IMPECD

Improvement of Education and Competences in Dietetics

WORKPACKAGE 1

MASSIVE OPEN ONLINE COURSE

FINAL REPORT, AUGUST 2018

Strategic Partnership IMPECD – Improvement of Education and Competences in Dieteticswww.impecd.eu

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ARTESIS PLANTIJN HOGESCHOOL ANTWERP

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Work package 1- Massive Open Online Course (MOOC)

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Objectives

In this work package, the IMPECD-MOOC embedded in the IMPECD-platform is a centerpiece of the project and the toolset for gathering all learning content developed within the project. This toolset creates an environment, for instance, based learning using a decision tree to simulate a realistic framework Dietetic Care Process (DCP).
The mLearning App, implemented via Moodle®, can be used with smartphones, tablets, notebook and desktop computers. It is the primary front-end for students solving clinical cases. Furthermore, it provides the opportunity for discussing clinical cases and allows collaboration between students, teachers, and professionals on an international level. Case developers and the technical staff use the administrative back-end for gathering and cataloguing clinical case data. The Server Application stores all clinical case data, user, and communication element at the St. Pölten University of Applied Sciences.
Through this innovative MOOC, based on the unified framework DCP, students practice dietetics as well as transversal skills like clinical reasoning, problem- solving, collaborative and interdisciplinary working. Employability research skills of participating students will increase by applying evidence-based therapy in dietetics. Further, the correct implementation of the DCP, as well as Lifelong Long Learning of professionals through their participation in the MOOC, supports the achievement of the goal mentioned above. Participants are guided in the IMPECD-MOOC to base their work in the clinical cases on the framework DCP to increase the quality of care. Students are trained in clinical reasoning and critical thinking by using an interactive method, without the need for practice placements and real-life patients. This approach goes in line with the 2011 EU Modernisation Agenda's priorities or with the 2013 Communication on Opening Up Education, e.g., benefits from ICT to enrich teaching or using ICT in training to reduce costs and increase flexibility in terms or time and space.
All results from work package two to five have been implemented in the MOOC: the unified framework of the DCP, the five clinical cases, the learning and evaluation material, as well as the interactive parts to promote international collaboration between students.

Description of work (broken down into activities)

- O1/A1 Requirements dietetics, development logo
- O1/A2 Requirements engineering
- O1/A3 IMPECD-platform, applications design and software engineering O1/A4 Development of the toolset / prototype
- O1/A5 Testing
- O1/A6 Production use support

Milestones: are displayed with planned date (application) and end date

Nr.	Milestone	planned date	end date
1a	Developed project logo, submittals/templates for docx, pptx	12/2015	12/2015
1b	Defined requirement dietetics for the MOOC	4/2016	4/2016
1c	Summary of requirements for beta version	7/2016	4/2016
1	Launch of beta version at first ISP (May 2017)	5/2017	5/2017
1d	Developed IMPECD-MOOC, application design and software engineering (http://mooc.fhstp.ac.at); Implementation of IMPECD-Homepage (=IMPECD-platform) (www.impecd.eu). The MOOC is embedded in the IMPECD-platform.	7/2017	2/2017
1e	Developed prototype	4/2018	5/2018
1f	Testing is finished	5/2018	8/2018
2	Software MOOC completed and available for download and use	5/2018	8/2018

Table 1/WP01: Overview of Milestones and intermediate steps in Work package 1.

Progress up to date:

- All initially planned deliverables and milestones for the time of reporting have been reached.
- O1/A1 Requirements dietetics, development logo (milestone 1a, 1b)
- The project logo (see Figure 2/WP01), templates for the project for Microsoft Word (see Figure 3/WP01) and PowerPoint have been created (milestone 1a).

Figure 2/WP01: Creating the projects' corporate identity: The IMPECD logo


Erasmus+

Überschrift

Überschrift 2

Überschrift 3

Formatvorlage Kapiteltext Die Formatierung von markiertem Text im Dokumenttext kann auf einfache Weise geändert werden, indem Sie im Schnellformatvorlagen-Katalog auf der Registerkarte 'Start' ein Layout für den markierten Text auswählen. Text können Sie auch direkt mithilfe der anderen Steuerelemente auf der Registerkarte 'Start' formatieren. Die meisten Steuerelemente ermöglichen die Auswahl zwischen dem Layout des aktuellen Designs oder der direkten Angabe eines Formats.

- Aufzählung 1
- Aufzählung 1
- Aufzählung 1

Formatvorlage Einzug Wählen Sie neue Designelemente auf der Registerkarte 'Seitenlayout' aus, um das generelle Layout des Dokument s zu ändern. Verwenden Sie den Befehl zum Ändern des aktuellen Schnellformatvorlagen-Satzes, um die im Schnellformatvorlagen-Katalog verfügbaren Formatvorlagen zu ändern. Die Design- und die Schnellformatvorlagen-Kataloge stellen beide Befehle zum Zurücksetzen bereit, damit Sie immer die Möglichkeit haben, das ursprüngliche Layout des Dokuments in der aktuellen Vorlage wiederherzustellen.

- Aufzählung 2
- Aufzählung 2
- Aufzählung 2

Formatvorlage Einzug2 Auf der Registerkarte 'Einfügen' enthalten die Kataloge Elemente, die mit dem generellen Layout des Dokuments koordiniert werden sollten. Mithilfe dieser Kataloge können Sie Tabellen, Kopfzeilen, Fußzeilen, Listen, Deckblätter und sonstige Dokumentbausteine einfügen. Wenn Sie Bilder, Tabellen oder Diagramme erstellen, werden diese auch mit dem aktuellen Dokumentlayout koordiniert.

Hochschule Fulda

Figure 3/WP01: Creating the projects' corporate identity: The word.doc template

Requirements for the MOOC from a dietitians/nutritionists perspective (milestone 1b) have been collected within the consortium. The primary elements are (i) that the project has its particular layout, (ii) each HEI can work within the MOOC, (iii) the learning environments should be suitable for case-based learning, (iv) the MOOC should provide several testing and communication tools, (v) the learners progress should be monitored and (vi) flexibility concerning up-/download is necessary e.g., learners can also upload files. The literature research of a bachelor student regrading the learning theories and existing MOOCs in the field of dietetics supported the requirements, and qualitative interviews were conducted with students (bachelor

thesis of Petra Raffetseder, a student of the HEI St. Pölten in 2015/16). The primary results of this thesis are that dietitians appreciate a MOOC for training the dietetic practice and value the international exchange. Furthermore, a logic and realistic way of the clinical case presentation is of great importance. Additionally, the design of the MOOC should be attractive for the learners.

O1/A2 Requirements engineering (milestone 1c)

The requirements of dietitians/nutritionists were evaluated from a technical point of view. Based on the limitation of funding, technicians recommended Moodle® for the mLearning App. Moodle® is a learning platform designed to provide educators, administrators, and learners with a single, robust, secure, and integrated system to create personalised learning environments. The use of Moodle® also reduces the resources necessary for programming during and after the project. The comparison of the dietetic requirements with the technical possibilities showed that Moodle® covers most requirements and thus is best suited for IMPECD. Due to the mentioned points, the team decided that Moodle® is a more sustainable and cheaper solution than the initially planned mLearning App. The consortium collected dietetic requirements and technical solutions in Moodle® via a summary **(Summary of requirements for the beta version, milestone 1c).**

There are different types of MOOCs. The “x” in xMOOCs stands for eXtension; this type is similar to traditional lectures at universities (Ebner, Kopp, Wittke, & Schön, 2015). The “c” in cMOOCs stands for “connectivism”, the new learning theory of the digital age by George Siemens. Within this type, the participants define themselves the learning goals during the course and participants provide all learning materials as well (Wedekind, 2013). The bMOOC (“b” - “blended”) is the connection between traditional lectures and online participants, where advantages and disadvantages of xMOOCs and cMOOCs are best compensated (Yousef, Chatti, Schroeder, & Wosnitza, 2015). The MOOC within the IMPECD-project is designed as a bMOOC because it connects with lectures at the participating HEIs. Nevertheless, it is possible for other dietetic students and professionals to participate and get a certificate. This certification process will be tested and implemented as a next step after the IMPECD project.

O1/A3: IMPECD-platform, application design and software engineering (milestone 1d)

In August 2016, a first IMPECD-MOOC was developed on Moodle® to test the implementation and usability of a draft clinical case. Therefore, a flock (http://flock-0875.students.fhstp.ac.at/Moodle/) was set up as a first mock-up version for the IMPECD-MOOC. Each project member had access to this version to test the usability and decide about the design for further modification. Due to technical limitations of the flock, the Moodle® - course (http://mooc.fhstp.ac.at/) was implemented on a live server later in September 2016. Each project member has continuous access.

O1/A4: Development of the toolset / prototype (milestone 1, 1e, 2)

The IMPECD-MOOC is an environment for distance-based learning using a decision tree to simulate a realistic process- driven dietetic care including dietetic clinical reasoning. The Moodle® course is also used as an administrative back-end for gathering and cataloguing clinical case data. Cases may consist of all kind of media (hypertext, pictures, videos,…) and interactive elements that will be used to navigate the decision tree to solve a clinical case. The MOOC is hosted at the virtual server of the HEI St. Pölten.

The project team aimed at creating the best learning environment and thus tested several options for presenting clinical cases to learners, which are offered by Moodle®, e.g., book or lesson format. Due to the advantages of the lessons-format (progress bar, the guidance of learners through a "story" and the possibility of decision nodes), the team decided to continue with this format. Although it is limited in testing tools, e.g., not having drag-and-drop questions, the advantages predominance. Until December 2016, the first version of an introduction course as a course for the DCP in general, and a course for the clinical case "cardiovascular disease" were implemented. After the first experiences with the clinical case "cardiovascular disease", two other clinical cases - "obesity" and "colon cancer" - were integrated into the MOOC in February 2017. From then on, all other cases have been implemented. Before the first ISP in Antwerp (28.5.2017-2.6.2017) all batch 1 cases, which are the lower level ones, were employed in the MOOC **(Launch of beta version at first ISP, milestone 1)**.

Batch 2 cases were implemented in the MOOC before the second ISP in Neubrandenburg (28.5.2018-1.6.2018). Furthermore, collaborative aspects as well as reflection tools for the students were realized. Therefore, the prototype was finished **(Developed prototype, milestone 1e)**.

To allow all interested students/professionals to participate in the MOOC, a self-registration tool was established in the prototype. After registration, users start with the introduction course.

Figure 4/WP01: The IMPECD-MOOC landing page

In this course, the learners get all information concerning the IMPECD-project and the MOOC itself. Afterwards, learners are guided through the DCP-course, as well as the clinical cases. Besides the introductory course, all courses consist of a general page and the clinical case itself. On the front page, learners find (i) general information as well as the (ii) learning materials concerning the topic of the clinical case, (iii) the related learning outcomes and (iv) collaborative tools like the discussion forum. Each clinical case follows the steps of the Dietetic Care Process and participating students learn and reflect on their progress while going through it. Besides case-related content, participants find 15 evaluation questions in every clinical case. These questions are part of the grading. , On the other hand, progress questions keep the clinical case going and reflection question are for the learners to reflect on their progress. Students have one attempt for each question. Evaluation questions contribute to a higher amount to the grade than progress questions (weighing). Reflection questions are not graded at all. Students have to pass 75% of all evaluation questions to fulfill the MOOC's requirements.

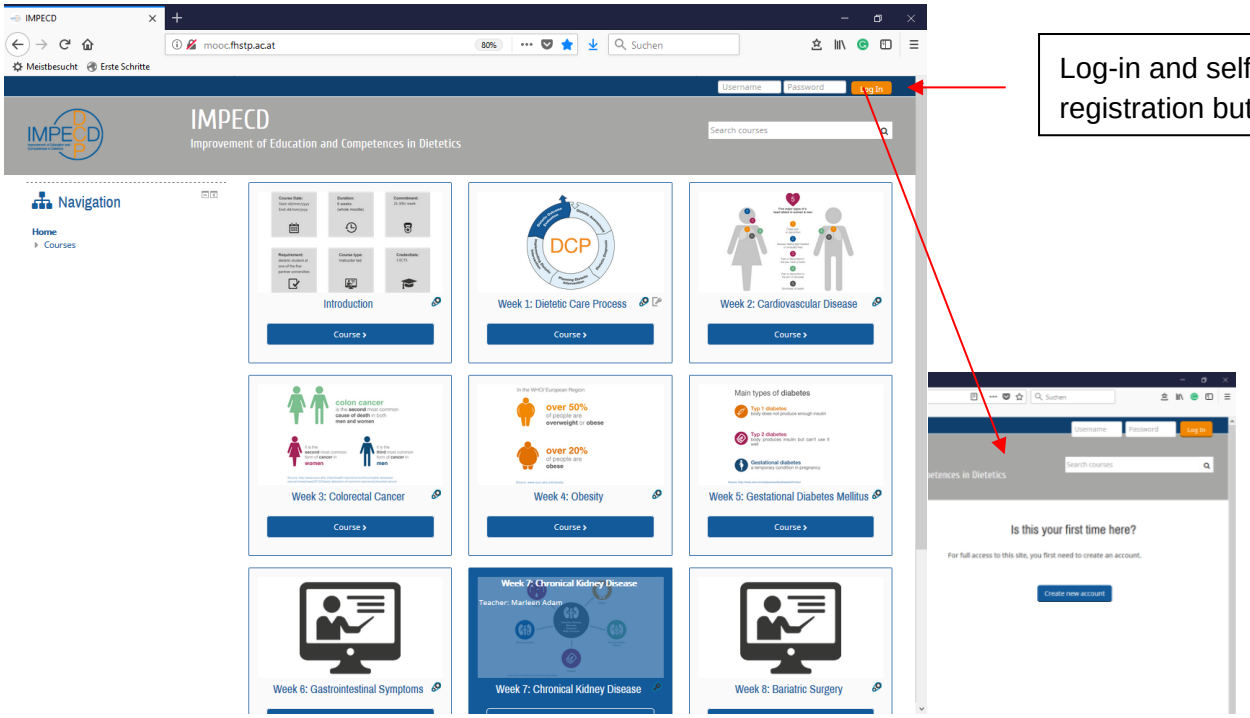

Figure 5/WP01: Improved IMPECD MOOC landing page incl. self-registration

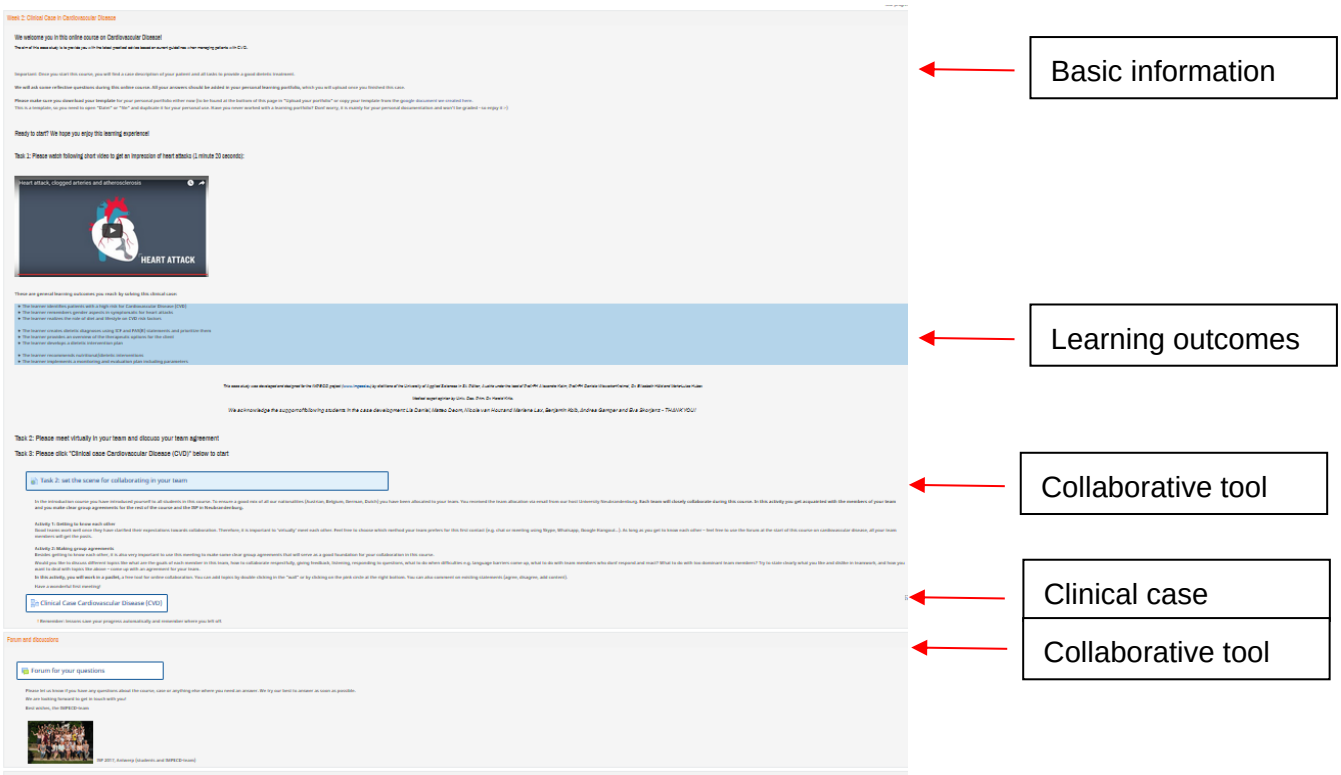

Figure 6/WP01: Example of a clinical case in the IMPECD-MOOC

The completed IMPECD-MOOC (=complete Software-Toolset) is now finalized after several testing rounds with international students and ready for download (=usage). The IMPECD-MOOC will be hosted by the HEI St. Pölten three years after the project has ended in August 2018 **(Software MOOC completed and available for download and use, milestone 2).**

After the IMPECD project, the first post-IMPECD MOOC will start in spring 2019. During this first phase, mainly students from the consortium will participate. Furthermore, minor improvements can be implemented before other students are invited actively for the next MOOC; starting in 2020.

O1/A5: Testing (milestone 1d)

The developed IMPECD-MOOC was tested via two usability tests:

- The first usability test took place on the 30th November 2016 as a pre-test with one tester (a co-worker from the St. Pölten University of Applied Sciences) and was conducted at the usability laboratory of the HEI St. Pölten. The user - test itself was held on 5th December and 7th December 2016 between 10:00am and 02:30pm at the usability laboratory. Eight dietetic students (five third semesters, two fifth semesters, one from the teaching department) who already had background knowledge from their training and knew about the dietetic care process (DCP), were acquired for the test. Each student completed eight tasks. The test's goal was to check the IMPECD MOOC's structure and process, with special regards to navigation through courses and page layout.

Figure 6/WP01: Team from HEI St. Pölten that observed the testing process during the first usability test

The results of the first usability test were mainly positive. It was reported that the structure is clear, it is easy to use, and the variety of the questions was appealing. During the test no serious problems occurred. Mostly, minor issues regarding design and appearance were found e.g. confusing “Get Started-Button” vs. “Log-in” on the landing page. The whole usability test was documented.

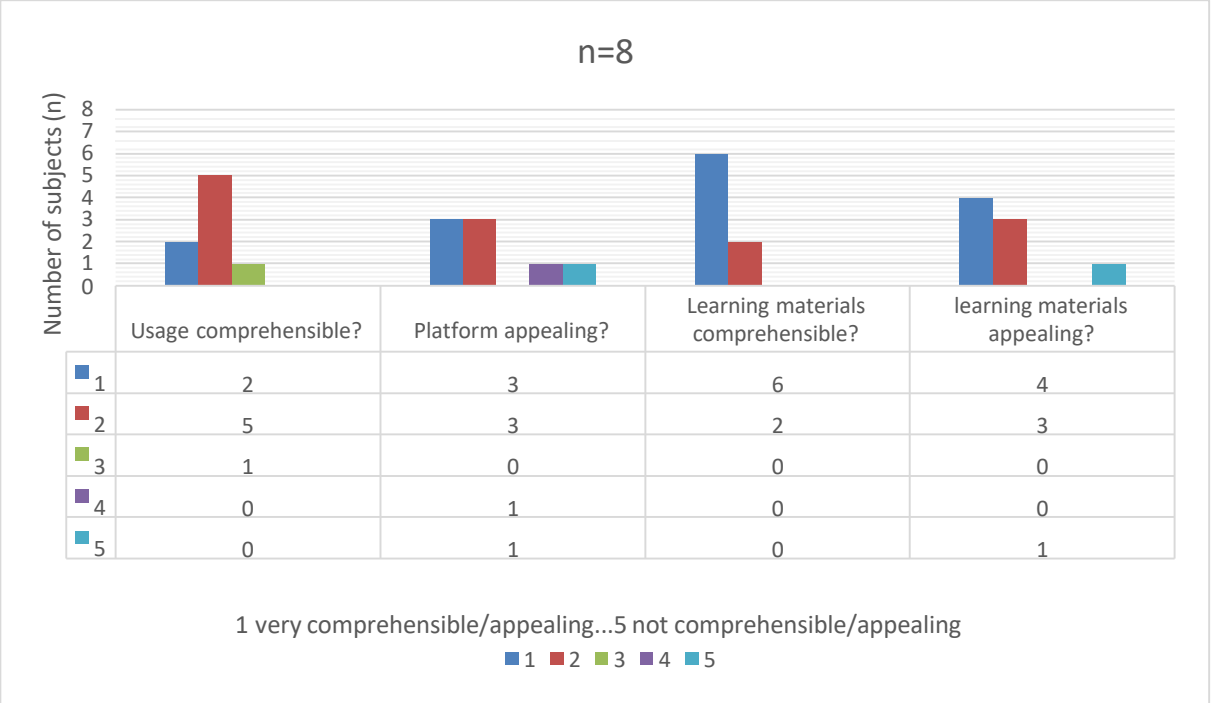

Figure 7/WP01: Results of the first usability test in December 2016

- The second usability test took place on 12th January 2017, from 3:30 pm to 4:45 pm with 26 dietetic students (3rd semester) at the usability lab of the HEI St. Pölten. This test had a strong content focus and based on the beta-version of the clinical case “cardiovascular disease” developed by HEI St. Pölten. The structure and the handling of the MOOC was clear for the majority of participants.
- Videos

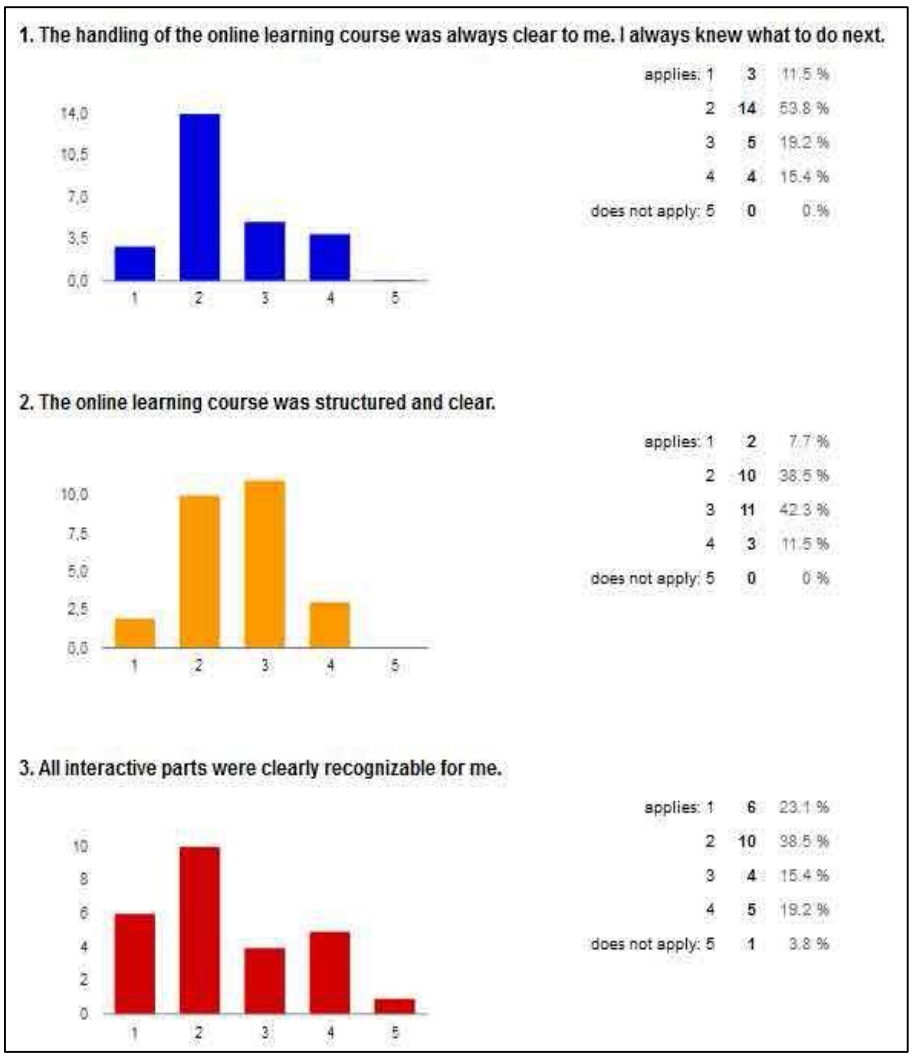

Figure 8/WP01: Results of the second usability test in January 2017

Following key areas for improvement were detected:

- Videos
  - Videos should have a clear connection to the actual topic within the MOOC e.g. questions for the videos – this will make the need for watching more comprehensible
  - Videos should be free of errors and understandable

- After the informative parts breaks for summary and repetition are necessary.
- Multiple choice questions
  - Same feedback for all “right-or-wrong answers”
- Picture of landing page

Figure 9/WP01: IMPECD MOOC showing different images of student groups, created and offered by the project partners

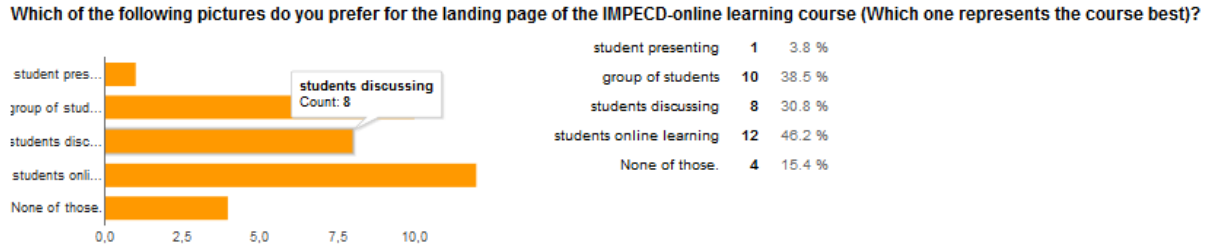

Figure 10/WP01: Grading of the IMPECD-MOOC landing page picture (second usability test)

More than half of all participants can imagine using the MOOC in the future. To improve the detected weaknesses, a new Moodle®-theme was implemented and the **IMPECD-platform with its application design and software engineering (milestone 1d)** is finished (http://mooc.fhstp.ac.at; http://mooc.fhstp.ac.at/)

Due to the IMPECD project and the fact that English is the project language, **internships of three months** for international students were possible at the HEI St. Pölten:
Two students from Han University of Applied Sciences Nijmegen in the Netherlands (Nicole van Hout and Marlene Lax, 2016) and one student from University College Leuven-Limburg, Belgium (Matteo Déom, 2017) employed a draft clinical case in the MOOC to enable first testing for the consortium. Furthermore, two students of the University of Barcelona (Marta Masson Sarda and Carla Rodenas Menchen) were involved in the final testing (additionally to the application) after the second ISP in summer 2018.

To evaluate and improve clinical cases in addition to the Intensive Study Program in Antwerp in May 2017, four dietetic students from HEI St. Pölten (Lia Daniel, Michaela Reischer, Beate Scharfmüller, Martina Huber) based their bachelor thesis on different aspects of the clinical cases “cardiovascular disease” and “Crohn’s disease”.

Besides the usability tests at the HEI St. Pölten**, all batch 1 cases were tested/evaluated from different perspectives during the first ISP in Antwerp** (2017). First, all case developers

tested their cases with students from the participating HEIs and documented the student's feedback. Secondly, Elisabeth Höld, the leader of the work package MOOC, attended all case testings and recorded general observations. Thirdly, the discussion concerning the case Cardiovascular Disease was filmed. This evaluation will be part of the PhD-thesis of Alexandra Kolm, the project leader. Fourthly, all participating students answered an online questionnaire concerning the usability of the MOOC. The questionnaire consisted of two standardized questionnaires (System Usability Scale = SUS, User Experience Questionnaire = UEQ) and project-specific questions. The SUS is a ten-item questionnaire with a five-point Likert-Scale which assesses the user's subjective rating of a product's usability with a maximum score of 100. The SUS is a reliable tool (Bangor, Kortum, & Miller, 2008; Brooke, 1995) and with interpreting the scores, the team follows Bangor et al. (2008) with a minimum acceptable score of above 70. Scores above 85 are considered as "excellent usability". The UEQ is a reliable and valid 26-item questionnaire including six factors: Attractiveness, Perspicuity, Efficiency, Dependability, Stimulation, and Novelty (Laugwitz et al., 2008).

Figure 11/WP01: Evaluation of the clinical case Gestational Diabetes during the first ISP in Antwerp

The results of the questionnaire were presented to, and discussed with all students during the ISP. Generally, the MOOC needed improvements regarding:

- The questions and their feedback: feedback should be related clearly to the questions and highlighted with colors
- The navigation should be easier,
- The documents available for download should open in extra tabs and
- the visual appearance, especially the number of pictures and videos, should improve

Overall, students like the MOOC and would use it for learning and cooperation with other students. The conclusion of this discussion as well as all other evaluation aspects served as a base for the development of the batch 1 cases. These improvements were done after the ISP during summer 2017.

Similar to the first ISP, **all batch 2 cases were evaluated during the second ISP in Neubrandenburg (2018)**. Under the guidance of the case developers participating students had to work through batch one before the ISP and batch two during the ISP. Again, the case developers collected feedback, and improvements were made after the second ISP. Especially questions and grading needed to be improved. Due to the limitations of Moodle© lessons, grading was a big challenge; e.g. due to default settings, it is not possible to change immediate feedback ("Your teacher will grade this.") students get after answering reflection questions, which are only for their reflection portfolio and not for grading. Therefore, the team of the work package MOOC worked on further improvements during July 2018. After this, everything was tested again and prepared for the first MOOC after the project (summer term 2019). **Finalise and finish testing (milestone 1f)**, all cases were checked concerning their technical and usability aspects.

O1/A6: Production use support

The project team members of St. Pölten prepared the ISPs from the technical point of view. They created topic-specific courses, registered all ISP-participants and implemented online questionnaires. Elisabeth Höld, the leader of this work package, participated in the first ISP in Antwerp (2017) for technical support. Due to the fact, that the system was stable during the first ISP and to save fundings, St. Pölten provided online support during the second ISP in Neubrandenburg (2018).

Challenges in work package 1

Because the IMPECD-MOOC is hosted on the virtual server of the HEI St. Pölten, speed changes according to the degree of capacity utilization in Moodle© were experienced. This experience was a big problem while the project team worked with the flock. After implementing Moodle© on a live server, the situation has improved. Moodle© offers several possibilities for providing content to learners (book, lesson, etc.), but none of them fit perfectly for the IMPECD-project. As the advantages of the lesson-format outweigh its disadvantages, this format was employed in the MOOC. Unfortunately, the first implemented Moodle©-theme induced several technical problems after the integration of clinical cases. Another Moodle©-theme, which has more technical opportunities and seems more stable, has been realized. This change decreased the technical challenges. Furthermore, and also related to the

framework of Moodle©, grading was of significant concern. Especially the default settings within Moodle© lessons forced the consortium to do more testing and rethink certain approaches; e.g., focus more on reflection during the learning process instead of hard points. The consortium decided to implement both, scores and a reflection portfolio. This implementation guarantees that the learning outcomes, as well as the learning process, are represented in the MOOC.

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