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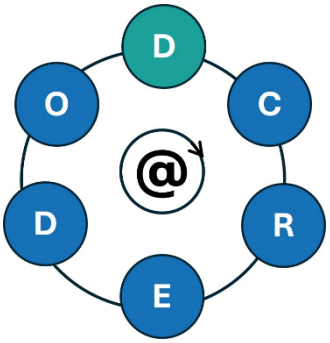
D-CREDO

Digital Health Technologies-Augmented Clinical Reasoning Education



2024-1-PL01-KA220-HED-000247790

D3.1 Blueprint Development

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1.0	17/09/25	Instruct	Instruct	
…				

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Summary

Objectives: The objectives of this deliverable was to translate the learning objectives and educational requirements agreed upon in work package 2 into a blueprint that serves as the basis for developing the learning units and virtual patients in the deliverables 3.2 and 3.3.

Approach: We split the deliverable in five tasks: Conceptualizing and developing the blueprint, publishing the blueprint, developing a template for the learning unit outlines, familiarizing with Moodle and its current structure developed for the DID-ACT project, and collecting and selecting the digital tools for each of the planned learning units.

Results: Overall, the blueprint outlines nine learning units for healthcare students, four for educators and a total of 25 virtual patients. In the blueprint the learning units are described with overarching learning objectives defined in work package 2, covered clinical reasoning topics, level of competency, target health professions, and type of digital tool covered. The virtual patients are outlined by demographic data of the fictitious patient, key symptom, and diagnosis.

Conclusion: The data outlined in the blueprint serve as the basis for developing the learning units and virtual patients in the following deliverables 3.2 and 3.3.

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Table of Contents

1 Introduction

The activities in this deliverable are designed to facilitate the development of the learning units (LUs) and virtual patients (VPs) in the upcoming deliverables D3.2 and D3.3.

The overall blueprint describing the LUs and VPs ensures a high quality of the curriculum and that all LUs and VPs are optimally aligned with each other based on the learning objectives (LOs) we developed in WP2.

2 Methods

We divided the tasks of this deliverable into five different activities: (1) developing the blueprint, (2) deciding about the publication format of the blueprint, (3) developing a LU description template, (4) familiarization with the DID-ACT curriculum, and (5) collecting and selecting digital tools to be used when implementing the LUs.

Activity 1 - Blueprint development

Based on the literature, work from WP2, and previous experiences of partners in curriculum development, we drafted an empty blueprint template which included metadata to describe the LUs (see Table 1). Some of the metadata will not be published as part of the blueprint, but will populate the LU description template as a preparatory step of developing the LUs. The population of the blueprint followed a three-step process:

1. Step 1: Populating basic LU data and agreement of all partners on the division of the LUs
2. Step 2: Assigning small groups for planning the details of step 2 for each LU in three phases starting with novice LUs, followed by intermediate and advanced, and finally the educator LUs.
3. Step 3: Planning details of the VPs and specific digital tools for each LU

Metadata	Description	Part of	Step
Clinical Reasoning theme	Each LU is assigned to at least one CR theme as defined in the DID-ACT project.	Blueprint, LU description	1
LU title	Short and precise name of the LU	Blueprint, LU description	
D-CREDO tool	Which of the five D-CREDO digital tool categories is/are covered in this LU	Blueprint, LU description	
Target group(s)	Medical students and/or nursing students or educators	Blueprint, LU description, VP blueprint	
Level of competency	Level of competency of the target group (novice, intermediate, advanced, educator)	Blueprint, LU description	

Overarching Learning objectives	Learning objectives from WP 2 (link) covered by this learning unit	Blueprint, LU description	
Prerequisites	Any prior knowledge or skills recommended for the target groups prior to participating in this LU	Blueprint, LU description	
Description	A short description of the LU	Blueprint, LU description	2
Specific LOs	Specific and measurable LOs operationalizing the overarching LOs defined in step 1	LU description	
Estimated time	An estimation of how much time will be required to teach this LU	LU description	
Teaching format and phases	Details of the blended learning approach (number, order of asynchronous and synchronous phases)	LU description	
Teaching methods	Learning and teaching methods that will be implemented in this LU to reach the LOs	LU description	
Assessment methods	Methods how the LOs of that LU will be assessed (based on WP4)	LU description	
Alignment with DID-ACT LUs	If there are any overlaps with LUs from the DID-ACT curriculum we define here whether the LU will be incorporated, followed-up, or replaced.	LU description	
Number of VPs	Envisioned number of VPs to be implemented for this LU	Blueprint, LU description	
Reviewer comments	All suggestions and comments made by the review group	internal for LU development groups	
Selected digital tool	Selecting a specific digital tool to be implemented in the LU	Blueprint, LU description	3
Patient-related data	Name, age, gender, profession, ethnicity, cultural background, disability, sexual orientation	VP Blueprint	
VP clinical data	Key symptom(s), final diagnosis, onset, addiction/substance abuse	VP Blueprint	
Encounter data	Encounter setting, scenario ending	VP Blueprint	
Additional information	Aspects to consider for creation, potentially suitable VPs from the iCoViP VP collection, anticipated adaptations	internal for VP development	

Table 1: Overview of the steps in developing and populating the blueprint and the LU description template

After the small groups had planned the first batch of LUs, we initiated an internal review process by an interprofessional and international team. Another small group of five partners reviewed the outline of the LUs individually according to the prior agreed criteria:

Review criteria:

- Are the specific LOs SMART (specific, measurable, achievable, relevant, time bound)
- Do the specific LOs represent (at least to some extent) the overarching LOs? and are they on a similar granularity as the specific LOs of the other LUs? Are they appropriate for the target group(s)?
- Are the prerequisites sufficient?
- Is the description clear and concise enough and aligned with the other descriptions (this could be later on the LU description displayed in Moodle for students)
- Is the estimated learning time within our limits (90min max/phase) and is there a maximum of 3 phases? If not, how could this be reached?
- Does the learning time align with the specific LOs and the intended teaching methods?
- Are the teaching methods clear, student-centered, appropriate for the intended phase and the target group(s).
- Are the assessment methods aligned with the teaching (e.g. not introducing completely new methods that have not been part of the prior teaching)
- Constructive alignment: Do the teaching and assessment methods align with the specific LOs (e.g. based on Bloom taxonomy)
- Is the intended (non-) alignment with DID-ACT LUs reasonable?
- Is the number of VPs (or other case formats) reasonable and does it also include VPs needed for assessment and if required different VPs for the professions (or can the VPS be used for both professions)?
- Are the planned LUs compliant with the educational framework requirements (WP2)

The reviewers put their comments and suggestions into the LU outlines. This will serve as a starting point for the small groups implementing the LUs as part of D3.2 and D3.3. After these review rounds all partners agreed on the final blueprint.

Activity 2 - Publication of the Blueprint

Based on the blueprints from former projects (DID-ACT and iCoViP) Instruct presented a draft online version of the D-CREDO blueprint for the website during an online meeting. Based on that all partners provided feedback and a small group developed two presentation modes that all partners could vote for. Based on the majority vote the final decision was made on how to publish the blueprint on the website.

Activity 3 - LU Description Template

A description template for a LU includes the metadata specified in the blueprint and details on the asynchronous and synchronous phases. For this activity we prepared a draft version of a template based on previous work during the DID-ACT project. We introduced the DID-ACT template including an exemplary LU outline during an online meeting. All partners had the opportunity to familiarize themselves with the documents and suggested refinements and adaptations for the use in D-CREDO.

After implementing the suggested refinements, we agreed on a template structure, which was implemented as a spreadsheet in our GoogleDrive.

After we had completed the blueprint activity, we provided pre-filled description templates for all LUs as a preparatory step before starting developing the LUs in D3.2 and D3.3.

Activity 4 - Familiarizing with the DID-ACT curriculum

The purpose of this activity was to familiarize partners with the structure of the DID-ACT curriculum, while also verifying and refining its usability for the extension with D-CREDO learning units. We introduced the structure and content of the DID-ACT curriculum on clinical reasoning during an online meeting to the D-CREDO consortium. Partners were asked to familiarize themselves with DID-ACT until the next meeting, in which we discussed questions and suggestions of the consortium. During the face-to-face meeting in Munich we continued this activity with a small group activity. We divided into three groups working on the following tasks:

(1) Was the introductory video helpful? If not, why not?

(2) DID-ACT Learning Unit “What is Clinical Reasoning - An introduction”:

- What are Theme(s), level of competency, format, instructions for educators?
- Where did you find the information?
- Did you find the LU quickly or did you have any issues?

(3) Based on that: What ideas for improvement do you have for the D-CREDO LUs?

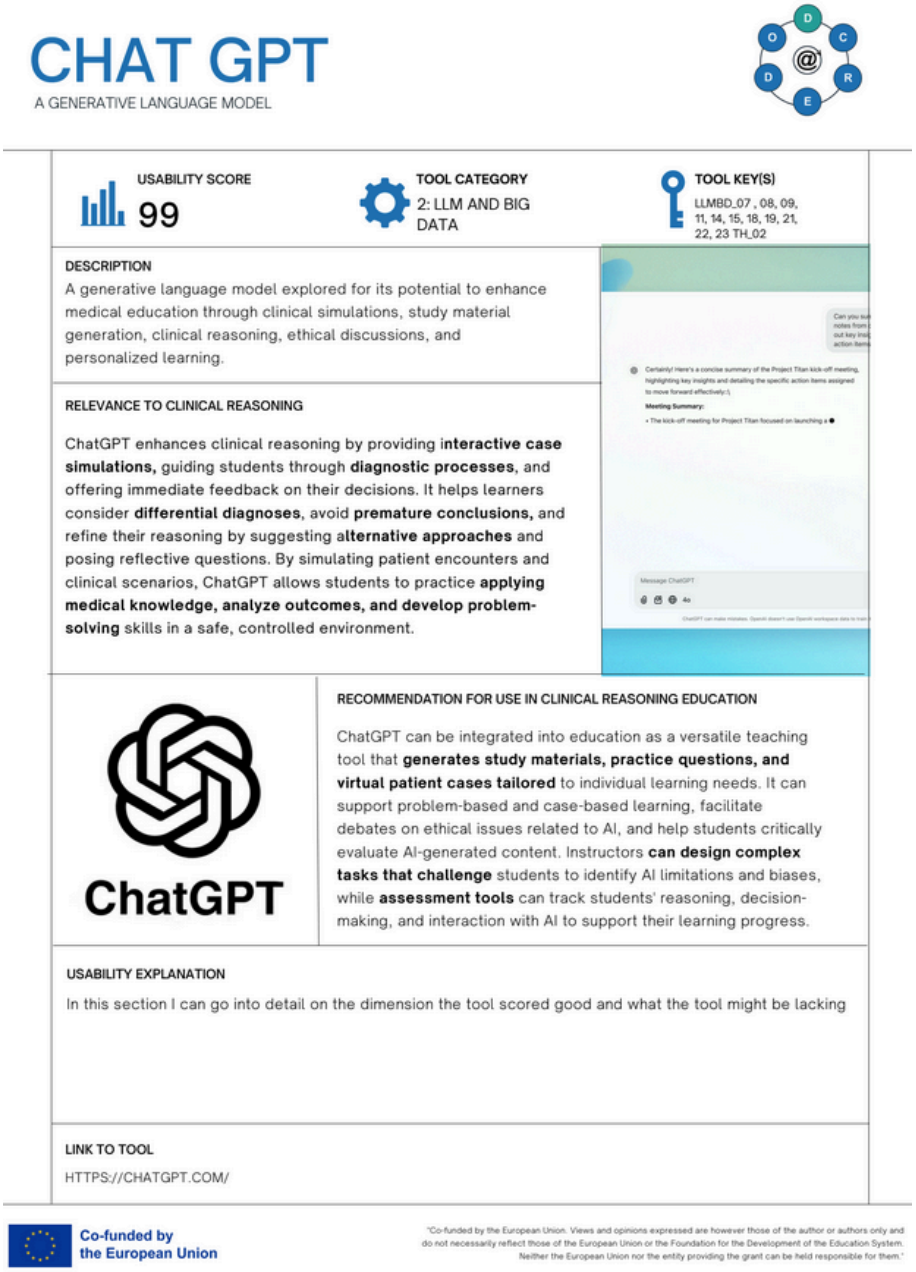
Each group collected their answers in GoogleDrive and we analyzed, summarized, presented, and discussed the results at the following online meeting. Based on that discussion the consortium agreed on necessary adaptations for accessing the D-CREDO LUs in Moodle.

Activity 5 - Collecting and selecting digital tools

We started this activity by searching the references from the rapid review (WP2) and the internet to find digital tools suitable for the use in D-CREDO. We collected the results in a spreadsheet with the following metadata:

- Name and type of tool and link
- Company that developed the tool
- Licencing information including availability and costs
- D-CREDO tool category
- Description
- Alignment with clinical reasoning theme(s)
- Relevance for clinical reasoning
- Overarching learning objectives from WP2 that can be covered with the tool
- Source where we found the tool
- For selected tools we provided a separate graphical summary (see figure x for an example)

In addition to the list and the summaries, educators received an introduction file on how to use the collection and approach selecting the most suitable tool(s) for their LU.



CHAT GPT

A GENERATIVE LANGUAGE MODEL

USABILITY SCORE

99

TOOL CATEGORY

2: LLM AND BIG DATA

TOOL KEY(S)

LLMBD_07 , 08, 09, 11, 14, 15, 18, 19, 21, 22, 23 TH_02

DESCRIPTION

A generative language model explored for its potential to enhance medical education through clinical simulations, study material generation, clinical reasoning, ethical discussions, and personalized learning.

RELEVANCE TO CLINICAL REASONING

ChatGPT enhances clinical reasoning by providing **interactive case simulations,** guiding students through **diagnostic processes**, and offering immediate feedback on their decisions. It helps learners consider **differential diagnoses**, avoid **premature conclusions,** and refine their reasoning by suggesting **alternative approaches** and posing reflective questions. By simulating patient encounters and clinical scenarios, ChatGPT allows students to practice **applying medical knowledge, analyze outcomes, and develop problem-solving** skills in a safe, controlled environment.

ChatGPT

RECOMMENDATION FOR USE IN CLINICAL REASONING EDUCATION

ChatGPT can be integrated into education as a versatile teaching tool that **generates study materials, practice questions, and virtual patient cases tailored** to individual learning needs. It can support problem-based and case-based learning, facilitate debates on ethical issues related to AI, and help students critically evaluate AI-generated content. Instructors **can design complex tasks that challenge** students to identify AI limitations and biases, while **assessment tools** can track students' reasoning, decision-making, and interaction with AI to support their learning progress.

USABILITY EXPLANATION

In this section I can go into detail on the dimension the tool scored good and what the tool might be lacking

LINK TO TOOL

HTTPS://CHATGPT.COM/

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Figure 1: Example of a summary of a digital tool included in the collection to help educators to select the most suitable tool(s) for their LU.

As the final step, the small groups who outlined the LUs selected suitable tools for their LUs from the provided list.

3 Results

Activity 1 & 2- Blueprint development and publication

The final blueprint is available on the D-CREDO website at https://d-credo.eu/curricular-blueprint/.

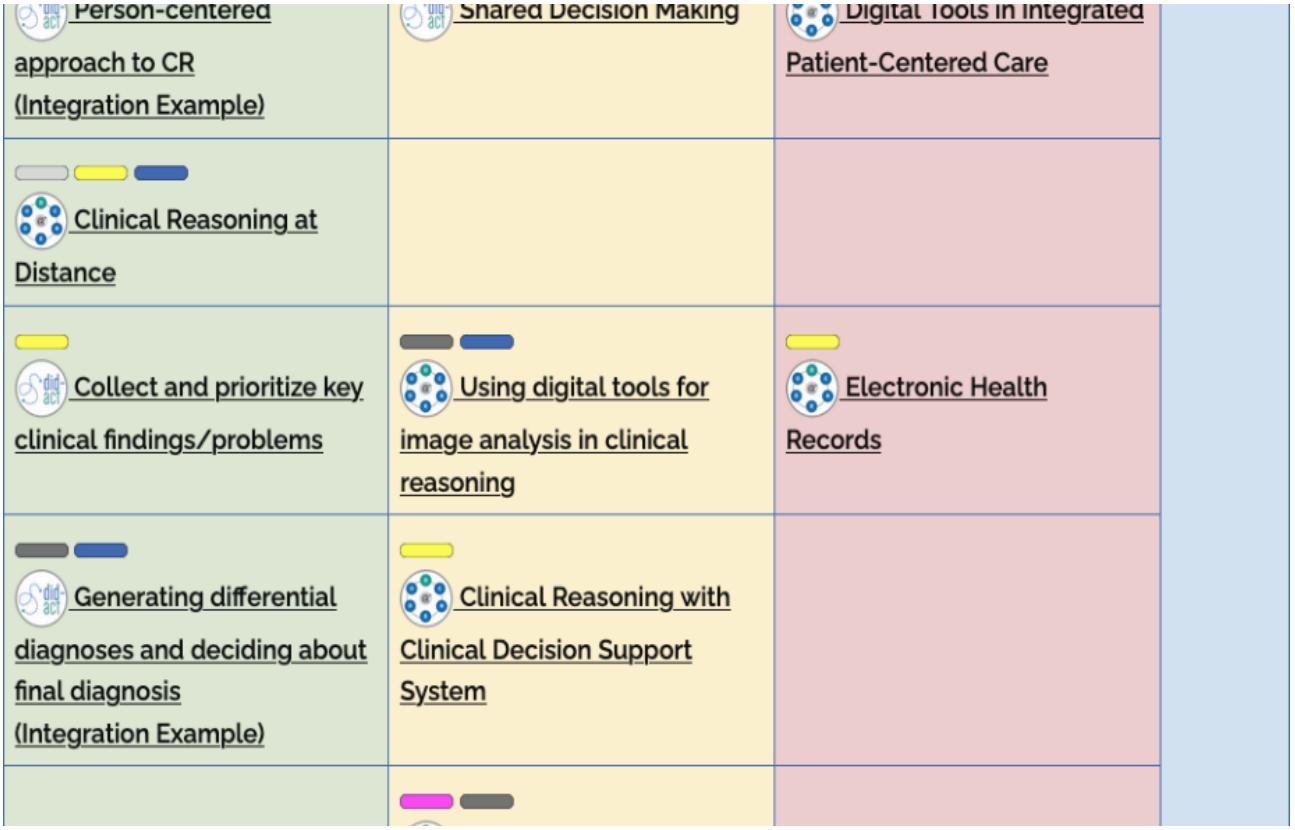

Figure 2: Screenshot (cropped) of the blueprint for students with the three levels of competencies (green=novice, yellow=intermediate, red=advanced). The colored rectangles represent the CR themes (see website for explanations).

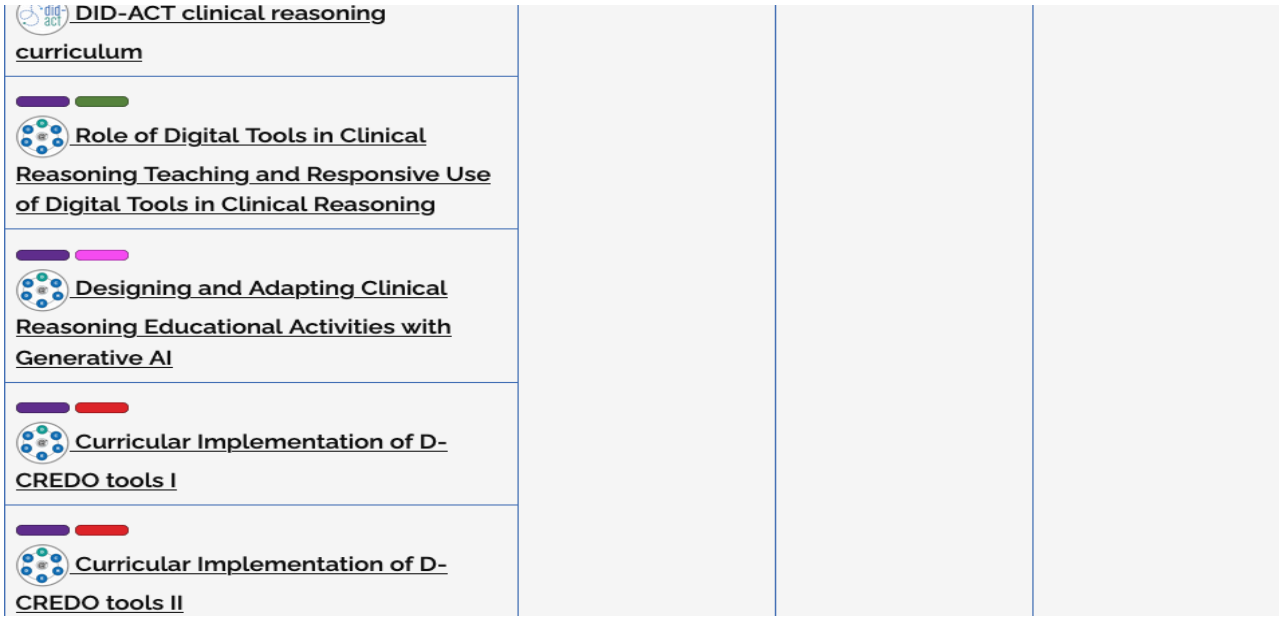

Figure 3: Screenshot (cropped) of the blueprint for educators (TTT). The colored rectangles represent the CR themes (see website for explanations).

The blueprint describing and outlining the 25 VPs is available as a google spreadsheet. We expect that during the development phase additional VPs might be necessary, so the list will be expanded accordingly.

The following table summarizes and describes the D-CREDO VP collection:

Aspect	**Description of VPs**
Gender	male: n=11, female: n=14
Age	Mean: 49.5 years (Min: 1.5, Max: 87)
Professions	Mix of academic (e.g. teacher, n=7) and non-academic professions (e.g.plumber, n=5), retired (n=5) and unemployed (n=1) VPs.
Ethnicity	White (n=21), Black (n=2), Asian (n=1)
Relevant cultural background	n=2
VPs with a disability	n=2 (dementia and mobility aid)
Addiction / substance abuse	Smoking / Ex-smoker (n=7), alcohol abuse (n=1), other drugs (n=1)
Sexual orientation	heterosexual (n=13), bisexual (n=1), homosexual (n=1), not stated or not applicable (n=10)
Ending of scenario	successful discharge (n=10), long-term treatment (n=12), death (n=2)
Encounter setting	Private practice (n=9), hospital (n=12) with emergency room

	admittance (n=3), outpatient clinic (n=2)
Key symptoms	14 different and common key symptoms are covered, e.g. fatigue (n=3), chest pain (n=1), or cough (n=4)
Final diagnosis	22 different and common diagnoses from various disciplines are covered, e.g. asthma, myocardial infarction, or diabetes mellitus.
Onset of key symptoms	Acute (n=7), subacute (n=6), chronic (n=11)

Table 2: Description of the 25 VPs planned for the LUs.

Most VP outlines will be used for medical and nursing students with adaptations. Only the VPs planned for the LU on image analysis tools will be designed for medical students as the LU will not be useful for nursing students.

Activity 3 - LU Description Template

The cover page contains the major metadata from the blueprint, such as title, CR theme, specific LOs, prerequisites, D-CREDO tool(s), target group(s), description, blended learning (BL) phases with group sizes, workload, and potential adaptations (see Figure 3).

Title of Learning unit					
Learner level					
Theme(s)					
Overarching and specific learning objectives					
Prerequisites					
Covered D-CREDO tool(s)					
Target group(s)					
Description					
Phases:					
Group size					
Approx. workload (ECTS)					
Adaptations					

Figure 4: Cover page of the LU template with metadata from the blueprint

For each asynchronous or synchronous phase a separate tab is provided in which the activities in the LU can be described in detail (Figure 2). It includes

- phase of instruction (e.g. activation of prior experiences, application, or feedback) based on a framework by Staedeli et al. (2010)
- specific learning objectives addressed by this phase of instruction

- ICAP level [Chi et al]: ICAP stands for the level of engagement of a learner within such a phase of instruction. The hypothesis is that the learning increases from P=passive to A=active, C=constructive, and I= interactive.
- Description of the phase of instruction
- Teaching and learning methods and strategies applied in this phase
- Recommended size of group (e.g. can be done with all students, small groups, or pairs)
- Approximate duration of this phase
- Material needed (e.g. a video, virtual patient, or e-portfolio)
- Optional alternatives for implementing this phase, e.g. with larger groups or when preferring other teaching methods

Phase 1:									
Phase of Instruction	Intention / spec. LOs	ICAP	Description	Methods/strategy		All / Small groups / Pairs / Individual	Approx duration (min)	Material needed	Alternative(s)

Figure 5: Spreadsheet for planning in detail each phase of the LU.

Activity 4 - Familiarizing with the DID-ACT curriculum

In summary, we drew the following conclusions from the groups responses:

- There is a need to refine the search functionality in the DID-ACT/D-CREDO Moodle.
- The educator resources for teaching student LUs are difficult to find, therefore we will move these DID-ACT and future D-CREDO resources into a dedicated Educators area.
- We checked and adapted the login/registration procedure as we encountered technical issues and the process needs a more detailed user guide for the future D-CREDO learners.
- We made some minor adjustments of the structure and layout of the LU outline and Moodle.

This process of refining the presentation of D-CREDO LUs in Moodle will continue throughout WP 3.

Activity 5 - Collecting and selecting digital tools

The initial collection of digital tools includes a total of 69 entries (multiple entries possible) and 58 digital tools representing:

- 9 entries for AI-supported image analysis
- 22 (11) entries for LLMs

- 7 entries for Telehealth application
- 7 entries for mHealth apps and wearables
- 18 entries for EHR and CDSS
- 4 entries for a combination of tools
- 2 other

This initial list of digitals tools cover all the CR themes and overarching LOs defined in WP2. However, we expect the list to dynamically be expanded until the end of this workpackage due to the rapid technical advancements and a more in-depth analysis during D3.2 and D3.3 in which we will develop the LUs and VPs.

The collection and the supporting documents are publicly available in the D-CREDO GoogleDrive: Digital Tool Collection

Quality indicators

In summary, we exceeded our quality criteria for this deliverable (Table 3)

Quality indicator	**Result**
Developing ≥ seven student LUs	The blueprint includes nine LUs for students with a total estimated time for teaching and assessment of ca. 35 hours
Developing ≥ three LUs for educators	The blueprint includes four LUs for educators with a total estimated time for teaching and assessment of ca. 16 hours
Each overarching LO from WP2 is covered in ≥ one LU	All overarching LOs defined in WP2 are covered
≥ Two LUs targeting at least two healthcare professions	12 of the 13 LUs are relevant for medical and nursing students / educators, one on AI-supported image analysis is relevant for medical students only
Description of planned VPs includes context of use, realistic socio/demographic background and clinical (leading symptom, final diagnosis) of the VP	In step 3 of the blueprint we ensured that we fulfilled this criterion. All relevant data are included in the blueprint and will guide the VP and LU development in D3.2. In total we plan to develop or adapt 25 VPs for the D-CREDO LUs.
Compliance with the educational framework requirements	The blueprint is compliant with the D-CREDO educational framework requirements defined in WP2. This was ensured during the blueprint review.

Table 3: Comparison of the D3.1 results with the quality indicators for this deliverable.

4 Conclusions

The results of our activities in this deliverable provide a useful preparation for the deliverables D3.2 and D3.3. In addition we gained valuable insights about how to compose the small groups working on the LU development.

5 References

- Chi MTH, Wylie R. The ICAP Framework: Linking Cognitive Engagement to Active Learning Outcomes. Educational Psychologist. 2014;49(4):219–243.
- Städeli C, Grassi A, Rhiner K, Obrist W (2010): Kompetenzorientiert unterrichten. Das AVIVA-Modell. Bern: hep-verlag.