Developing, implementing, and disseminating an adaptive clinical reasoning curriculum for healthcare students and educators

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D4.2 Pilot implementations of the student curriculum

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1. Summary

An important part of our project is the testing of the developed learning units for students of the healthcare professions. With such pilot implementations we receive valuable feedback from the course participants, which will help us to further improve the learning units. Thus, each medical school in our consortium planned such a pilot implementation during fall/winter 2021. Overall, we conducted 9 courses covering five different clinical reasoning topics until the end of January 2022. We managed to recruit 188 medical and nursing students from partner-, associate partner-, and external institutions. In addition, we piloted our virtual patient units with a total of 618 students. Overall, the feedback from the facilitators and the interest of students participating in our courses especially in international and interprofessional settings was very positive. The facilitators highlighted the discussion among participants, but in some units more time than anticipated was required. Similar to the train-the-trainer courses technical challenges were reported by participants due to their unfamiliarity with our learning platform. The collected feedback together with the participant questionnaires will provide the basis for improving the courses.

2. Introduction

In this deliverable we describe how we conducted the pilot implementations of selected learning units of the student curriculum within partner institutions. We will also summarize the results of these pilots, which will be analyzed in-depth as part of D5.3. Both deliverables will serve as a basis for revising the learning units.

3. Quality criteria

- More than 500 participants from partner and associate partner institutions, as well as external participants
- Covering a wide range of topics of the student curriculum that fit to the partner curricula
- Piloting of at least two same learning units by 2-3 partners
- Thoroughly evaluated based on questionnaires for participants and instructors and learning analytics (in alignment with WP5)

4. Methods

The learning units we piloted in this deliverable are part of D4.1 Development of course outline and material based on our curricular framework (D2.2). The courses are implemented in a blended learning format in our learning management platform Moodle. In Moodle facilitators can also access all resources required to run the learning units.

4.1 Planning phase

The planning of the pilot implementation of the student learning units started in parallel with the planning of the pilots of the train-the-trainer courses (D3.2). This allowed each partner to align these pilots, so that the facilitators of the student courses could participate first in the train-the-trainer course related to this topic. The decision about which learning units to pilot was made by partners and depended mainly on the needs and requirements of their study programs and our quality criteria for the pilots. We collected the relevant data for the pilots in a shared document, including:

- Topic of the course
- Piloting institution
- Dates of asynchronous phases and synchronous meetings
- Anticipated number of participants
- Professions of participants, i.e. whether the pilot was conducted in a mono-, multi-, or interprofessional setting

At the same time the consortium met regularly in the planning phase to discuss each partner's choices and ensure that our quality criteria were met. We also seeked advice from

our associate partners from Sweden, Switzerland, and the US during these discussions to include their options and perspectives. In addition, we decided to open selected pilot courses for external participants to evaluate the applicability of our learning units outside of our consortium. Due to ongoing restrictions in some partner schools for some courses the synchronous meetings were held via video conferencing tools.
Table 1 shows the pilots conducted by partners aligned with the themes and topics defined in our DID-ACT curricular framework.

Theme	**Topic**	**Level**	**Piloted by**
Theories of clinical reasoning	What is clinical reasoning - an introduction	Novice	UAU
	Health professionals roles in clinical reasoning	Novice	UAU
		Intermediate	ORU
Patient perspective	Person-centered approach and the role of the patient	Novice	EDU
			JU
Generating differential diagnoses Decision Making	Generating differential diagnoses and deciding about final diagnoses	Novice	UBERN
			JU
			MFUM
Gathering and interpreting information, Generating differential diagnoses, Developing a treatment plan	Collection of virtual patients	Intermediate	Instruct

Table 1: Overview about the topics and themes covered with the pilots at the partner institutions.

4.2. Implementation phase

Instruct provided the technical support for participants and facilitators. In our regular team meetings and additional 1:1 meetings Instruct configured course access for each partner and explained course access, structure of the pilots and required facilitator resources to the partners. Course registration and the invitation of participants was organized by the local facilitators via the following recruitment methods:

- JU: Recruiting of 3rd year students from the course on "Laboratory Training of Clinical Skills 2" and 2nd year students from the course "Introduction to Clinical Sciences"
- EDU: Students at EDU were recruited via Email

- UAU: Recruitment of students in Year 1 and 2 at UAU and partner institutions via Email and for a voluntary extra-curricular international course
- UBERN: Recruitment of students of the pediatric clerkship via Email
- ORU: Voluntary extra-curricular event as part of an internationalization project.
- MFUM: Recruitment via Email to the Peer tutor group
- Instruct: Access to the courses was publicly available and announced in CASUS for registered and new students.

Each partner also received a specific roadmap document prior to their pilot to provide basic information about the course access and aspects to keep in mind. Additionally, Instruct provided a short manual on how to register and access the moodle platform.
During the piloting phases the courses were closely monitored by Instruct and the course facilitators for any questions asked by participants or arising issues.
Due to the ongoing pandemic situation most synchronous phases had to be held via videoconferencing.

4.3 Analysis and feedback phase

The questionnaire for piloting the student courses were developed as part of work package 5 (Evaluation) and will be described in the deliverable report 5.3. Also, as part of D5.3 we designed the analysis of usage data (learning analytics) within our learning management system.
In addition to these evaluation activities, we asked the facilitators to provide a structured summary of what went well and what could be improved about during their pilots in a template (see appendix 1). This template has been developed as part of the quality control (WP6) by Instruct and reviewed and agreed upon by all partners. After all pilots were completed, we categorized the responses in the template based on the categories developed for the train-the-trainer pilot feedback.
During and shortly after the student pilot courses have been completed by all partners, we met with all facilitators to collect and discuss their feedback and present the categories and analysis results.

5. Results

5.1 Overview

Overall we piloted five learning units of the student curriculum with 188 medical and nursing students from partner-, associate partner-, and external schools. The piloted units were mostly on novice, but also intermediate level and included one interprofessional and two international settings. In addition, we piloted our self-study learning unit which includes 75 virtual patients on an intermediate level with a total of 618 students. The following table provides an overview about the piloted learning units (Table 2).

Topic	Pilot lead	Number of participants	Participant Institutions	Professions	Dates
What is clinical reasoning - an introduction	UAU	34	UAU, Karolinska Institute Sweden, University of Zurich and ETH Zurich, Switzerland, UBERN, MFUM, University of Porto, Portugal	Medicine	Nov 22 - 25 2021
Health professionals roles in clinical reasoning (Intermediate)	ORU	20	ORU, JU, Berner Bildungszentrum Pflege, Switzerland	Nursing, Medicine	Oct 13/14 & Nov 30/Dec 1 2021
Health professionals roles in clinical reasoning (Novice)	UAU	34	UAU, Karolinska Institute Sweden, University of Zurich and ETH Zurich, Switzerland, UBERN, MFUM, University of Porto, Portugal	Medicine	Dec 6 - 9 2021
Person-centered approach and the role of the patient	EDU	10	EDU	Medicine	Nov 22 - 30 2021
	JU	49	JU	Medicine	Oct 18 - Jan 20 2022
Generating differential diagnoses and deciding about final diagnoses	UBERN	6	UBERN	Medicine	Nov 11 - 18 2021
	JU	35	JU	Medicine	Nov 23 2021 - Dec 10 2021
	MFUM	10	MFUM	Medicine	Dec 10 2021 - Jan 12 2022
Gathering and interpreting information, Generating differential diagnoses, Developing a treatment plan	Instruct	618	International	Medicine	Oct 1 2021 - Jan 10 2022

Table 2: Overview about topics, participants, and dates of the conducted pilots

5.2 Summary from course facilitators

Table 3 summarizes the feedback we collected from the facilitators of the pilot courses with our template and during the discussions. This feedback will be one of the sources for the course refinement phase (D4.3) in combination with the quantitative and qualitative results of the questionnaires and learning analytics (will be reported in D5.3).

Category		**Negative**	**Positive**
Didactical			● Varied modalities of teaching ● Structure of the session
Content		● VINDICATE did not work well in the beginning ● Worksheet needs adaptation ● More cases would be helpful	● Talking about the cases ● Virtual patients were appreciated by students
Technical		● Better introduction of Moodle and CASUS ● Visualizing the results of students in Moodle not easy ● Setup in Moodle for subgroups requires lot of manual work ● Recruitment issues for international courses and early planning needed	● Using Padlet during synchronous online sessions worked well
Interaction / Collaboration			● Interactiveness of sessions ● Brainstorming session ● New professional perspective ● International setting
Implementation	Time	● More room for discussion needed ● Zoom environment required a bit more time to encourage students to interact ● Took longer than anticipated	
	Facilitators		

Table 3: Summary of general feedback from facilitators who conducted the student courses.

Instruct, who provided the technical support for the course facilitators and participants, did not record any support requests during the pilot phases.

5.3 Collection of virtual patients

As part of the DID-ACT pilot implementations we also implemented and evaluated courses with virtual patients.
Overall, we recorded 1516 completed VP sessions by 618 learners during October 2021 and January 10th 2022. 70 of the 75 provided VPs have been completed at least once. Access to these virtual patients was provided by Instruct at https://crt.casus.net. More details on learning analytics will be provided as part of D5.3.

6. Conclusions

Overall, our experiences with the student pilot courses were very positive. However, for the implementation we encountered some challenges in organizing the synchronous phases, which had to be held mostly through videoconferencing. On the other hand, this provided us the opportunity to offer three of the learning units in an international setting with participants from at least two different European universities. In these courses the feedback from students also included positive responses to the opportunity to learn together with students from different countries. Although recruitment for these course settings was quite challenging for ORU and UAU, both partners regarded this as an extremely positive experience.

7. Appendix

7.1 Feedback Template for course facilitators

Please complete this feedback form after your pilot learning unit has ended. In addition to the regular evaluation activities this will provide valuable insights into the pilots at each institution.

Learning Unit:	
Partner Institution	
Date(s):	(including duration of asynchronous phases and days of synchronous meetings)
Instructor(s):	

Number of Participants:	
Profession(s)	
Recruitment	(how did you recruit participants - was it a regular activity, study with paid participants, favor of friends, etc….)
Evaluation types(s)	Participants questionnaire | Instructors questionnaire | Learning analytics
Description of setting	(face-to-face or virtual online, anything specific)
Adaptations made from the "standard LU"	(please describe changes you made)

For the following summary of your impressions, please think of any technical, didactical, integration-related, or content-related aspects:

Problems/Challenges encountered
(if possible please relate to barriers & solutions we have identified in WP1) and solutions implemented (if applicable)

Challenges / Barriers / Problems	**Implemented Solution (if applicable) or what would you change next time**

What went (very) well / What did you and/or the participants like?

Have you implemented this into your curriculum yet? If yes, please expand on your process below. If not, please highlight how you could imagine doing it.

Any other aspects you regard as important :

7.2 Impressions from the synchronous sessions

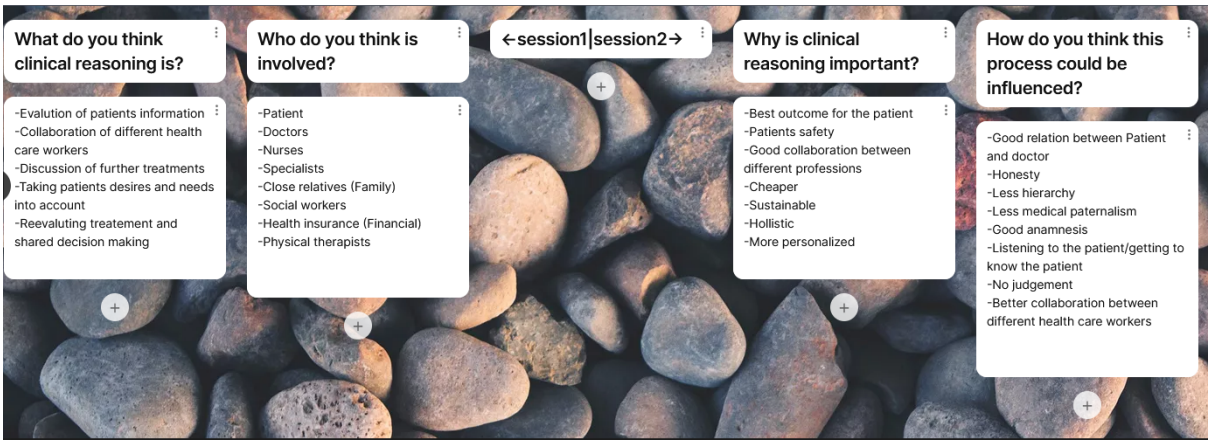

Figure 1: Screenshot of the Padlet from the learning unit on "What is clinical reasoning - an introduction"

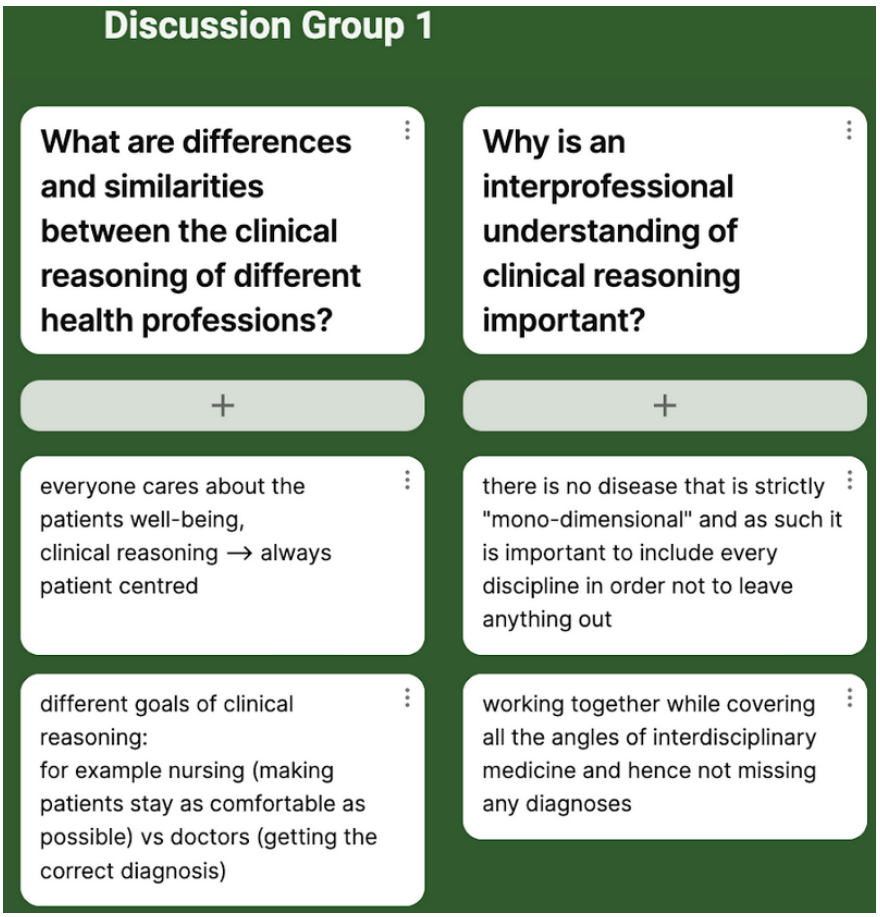

Figure 2: Screenshot from the discussion during the synchronous meeting in zoom on "Health professionals roles in clinical reasoning"

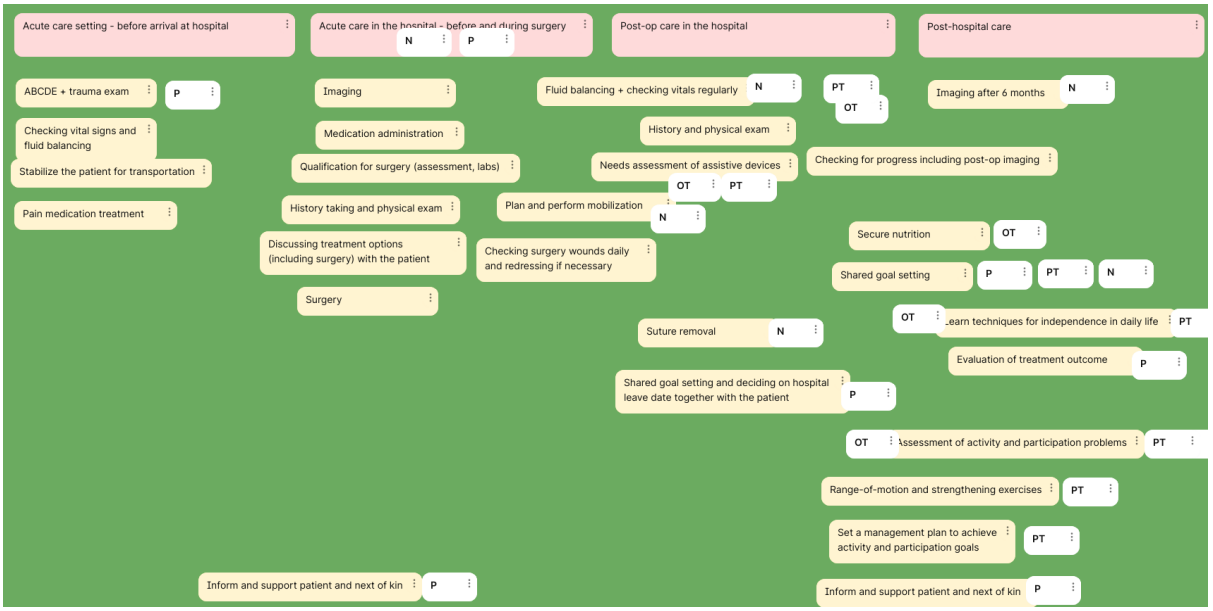

Figure 3: Worksheet of the learning unit "Health professionals roles in clinical reasoning" worked on by the students in Padlet.