 30 procedures, residents experience them not at once; they experience the procedures separately. If database module or questionnaire module are used, residents have to answer all items one by one in each input. As this task would otherwise be unnecessarily time-consuming, the method was introduced to streamline the process.

2.5 Configurable Reports for Data Aggregation

Configurable Reports is an additional plugin for Moodle that enables the creation of custom reports based on database queries or pre-defined templates. It provides users with flexible options to design and generate reports tailored to specific needs without requiring advanced programming skills. In the context of postgraduate medical education, this plugin facilitates the monitoring of trainees' progress, the tracking of portfolio submissions, and the analysis of training activities across different clinical departments.

As mentioned earlier, this plugin was utilized to aggregate and compile the data entered by trainees. When creating SQL queries within the plugin, it is possible to set the user's own ID as a filtering condition. By applying this, each trainee can view only the data they have submitted.

The aggregation serves primarily the following purposes:

- For training administrators to monitor the overall progress of all trainees.
- For residents themselves to track their own achievements and identify any areas requiring improvement.

Additionally, the data can be exported in formats such as CSV or Excel files. Therefore, further aggregation and visualization processes using tools like Excel or R can be conducted as needed.

3 Results

3.1 Summary Information with Database Module

Table 1 shows the fields of summary information database modules. Items including gender and clinical day were enumerated based on the template provided by EPOC.

Table 1: Fields of database module for summary information form

Field Name	Field Type
Clinical Department	Dropdown List
Patient Gender	Dropdown List
Signs and Symptoms	Checkboxes
Diseases and Disorders	Checkboxes
Clinical Day	Date
Patient Age	Dropdown List
Clinical Setting	Dropdown List
Patient Outcome	Dropdown List
Notes (for residents)	Text Area
Notes (for senior doctors)	Text Area

The workflow of approve is following:

1) Residents input the entry from database form after submitting summary.
2) Senior doctors check the information and decide to approve or not.
3) If the entry is disapproved, residents edit the information and re-submit.

3.2 Evaluation Forms with Questionnaire Module

Three evaluation forms for "Fundamental Values as Physician (Professionalism)", "Competencies and Capabilities", and "Independent Practice Allowed in Conditional Situations" were made separately. Each of questionnaire was set as Table 2.

Table 2: Questionnaire setting for evaluation forms

Setting Items	Actual Setting
Response Type	espond many (more than once)
Respondent Type	with full name
Save / Resume answers	enable

3.3 Procedural Skills Forms with Quiz Module

There are more than 30 items in the procedural skills. Moodle quiz modules show each question separately, so if the 30 skills were made as independent items, the answering screen becomes a little difficult to see. Thus, procedural items were made with the Cloze type question. The Cloze question format in Moodle allows the creation of embedded answers within a passage of text, where blanks are filled in by the residents. It supports a variety of response types, including short answer, multiple choice, and dropdown list. Since each item has assessed in five levels, each item was made by dropdown list. The sample source code of 5-level dropdown item is following:

{1:MULTICHOICE:=level 1~= level 2~= level 3~= level 4~= level 5~=NA}

In this code, = means "correct answer", and ~ means separator. Since this "question" is not as a real question which has correct and wrong answer but more likely as a "questionnaire / scale", the scoring of the item has no meaning. Thus, each choice was set as correct answer.

3.4 Configurable Reports for Data Aggregation

As written in the Methods section, it is somewhat difficult to aggregate data across different modules. Particularly for student accounts (in this study, resident accounts), users can only view their own individual data entries, rather than aggregated summaries of their data. In addition, they are not able to view any aggregated data that compares their performance with that of their colleagues.

Thus, following reports were constructed with SQL:

- Summarized data for each resident, including (1) Types of “Signs and Symptoms” and “Diseases and Disorders” experienced, and (2) The frequency of experiences for each “Sign and Symptom” and “Disease and Disorder”
- Comparison of evaluation form results by clinical department and over time
- Comparison of procedural skills form results over time
- Total attendance counts for mandatory seminars, such as patient safety sessions

4 Discussions

4.1 Summary Information with Database Module

The use of the Database module allowed each summary to be registered as an individual entry. This makes it possible to aggregate the signs, symptoms, and diseases experienced. In addition to this, analyzing in which clinical departments these experiences occurred would be possible. Moreover, since the data could be exported as CSV files, it was possible to further aggregate and analyze the data as needed using external tools.

However, unlike the Forum module, the Database module does not send notifications when comments are made. As a result, it became necessary to contact users separately via email or phone to inform them of feedback. Nevertheless, by utilizing an additional plugin developed separately by the author [4], it is possible to add a comment notification feature to the Database module. Moreover, because the setup of the Database module is relatively complex including designing html / css templates, a considerable amount of time and effort was required for the initial time cost. However, once the system was prepared, subsequent deployments could be handled simply by duplicating the original structure.

4.2 Evaluation Forms with Questionnaire Module

The Questionnaire module allowed users to answer freely at any convenient timing, providing flexibility in response schedules. Furthermore, because intermediate saving was possible, even lengthy questionnaires could be completed in segments during available free time.

However, intermediate saving was limited to a single entry. Although this would be no problem for residents, , it would make challenges when senior doctors attempted to evaluate multiple residents simultaneously. As a workaround, redesigning the evaluation forms using the Database module allowed individual intermediate saves. In doing so, however, it was necessary to adjust the interface — for example, using CSS to present multiple-choice items as buttons — because by default, the Database module's appearance becomes cluttered when many choice options are added. Additionally, the label "Questionnaire" remained visible on the screen. This issue could also be resolved by switching to the Database module.

4.3 Procedural Skills Forms with Quiz Module

By utilizing the "Each attempt builds on the last" function, it was possible to eliminate the need for residents to re-enter all items each time, allowing them to update only the sections that required revision. In addition, because the Quiz module maintains a history of all updates, it was easy to track when and at what stage each input was made, enabling chronological review.

However, it was difficult to determine in which clinical department a specific item was confirmed. Although a question asking for the department could be added, there was still a risk that users might forget to update that field when revising their responses, which would reduce reliability. On the other hand, if the forms had been implemented using the Database or Questionnaire modules, any overwritten updates would overwrite previous data, making chronological tracking difficult. Given these considerations, the Quiz module was deemed the most appropriate solution under the current circumstances. In the future, a potential improvement could be achieved by extending the Database module with additional JavaScript functionality, allowing users to duplicate previous entries when creating new records.

4.4 Configurable Reports for Data Aggregation

The use of the Configurable Reports plugin allowed the aggregation and organization of data that could not be handled by Moodle's standard reporting features. In addition to providing summary reports for administrators, individual progress reports could also be generated for each resident. As a result, the system could be used not only for summative assessment but also for formative assessment, when combined with appropriate feedback and mentoring practices.

However, creating custom reports required specialized SQL knowledge, which posed a technical barrier. Furthermore, the current system only supported aggregation and output in numerical data formats. To visualize the data as graphs, it was necessary to either install additional plugins within Moodle or export the data as CSV files for processing using tools like Excel or BI tools.

5 Conclusions

This trial demonstrated the potential of Moodle as a flexible platform for developing an e-portfolio system tailored to postgraduate medical education in Japan. By creatively adapting core modules and plugins, the system successfully supported various aspects of clinical training evaluation, ranging from individualized feedback to administrative monitoring. Although some technical and operational challenges were encountered — particularly regarding report aggregation and ease of data entry — the overall results indicate that Moodle-based systems can provide an effective, scalable foundation for future e-portfolio development. Further system enhancements, such as improved visualization and simplified reporting functions, will be important for broader implementation.

Acknowledgement

This work was supported by "JSPS KAKENHI" (Grant Number JP22K02808).

References

[1] The Ministry of Health, Labour and Welfare. Guidelines for clinical training guidance for physicians. 2020 Available: https://www.mhlw.go.jp/content/10800000/000719078.pdf

[2] M. Saqr, U. Fors, M. Tedre, "How learning analytics can early predict under-achieving students in a blended medical education course," Medical Teacher, vol. 39, no. 7, 2017, pp. 757-767.

[3] Y. Asada, MS. Yagi, " Moodle for Learning Analytics and Institutional Research: Exporting Data via SQLs and Plugins," International Journal of Institutional Research and Management, vol. 4, no. 2, 2020, pp. 30-43.

[4] Y. Asada, Comment Notifications; https://github.com/yasada0819/moodle-local_db-com-notificator