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

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D4.3 Refinement of student courses based on pilot implementations - Summary of deliverable

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Reviewed by	All partners

1. Summary

Based on our experience with the pilot implementations and feedback we received from course participants and facilitators we refined the 25 student learning units. We identified specific improvement suggestions for learning units, such as the need for more or different interactive content, that the allocated time was not adequate, or that instructions in the asynchronous phases were not clear. These suggestions were addressed by the original development teams and refinements were made in the course outlines and the courses in our learning management platform Moodle. Moreover, we discovered similar general suggestions for improvement as for the train-the-trainer courses, especially technical problems, which have already been addressed as part of D3.3.

2. Introduction

During the preceding deliverables D4.2 (Pilot implementations of the student courses) and D5.3 (Evaluation of the pilot implementations), we collected feedback from participants and facilitators about their satisfaction and impressions of the learning units (LU) they held or attended. We collected these data through online questionnaires and a feedback template completed by facilitators as a basis for the course refinements implemented and described in this deliverable D4.3.

3. Quality criteria

- Workshop on sharing experiences of pilots at the beginning of this deliverable
- Considering all issues identified in the pilot implementation
- In close cooperation with target group(s), partners, and associate partners and with repeated feedback rounds
- Discussed and agreed upon by all partners

4. Methods

At the beginning of this deliverable, we collected and summarized all issues identified during our pilot implementations and which we reported in our D5.3 and 4.2 reports (Table 1).

LU	Category	Issue
General	Technical	Unfamiliarity with Moodle and CASUS. Troubles logging into Moodle and usability issues with Moodle. A better overview of the online self-study.
General	Technical	It was challenging to set up the Moodle course for the 4 groups in a way that each group only sees what they are doing.
General	Implementation - Time	Time issues - better schedule of the classes needed and students lacked time for discussion.
LU1	Didactical	More interactive virtual patients.
LU6	Content	Students weren't keen to perform the included exercise (to try act as a person with barriers such as vision impairment).
LU6	Technical	LU took longer than expected due to technical issues.
LU6	Content	Wish for more virtual patient cases with different diseases and more variety.
LU7	Content	Videos on different perspectives on clinical reasoning.
LU7	Content	Quiz on Moodle instead of downloading a text document and having to upload it again.
LU7	Didactical	Remove the online case study on Moodle. Just have live/Zoom sessions and in those sessions talk about real-life scenarios.
LU7	Content	The worksheet is very strict in terms of when what happens. Some of the tasks will happen continuously in all phases. Also other professions (e.g. paramedics) are missing. Some professions are not well known with novice medical students, such as occupational therapy
LU7	Didactical	Maybe you could change the separation of the case description of Mrs. Cramer's case and the quiz afterwards and include the quiz between the different stages of Mrs. Cramer's case. So the learning would be more interactive.
LU10	Content	The need to use the VINDICATE mnemonic sometimes made hypothesis generation difficult - sometimes more effort was spent by students in thinking about what a category meant or which category a hypothesis should belong to than in actually generating hypotheses. Perhaps a different mnemonic or a different framework would fit more.
LU10	Implementation - Time	Students don't really like the rigid structure of learning in the first meeting, which doesn't always fit the case. In my opinion it also works better if they have more room for discussion first than if they try to fit the discussion into a framework right away.

LU10	Technical	Things that I would consider downsides include reviewing homework assignments (summaries) in Moodle. It is cumbersome. There is no division of students into subgroups as in the classroom (so I had to manually search for which subgroup a given student belongs to). Switching between assignments is not an easy thing to do either.
LU10	Content	The defining and differentiating features were also not always clear to the students, so we spent some energy and time talking about it and deciding what is a defining feature and what is a differentiating feature, or maybe one feature can be in both categories, etc.
LU10	Content	Need for more information about how to interpret medical tests
LU10	Content / Didactical	Had to adapt the slides to align to the students' needs. Too many or need of change in student presentations
LU24	Didactical	Clarity of instructions

Table 1: Table with identified issues as basis for discussions about refinements.

We arranged for a meeting in which representatives from all partners and associate partners discussed potential refinements addressing the discovered shortcomings. In this meeting ten stakeholders from partner- and associate partner institutions participated and Instruct moderated the brainstorming session. Due to the ongoing pandemic situation the meeting was held via a Zoom meeting. After the meeting all participants had time to refine their ideas and add any additional thoughts and ideas.

In addition to the piloted LUs, we also considered whether the received feedback requires revisions of LUs that were not piloted.

In a follow-up meeting we agreed on the identified refinements and distributed work among partners. After that, the development teams of each of the learning units started refining their LU and necessary changes were implemented in the course outlines and moodle courses. Finally, all changes were reviewed by consortium members from different professions.

We presented and discussed interim results regularly during our bi-weekly team meetings.

5. Results

In table 2 we summarize general course refinements we have agreed upon after our second team meeting. These were checked and revised for all LUs (including the non-piloted).

Issue	Discussed and Implemented Solutions
Clarity of instructions	We added exemplary solutions for all assignments and group works in all LUs. If available, we also added samples we received from the course participants during the pilot phases. This will help facilitators to support the learners and ensure that the most relevant aspects are covered. These solutions also serve as direct feedback for learners who complete a learning unit in self-study mode.

	Additionally, we checked and revised all LU outline descriptions for any clarity issues and adapted them accordingly. Especially, we specified the applied teaching methods in more detail (see table 3)
Time issues	Based on the feedback for the pilot LUs we checked and adapted the estimated times in the LU descriptions accordingly to allow for more time for discussions.
Wish for more interactivity and opportunities for exercise	We have added more quizzes and assignments, so that students can more frequently self-assess their knowledge. Where applicable we pointed students and facilitators to additional (optional) exercises, such as virtual patients for further practice.
Technical issues	The issues were similar to the technical challenges experienced during the train-the-trainer pilots, so they were already addressed by implementing changes and additional guiding resources in Moodle.

Table 2: Identified issues and implemented refinements

Former description / Category	**Specification (one of the following)**
Discussion	- World Cafe - Speed Dating / Concentric circles - Snowball Discussion - Think-pair-share - Forum posting and commenting - One Minute Problem - Walk and Talk - Accountable Discussions - Two Stray, One stay - Fishbowl - Open Space
Feedback	- Computerized automatic feedback - Peer-Feedback - Tutor-Feedback - Sample / Exemplary solution
Activities	- Role-play - Case / VP work - Escape Room - Quiz - Script Concordance Testing - Post Encounter Form - Cognitive Autopsy - Situational Judgment Test - Think Aloud - Implicit Association Test - Learning by Teaching
Groupwork	- Gallery Walk - Affinity Mapping

	- Jigsaw Technique - Micro Teaching - Peer Consulting - Team-based learning
Creation	- Concept / mind maps - Create case / VP - Composing Summary Statement - Reflection piece in (E-)Portfolio - One Minute Note - Fishbone Diagram - Structured Reflection
Input	- Presentation / Lecture - Video
Getting opinions	- Consensogram - Anticipation Guide - Polling questions
Assessment	- Mini-CEX - Script Concordance Testing - Written assignment

Table 3: Specification of teaching methods applied in the learning units (LUs) based on previous work in work package 2. The former more general descriptions are now used as categories together with a more detailed specification.

The following table shows a summary of changes we implemented in specific learning units.

		Implemented / Planned changes
LU1	More interactive virtual patient	Indeed in this virtual patient the interactivity is implemented as a separate assignment. However, we see the tasks of identifying actors, contextual factors, and focuses of clinical reasoning as crucial aspects that should be implemented technically in the virtual patient system. This additional programming is currently implemented and this additional integrated interactivity will be available until the end of the project period. To provide more opportunities for exercise we included two additional case assignments that were developed as assessment for the piloting phase.
LU6	"Students weren't keen to perform the included exercise (to try to act as a person with barriers such as vision impairment)."	We changed the instructions in Moodle to reduce anxiety and added a note to the facilitators resources, that this task might need some additional encouragement. We also carefully reviewed the tasks included in this exercise and removed some of the less attractive ones.
LU7	Difficulty with video about clinical reasoning in nursing.	We exchanged this video with one we developed. This is especially tailored to the student's needs and easier to comprehend.

LU7	Lack of flexibility of the worksheet	We recommend facilitators to use other more flexible visualization tools, such as padlet or a digital whiteboard.
LU10	Need for more information about how to interpret medical tests	We emphasized in the online phase that the focus is not on interpreting tests, such as lab results or images, if students do not yet have the required knowledge to do so. We also advised facilitators that depending on the prior knowledge of students this might be a challenge and additional instruction might be needed or alternatively simpler cases could be used.
LU10	The defining and differentiating features were also not always clear to the students, so we spent some energy and time talking about it and deciding what is a defining feature and what is a differentiating feature, or maybe one feature can be in both categories, etc.	We added additional exercises for identifying the defining and differentiating features in Moodle.
Additional specific changes to non-piloted LUs (in addition to the above mentioned general refinements)		
LU9	Motivational [video](#) added to highlight the importance of this topic	
LU11	We added a second more complex case as an alternative for the current case. Facilitators can decide which one to use depending on the level of competence of their students. We also added the management reasoning framework as an overarching concept to this LU.	
LU14	This LU was moved from the novice to the intermediate level, as some prerequisites, such as knowledge about Decision Support Systems, seemed to be too advanced for novice learners.	
LU22	Additional interactive exercises for applying clinical ethical reasoning were implemented. These are based on audio recordings based on which students are prompted to work on ethical aspects. Also, in addition to the slide-based presentation we developed a video.	

Table 4: Implemented specific refinements for the learning units.

We did not identify new aspects that we need to consider for the integration guideline in addition to what we have already identified as part of the train-the-trainer course refinements.

The refined learning units and facilitator instructions are available in our [learning management system Moodle](#).

6. Conclusions

The piloting of the learning units revealed some aspects for improvements concerning content, teaching format, and didactics. We also used these discovered aspects as inspiration to further develop all learning units, including the non-piloted ones. We addressed

these shortcomings by improving the activities implemented in our Moodle and changing the instructions and course outlines for the course facilitators.