WP4 D5 Technical documentation of software developed

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Context

Europe's aging population with increasing multimorbidity requires a workforce skilled in managing chronic diseases. To meet this need, health professions education must emphasize lifelong and interprofessional learning, using innovative pedagogies and technologies. However, current skills labs and workplaces often lack the conditions needed for deliberate practice and effective interprofessional training.

The partnership between University of Twente BMS Lab, University of Münster IfAS and Leipzig University of Applied Sciences aims to address this by developing simulation scenarios for individual and collaborative skills training in home and palliative care (ACTIVATE project[1]). This includes a mobile app for narrative feedback and a shared dashboard for debriefing interprofessional teams. The tools and methods will be tested with health profession students in Germany and Sweden across various fields, including medicine, nursing, occupational therapy, and pharmacy.

Key outcomes include training scenarios, learning materials, a feedback app with AI integration, a debriefing dashboard, and scholarly publications. These innovations will enhance learning, encouraging deliberate practice and collaboration in team-based care, moving away from single-professional approaches.

As part of the project, the TIIM app and the Dashboard are extended to request a module each time they have a training session where they receive feedback, to support recording & transcribing of audio recorded during those feedback sessions, and viewing their answers and progress in an e-portfolio. The following chapter gives a detailed overview of the developed features.

Technical details

On-demand module

Timed modules allow the researcher to configure timing rules when a module should be available or unavailable for participants. With the timing rule “On demand module” it is possible for participants to start an already finished module again at any time of their choosing.

The researcher who configures the study, should configure this timing rule to let the participant have the option to create a new instance of the module for themselves by clicking on a button in the study page. The API responds by creating a new participant modules record in the database for this module. Before the participant can click the button again, the module just created needs to be finished. This way, there is only a

[1] https://medicampus.uni-muenster.de/ccel/projects/activate

single module of this type active at certain time, but the participant can answer the module as often as desired.

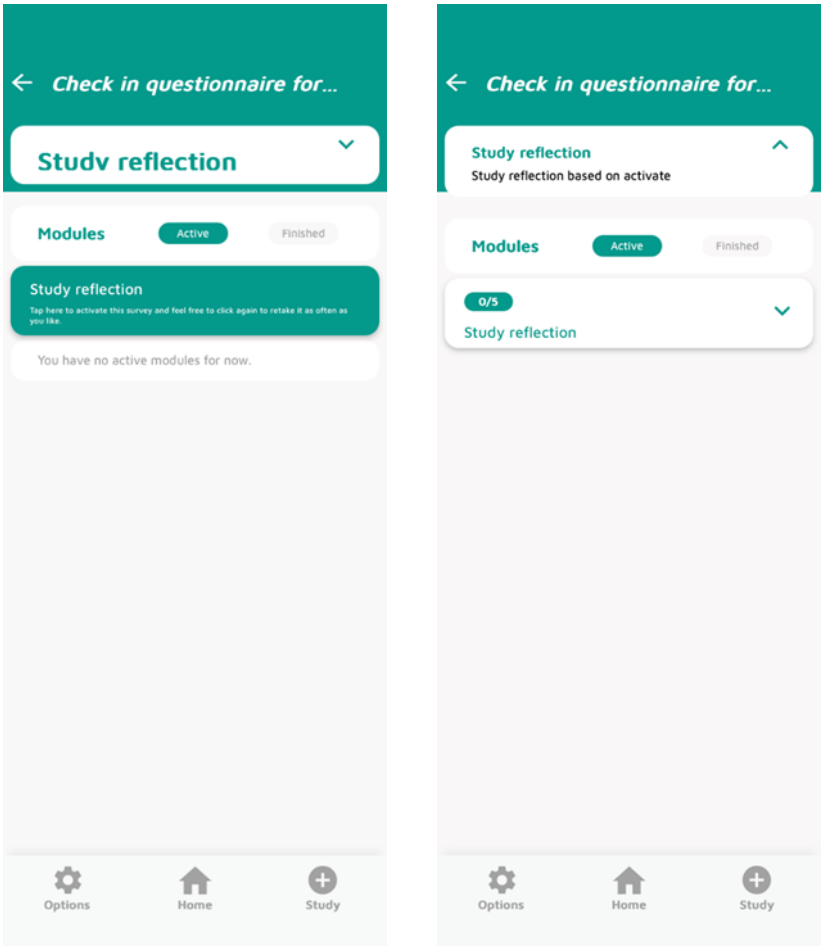


Figure 1. Before and after requesting

Transcription

To have enough time during feedback sessions for the actual feedback, participants should be able to record and review verbal feedback. For that the already existing audio recording module item was extended with a transcription switch.

Transcription flow overview

The flow diagram shows a simple overview of the transcription process. It starts from the user's phone after finishing a module. The audio recording is saved and sent to the TIIM API, where it is checked for audio answers that need to be transcribed. If such answers are found, the audio is sent to the Data Processor API, which handles the transcription. Once completed, the transcription is sent and saved in the data storage.

When the e-portfolio link is requested and opened, the transcription is retrieved and can be viewed. The same applies if the user wants to view it in the phone app (on the Finished Modules page).

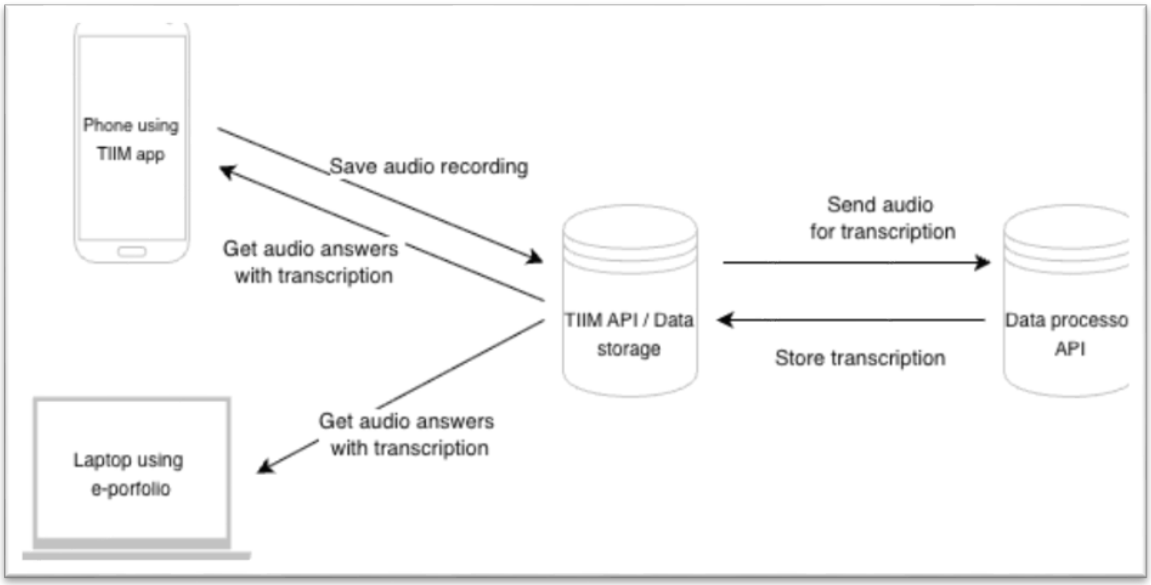


Figure 2. Flow diagram

Transcription flow

To enable the transcription of audio recordings the switch “Transcription” needs to be activated inside an audio recording item (see Figure 3).

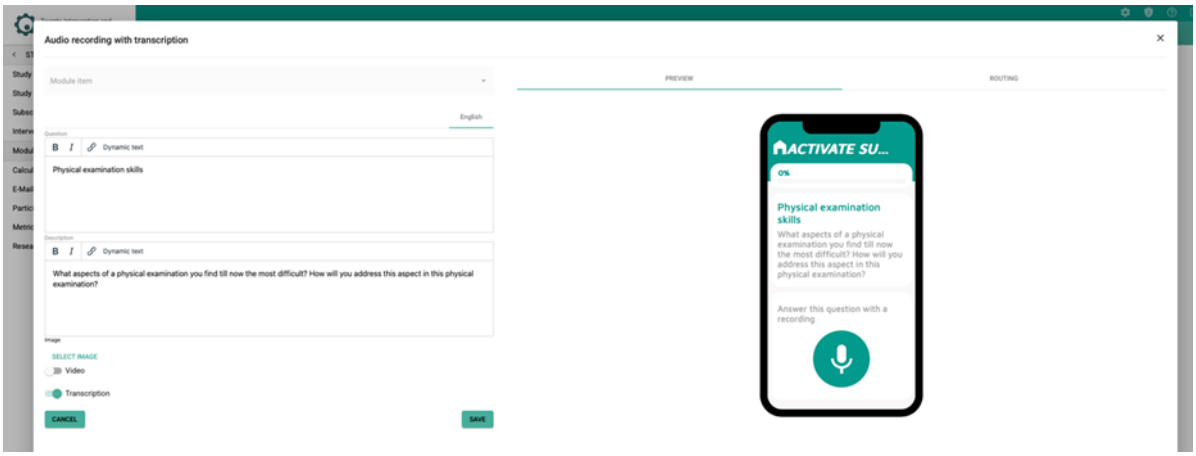


Figure 3 Audio recording module item with speech to text switch

If a participant submits an audio recording of this extended module type, the audio file (originally in .aac format) is converted to .mp3. Then, a record is created in the Database table `process_transcriptions`.

Endpoint: POST: v1/frontend/audio/{studyId}/{moduleId}/{moduleItemId}

A set of three connected scheduled commands (cron jobs) are responsible for the actual transcription.

The first one (INIT) sends the recordings with status `new` to the Data Processor:

```
php artisan app:init-transcription-service
```

The Data Processor service is a docker container running on the machine to provide services to other containers and applications. It is written in Python to allow the use of the extensive Python libraries to process data. The server is based on FastAPI[2]. The server API is exposed to external applications (like the TIIM API). Authorization is required with a "Bearer Token". At present the transcription service is provided by Amberscript. The Data Processor service provides endpoints to submit a speech audio/video file to Amberscript, to query the status of the transcription and to fetch the completed transcription.

The second command (POLL) checks every minute if the transcription is still processing or is finished:

```
php artisan app:poll-transcription-service
```

Finally, the last one (GET) gets the transcription when ready and stores it in the database in the `response_texts` table:

```
php artisan app:get-finished-transcriptions
```

Metrics page, exports and downloads

The text of a transcription becomes quite large so they are only visible in the CSV exports from the dashboard (where the `format` parameter controls the CSV to be either column or row based).

Endpoint: POST: v1/export/study/language/{lang}/metrics/{interventionId}/{format?}

In the metrics page and the PDF exports, only the filename of the audio recording is shown (as is the case for regular audio recordings).

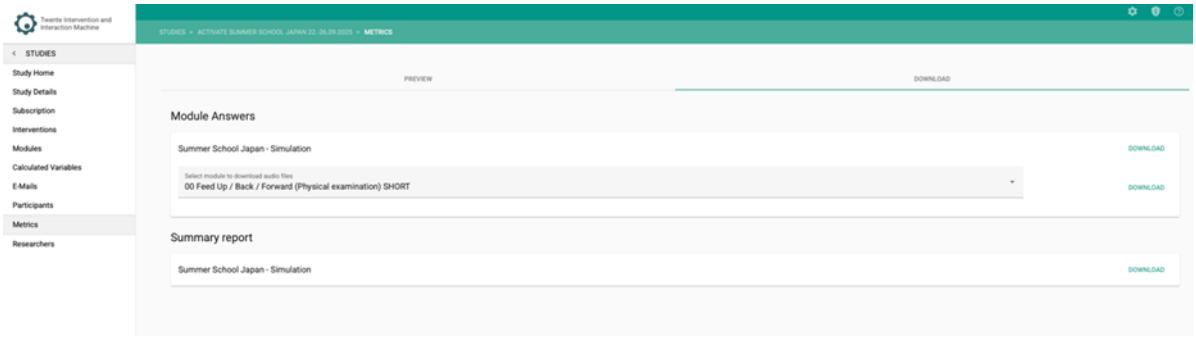


Figure 4. Download page

[2] https://fastapi.tiangolo.com/

E-Portfolio

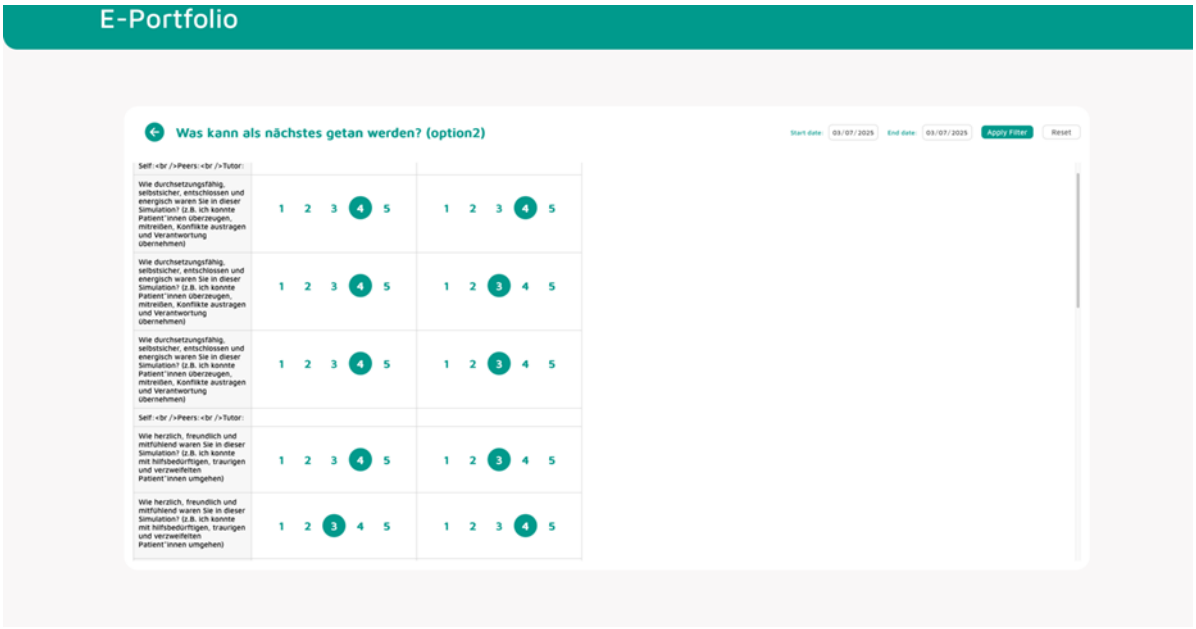


Figure 5. E-portfolio comparison view

The e-portfolio is a page in the app where participants can see all their answers for a study in a convenient layout. In the e-portfolio, the participants themselves can choose the way in which they would like to view the answers, one module at a time or several at the same time making it easy to compare, as shown in Figure 5. Here, the transcription will be shown.

Endpoint: GET: v1/frontend/eportfolio

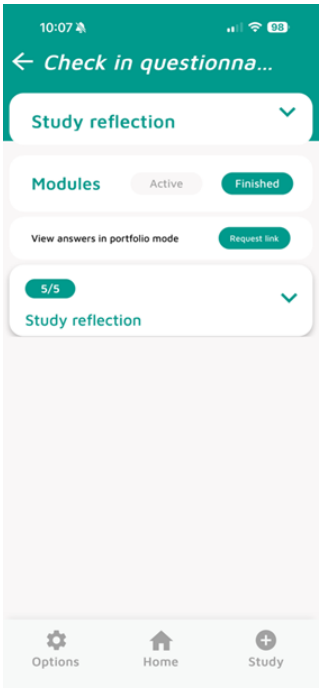


Figure 6. Requesting link

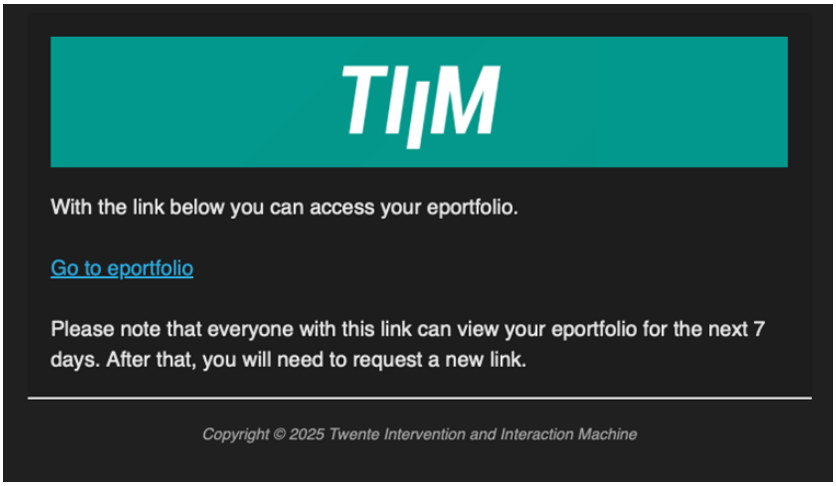


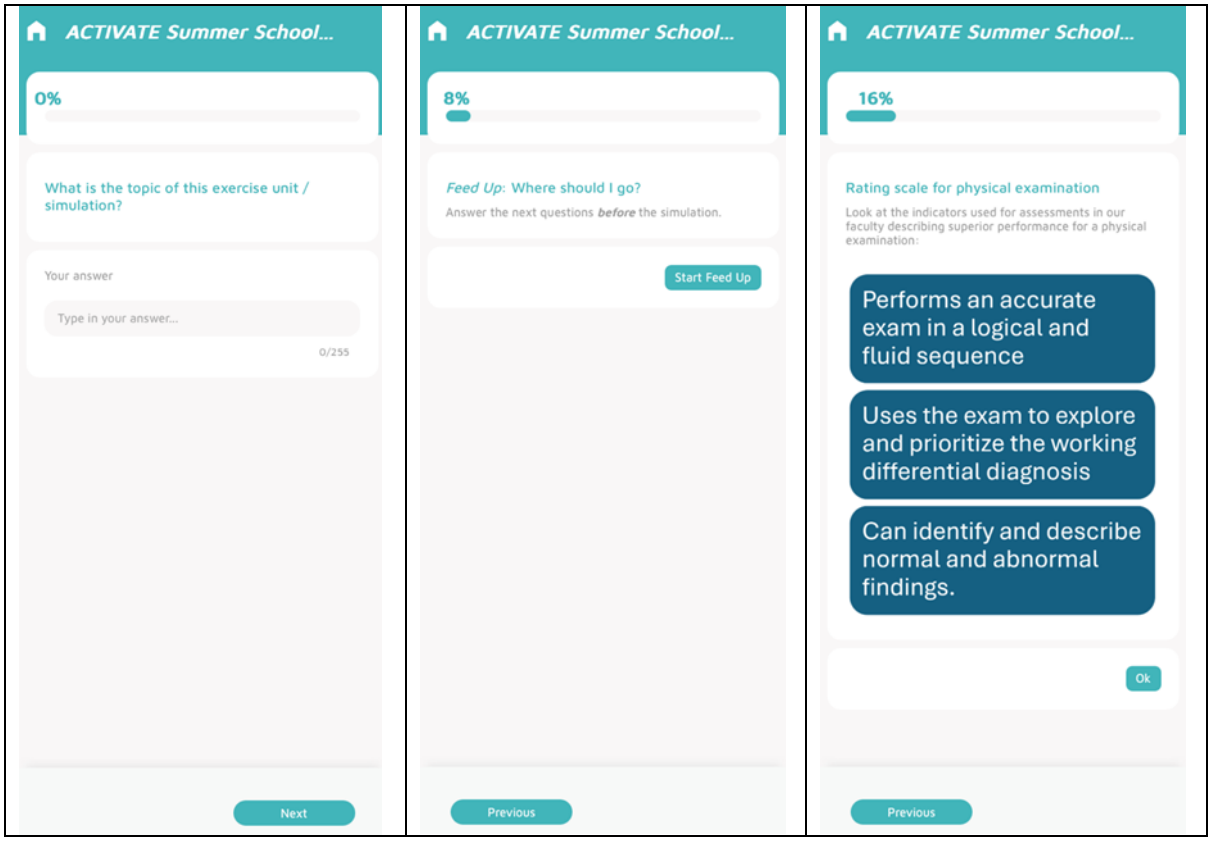
Figure 7. Email with link to the e-portfolio

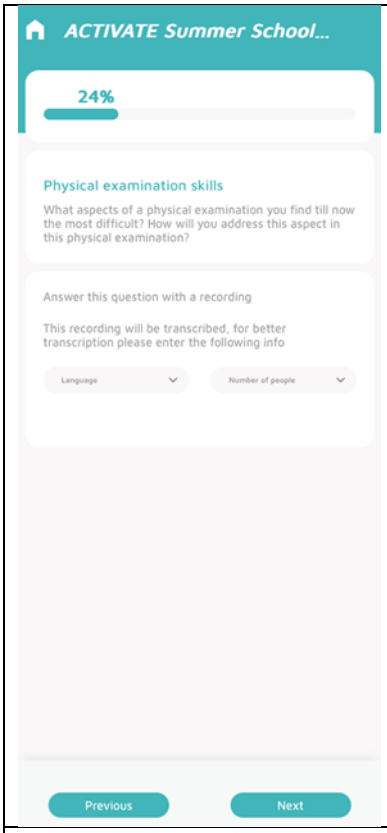
Endpoint: GET: v1/frontend/eportfolio/emaillink/{studyId}/{participantId}

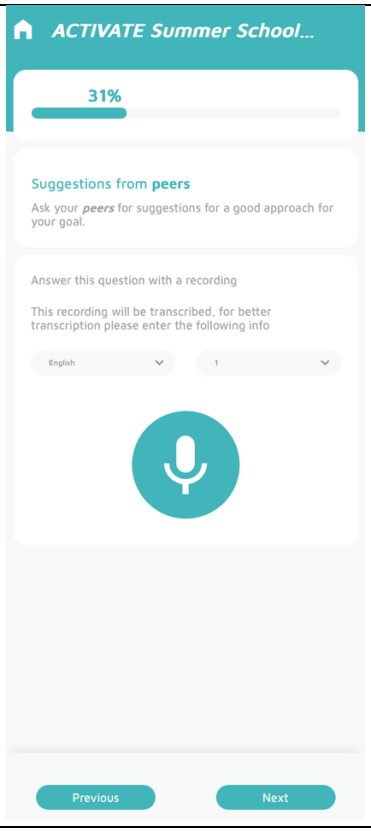
A participant can request a link to the e-portfolio page by clicking a button from within the app. A link to the e-portfolio is emailed to the participant. This link may be shared: everyone with the link can view the e-portfolio. However, such a link is only valid for 7 days. Multiple links can exist side by side.

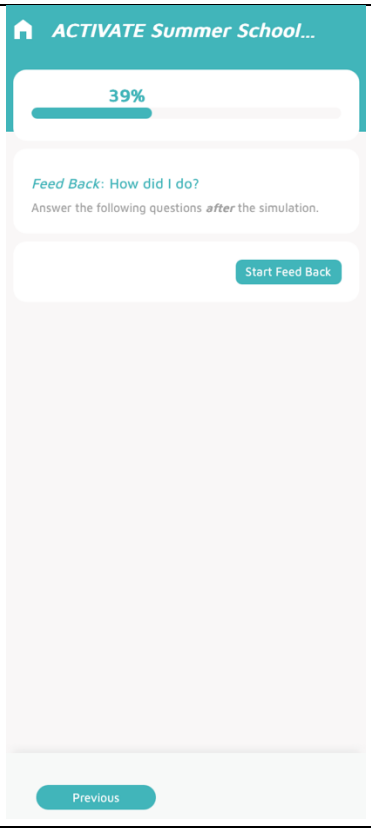
Appendix I - Questionnaire

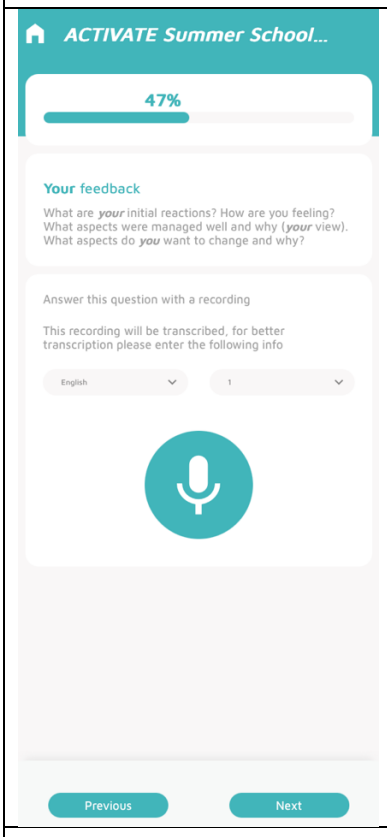
The new developments were used to create and share with students a questionnaire directing the “feed up” (before the simulation), feed back (after the simulation, focus on the just finished simulation) and feed forward (after the simulation, focus on learning goals) stages during the feedback session. The questionnaire that was used in a session with students can be seen below.

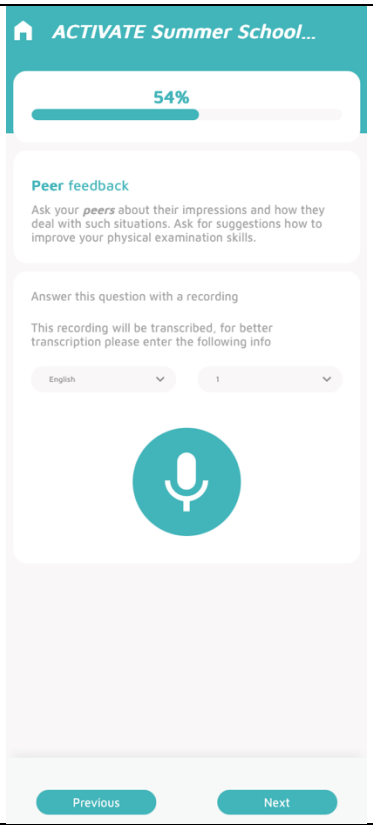


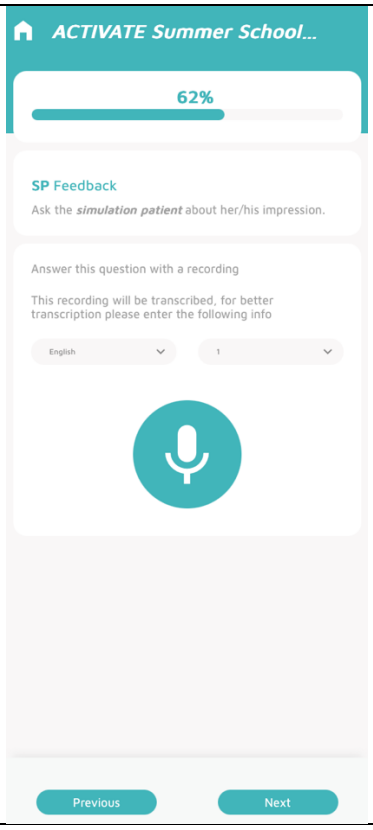

ACTIVATE Summer School...
24%
Physical examination skills
What aspects of a physical examination you find till now the most difficult? How will you address this aspect in this physical examination?
Answer this question with a recording
This recording will be transcribed, for better transcription please enter the following info
Language
Number of people
Previous
Next

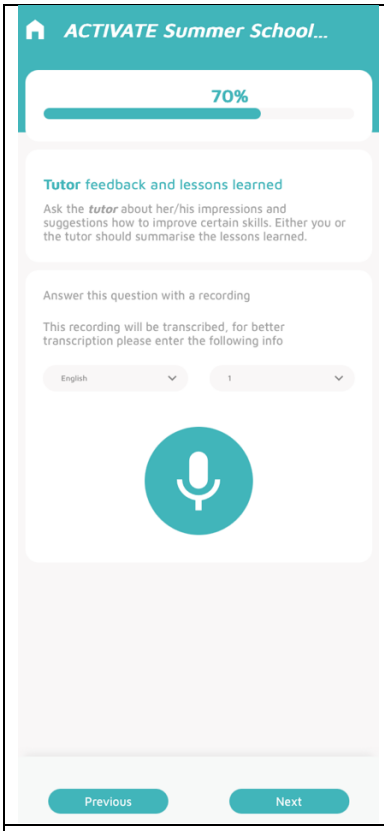

ACTIVATE Summer School...
31%
Suggestions from peers
Ask your peers for suggestions for a good approach for your goal.
Answer this question with a recording
This recording will be transcribed, for better transcription please enter the following info
English
1
Previous
Next

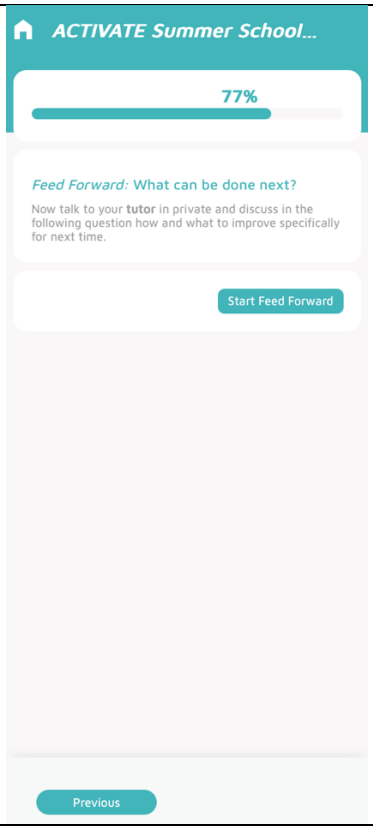

ACTIVATE Summer School...
39%
Feed Back: How did I do?
Answer the following questions after the simulation.
Start Feed Back
Previous

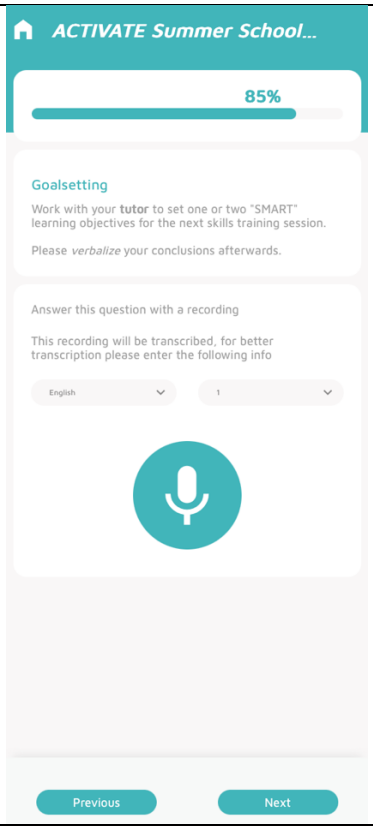

ACTIVATE Summer School...
47%
Your feedback
What are your initial reactions? How are you feeling? What aspects were managed well and why (your view). What aspects do you want to change and why?
Answer this question with a recording
This recording will be transcribed, for better transcription please enter the following info
English
1
Previous
Next

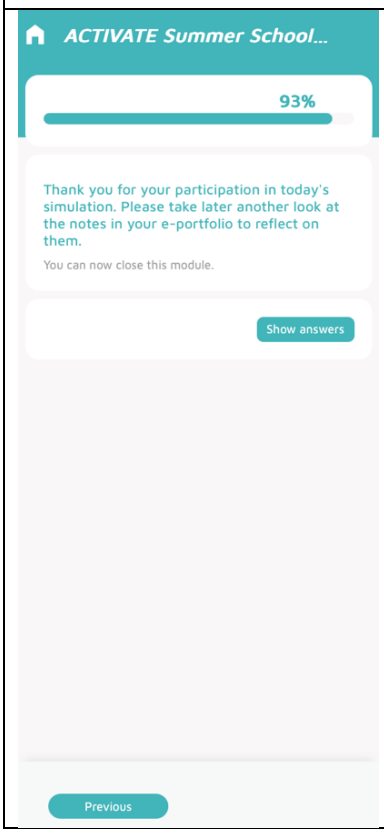

ACTIVATE Summer School...
54%
Peer feedback
Ask your peers about their impressions and how they deal with such situations. Ask for suggestions how to improve your physical examination skills.
Answer this question with a recording
This recording will be transcribed, for better transcription please enter the following info
English
1
Previous
Next


ACTIVATE Summer School...
62%
SP Feedback
Ask the simulation patient about her/his impression.
Answer this question with a recording
This recording will be transcribed, for better transcription please enter the following info
English
1
Previous
Next


ACTIVATE Summer School...
70%
Tutor feedback and lessons learned
Ask the tutor about her/his impressions and suggestions how to improve certain skills. Either you or the tutor should summarise the lessons learned.
Answer this question with a recording
This recording will be transcribed, for better transcription please enter the following info
English
1
Previous
Next


ACTIVATE Summer School...
77%
Feed Forward: What can be done next?
Now talk to your tutor in private and discuss in the following question how and what to improve specifically for next time.
Start Feed Forward
Previous


ACTIVATE Summer School...
85%
Goalsetting
Work with your tutor to set one or two "SMART" learning objectives for the next skills training session.
Please verbalize your conclusions afterwards.
Answer this question with a recording
This recording will be transcribed, for better transcription please enter the following info
English
1
Previous
Next


ACTIVATE Summer School...
93%
Thank you for your participation in today's simulation. Please take later another look at the notes in your e-portfolio to reflect on them.
You can now close this module.
Show answers
Previous

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