Project Number: 2014-1-ES01-KA202-004533
Project Title: "Online Vocational Training course on ergonomics for orthopaedic Minimally Invasive Surgery"

INTELLECTUAL OUTPUT 5

Pilot test report

Prepared by:

Partner	Name	Date
CCMIJU	José Luis Moyano	31/08/2017

Content

1. Introduction

This deliverable presents the methodology and results obtained for the pilot tests carried out to validate the Train4Orthomis course.

This information will be used to revise the English course and assure its adequacy to the project objectives, before translating the definitive contents to the rest of languages.

In addition, the work performed to treat the results and extract worthy information to improve the e-learning course prototype and contents/materials will be reported in this deliverable.

The objective of IO5 was the conduction of a pilot course to test and analyse the performance of the new e-learning course in English, and thus to propose improvements to maximize the pedagogical, its adequacy to satisfy the needs detected in WP1 for both target groups (laparoscopic surgeons and instrument designers).

The course was conducted in an international scenario (English).

The Train4Orthomis course has counted on the help of two figures supporting, assisting, motivating and encouraging students along the course. The pedagogic experts supervised them during the development of the course:

(1)   Facilitator (CCMIJU, KOMAG, SUT) – They were responsible for the follow up of students, and resolved any issue related to the coordination of the course.

(2)   Tutors (IBV, CCMIJU, KOMAG, BGU-MURNAU) – As experts in contents, they resolved any issue related to contents of the course. They were responsible for the evaluation of the students.

2. Pilot test methodology

Next stages were followed during the pilot testing period:

- Preparation of the course structure and definition of the profile of tutor and facilitator profiles;

- Preparation of tests and trials calendar;

- Recruitment of participants;

- Testing Period (approximately 2 months). During this testing period, the participants performed the online course. Checkpoints were established after each module. At these checkpoints, the pilot users were asked to complete a questionnaire to assess contents, format and other aspects. The users had the opportunity to contact with different partners through the online course resources (e-mail and chat) to solve doubts or make suggestions for improvement. Administrators maintained contact with the users through the tool, suggesting activities or answering specific questions.

- Treatment of the gathered information. After the trial period, the data collected both from questionnaires and from open questions were compiled and analysed. Based on the specific improvement proposals received, the course also suffered specific modifications.

2.1. Tests preparation and calendar

The general procedure of the tests / steps are the following:

1. Recruitment of members (name, profession, company, e-mail)
2. Sending to the users the goals and procedure of the pilot tests
3. Start of the course (10/10/2016)
4. Testing period. Including:
    a. Contacts with users and solution of doubts.
    b. Follow up of the user's progress (assessments and achieved level of activities and use of resources).
    c. Checkpoints (questionnaire) at the end of each module.
    d. Final assessment of the course.
    e. End of the pilot test / Analysis of the results (questionnaires and open questions).
5. End of the course (30/11/2016)

Due to number of the participants in the first test were reduced, the course were open again in a second period to increment the number of the participants. This second test started on 06/06/2017 and finished on 26/06/2017 with the final exam. The results of the second test were joined with the results of the first test.

The pilot tests involve two profiles of the orthopaedic surgeons: spine surgeons and hip surgeons. Module 1 and Module 4 are common for both specialities, Module 2 is specific for the hip surgeons and Module 3 is specific for the spine surgeons. Table 1 summarizes the modules performed by both profiles.

COURSE OF HIP SURGEONS	COURSE OF SPINE SURGEONS

<table>
<tr><td colspan="2">

MODULE I – INTRODUCTION TO THE ERGONOMICS IN MIS

- **Session 1: Ergonomics: concept, fields of application in surgery and problems related with lack of ergonomics**
- **Session 2: Ergonomics studies and technologies in MIS**
- **Session 3: Ergonomics guidelines for orthopaedic surgery**

</td></tr>
<tr><td>

MODULE II – ERGONOMICS IN HIP SURGERY

- **Session 1: Introduction to hip surgical procedures**
- **Session 2: Ergonomic considerations for total hip replacement (THR) of traditional approach**
- **Session 3: Ergonomic considerations for total hip replacement of minimally invasive surgery**
- **Session 4: New surgical approaches, tools and technologies**

</td><td>

MODULE III – ERGONOMICS IN SPINE SURGERY

- **Session 1 & 2: Introduction to spine surgical procedures and ergonomic considerations for minimally invasive dorsal stabilization**
- **Sessions 3 & 4: Ergonomic considerations for minimally invasive dorsal stabilization**

</td></tr>
<tr><td colspan="2">

MODULE IV – CASE STUDIES

- **Session 1: Operating room setting and environment conditions in hip surgery**
- **Session 2: Operating room setting and environment conditions in spine surgery**

</td></tr>
</table>

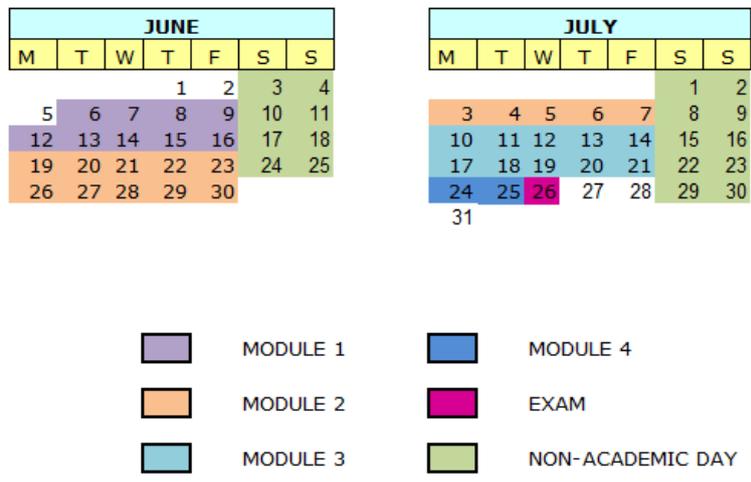**Table 1** Train4Orthomis courses structure

Calendars

TRAIN4ORTHOMIS: ONLINE VOCATIONAL TRAINING COURSE ON ERGONOMICS FOR ORTHOPAEDIC MINIMALLY INVASIVE SURGERY
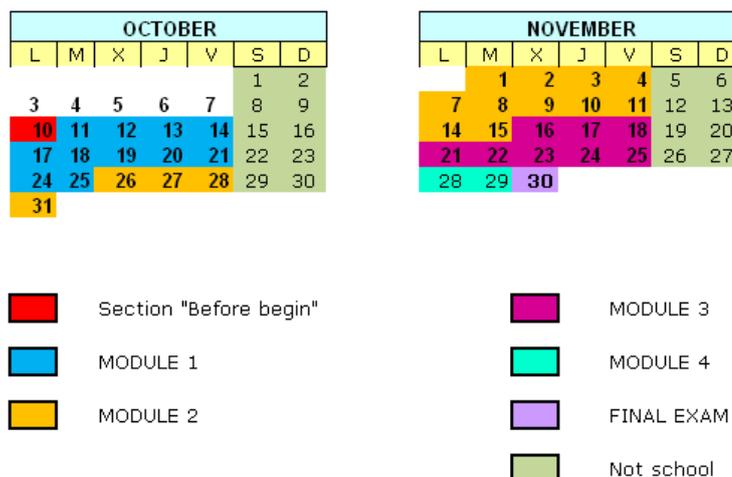
The final exam of the first test was extended until 30th November because there were users who in the original period could not complete the entire course.

The second test:

	JUNE									JULY					

Calendar legend:
- MODULE 1
- MODULE 2
- MODULE 3
- MODULE 4
- EXAM
- NON-ACADEMIC DAY

2.2. Users recruitment / profile

A total of 82 users were enrolled in the pilot course of Train4Orthomis Project, of which 52 were orthopaedic surgeons, and 30 other professionals and students. Of them all, 32 users fulfilled all the questionnaires in an adequate manner.

Table 2 Pilot users of the Train4Orthomis courses

Description of the participants
The participants were active professionals in orthopaedic surgery and students ((Figure 1).
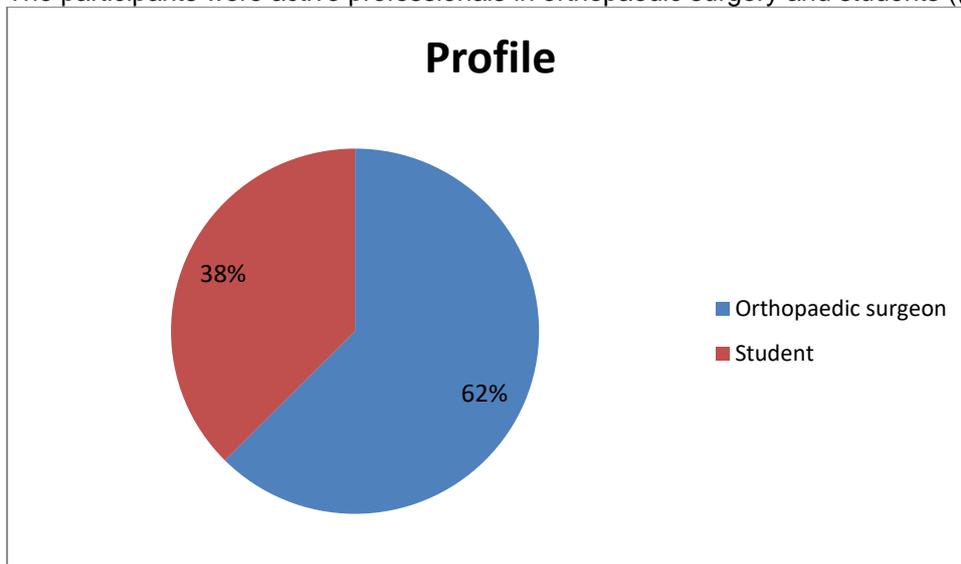

Figure 1 **Professions of the pilot users**

The participants of the course were mainly female. Mean age of participants was 31.63 year, with a range between 20-49 years.

2.3. Roles of the partners

The roles developed by the partners are the following (Table 3):

Partners	Role
IBV (Spain)	Tutoring of the pilot course from industrial perspective. Recruitment of trainees with surgeon and student profile. Facilitator of the Train4orthomis pilot course in Spain.
CCMIJU (Spain)	Tutoring of the pilot course from surgeons' perspective. Recruitment of trainees with surgeon profile and facilitation of the Train4orthomis pilot course in Spain. Leading the analysis of results and adaptation of the contents according to the recommendations.
KOMAG (Poland)	Recruitment of trainees and facilitation of the Train4orthomis pilot course in Poland. Adaptation of the contents according to the recommendations.
SUT (Poland)	Recruitment of trainees and facilitation of the Train4orthomis pilot course in Poland. Contributions to the analysis of results from facilitators' point of view. Adaptation of the contents according to the recommendations.
BGU-MURNAU (Germany)	Recruitment of trainees and facilitation of the Train4Orthomis pilot course in Germany. Tutoring of the pilot course from surgeons' perspective.

Table 3 Roles developed by the partners

3. Pilot test results

During the duration of both pilot courses, two types of information was gathered:

- Quantitative information from answers to the specific closed questions of the questionnaires

- Qualitative information from the open questions of the questionnaires (answers, opinions and comments from the students)

In the following pages, main results obtained will be presented. The analysis was based on the following structure (Figure 2):
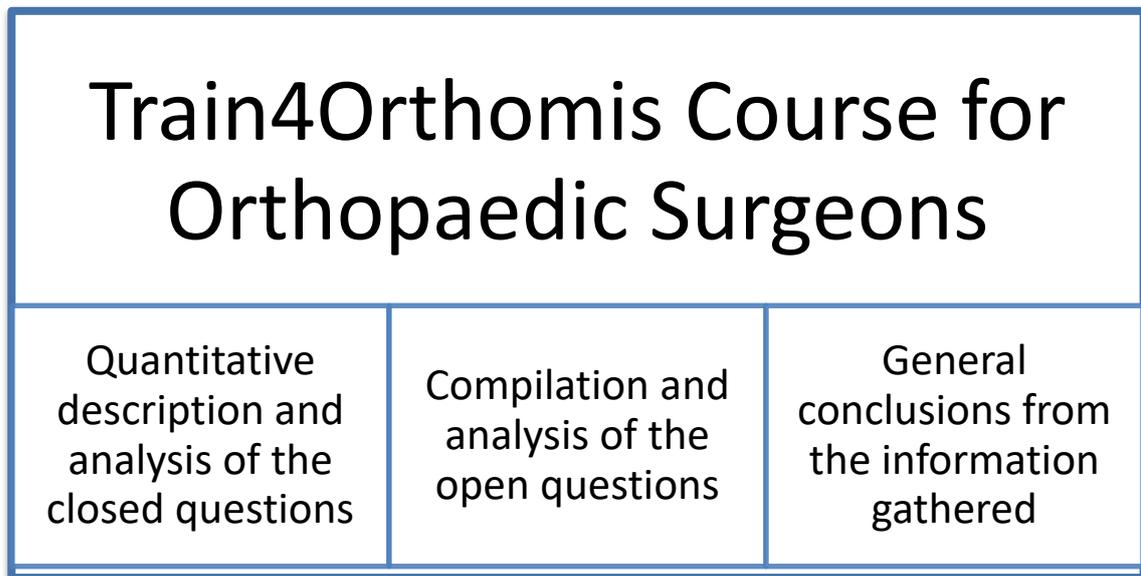

Figure 2 Scheme of the results

3.1.1. Quantitative analysis

92 questionnaires were collected during the testing period. The number of questionnaires received was determined by the number of sessions considered in each module. In the Figure 5, the percentage of questionnaires per module regarding the total of questionnaires is presented. Module 1, composed by four sessions, is the module with more questionnaires answered, while Module 4, composed by a single session, obtained less questionnaires answered.
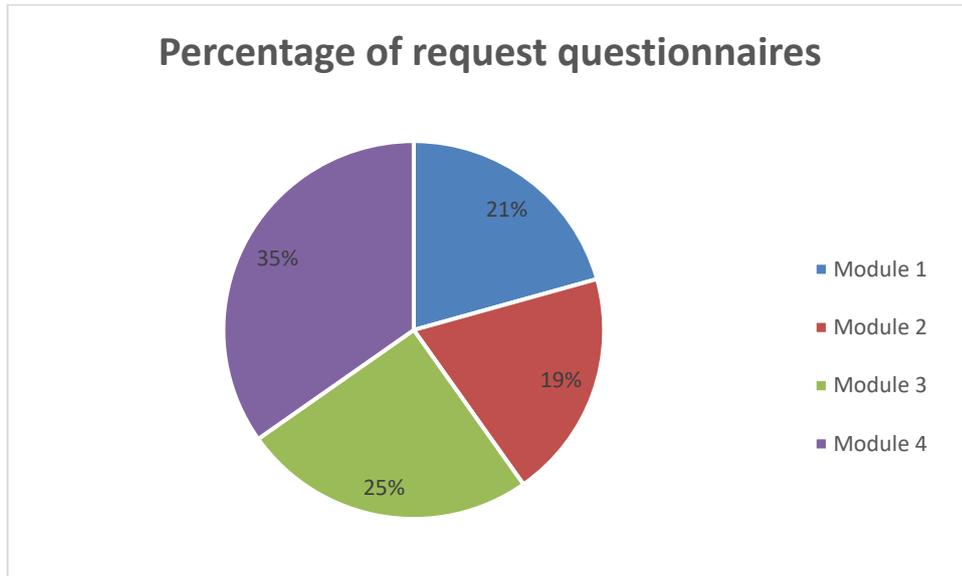
Percentage of request questionnaires

21% Module 1
19% Module 2
25% Module 3
35% Module 4

Figure 3 **Percentage of request questionnaires**

Evaluation of the platform

The questionnaire included a first block of 4 questions with the objective of evaluate the platform. These questions are a 5-point Likert scale (from "strongly disagree"-1 to "strongly agree"-5). The main objective was to assess the opinion (of the user) concerning the online environment once completed the course.

4 closed questions were followed by 1 open question intended to assess the general comments, positive and negative aspects of the platform. The answers of the open question were analysed with the qualitative analysis.

The average scores of these 4 questions are shown in the Figure 4. In general, the surgeons value with a good score all aspect of the platform, with a minimum value of the 4.08 out of 5 for the graphical aspect.

Aspect of the platform

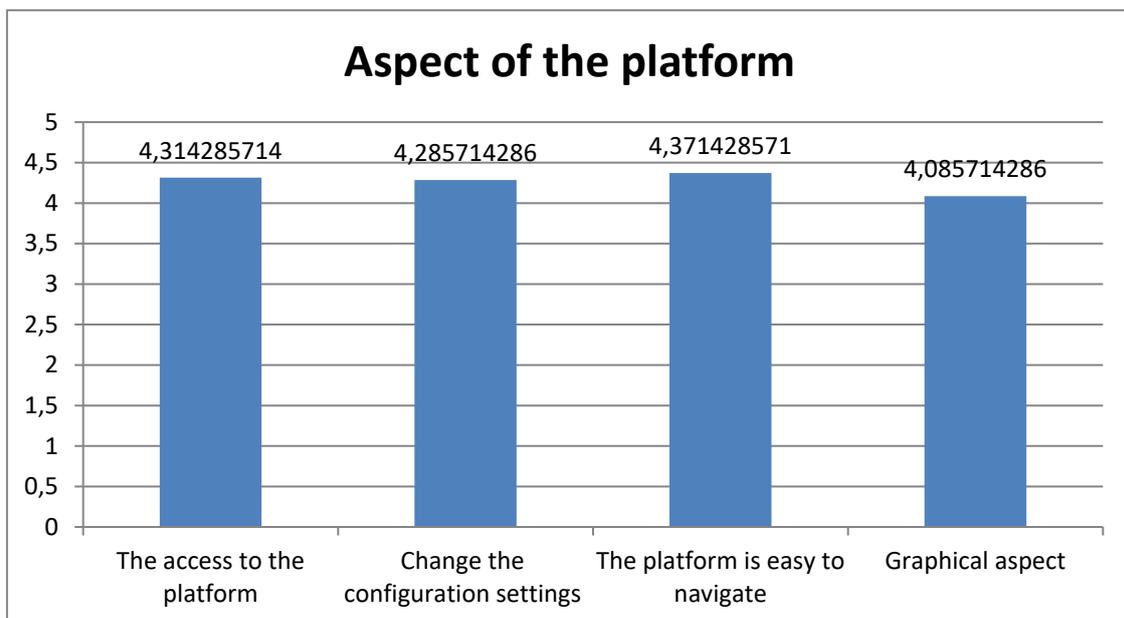| The access to the platform	Change the configuration settings	The platform is easy to navigate	Graphical aspect
4,314285714	4,285714286	4,371428571	4,085714286

Figure 4 Average scores by general aspects about the platform

1. *Access to the platform and to the course (register, login)*

This question evaluates the easiness of the first step of the online learning process. The initial step is the registration in the course and login. In the subsequent sessions, only the login is necessary.

The majority of users (88%) consider that these processes are easy, and the 3% of the users think that the access to the platform is standard. Only 9% do not thought that the access or login to the platform is easy.
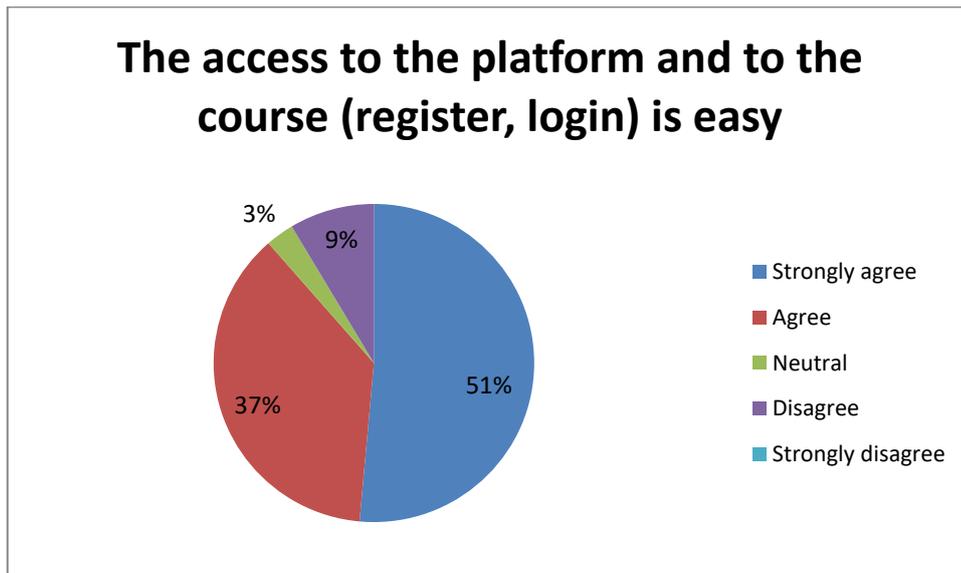
The access to the platform and to the course (register, login) is easy

- ■ Strongly agree
- ■ Agree
- ■ Neutral
- ■ Disagree
- ■ Strongly disagree

51%, 37%, 3%, 9%

Figure 5 Distribution of the easiness of access to the platform and course

2. *Change the configuration settings (language, password, profile)*

The second question evaluates the easiness of configuring basic settings of the platform (change the language, access to the personal profile, change the password, etc.).

The majority of users (91%) consider that **changing the configuration settings is easy** (Figure 6). The 9% of users manifest a neutral opinion. In this case any negative opinion was received.
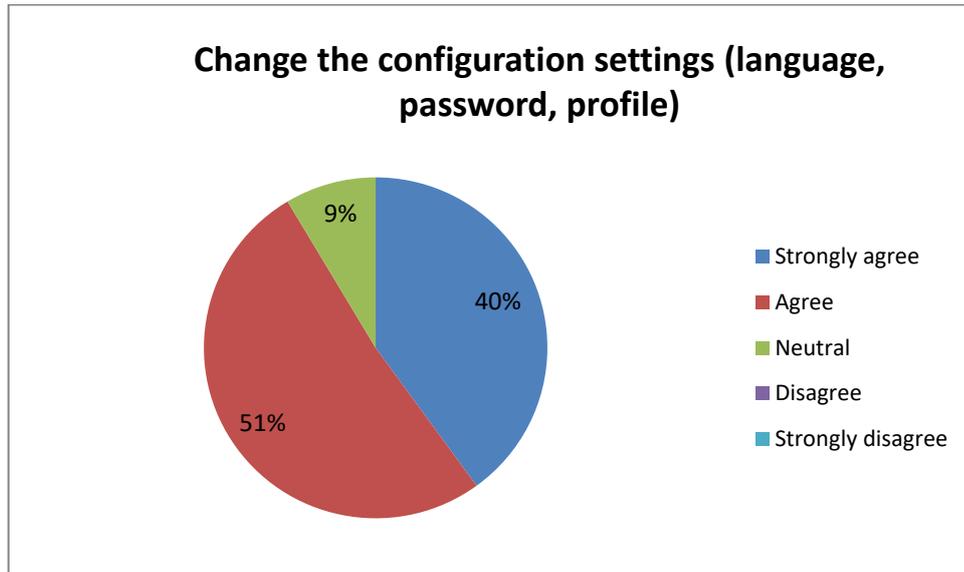
Change the configuration settings (language, password, profile)

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

40%

51%

9%

Figure 6 Distribution of the easiness of change of the configuration settings

3. *Platform is easy to navigate*

The third question is about the navigation through the online platform, focusing on the most common activities that the student must accomplish during the training process: access to the didactic units, consult the information, read the messages, participate in forums, perform the activities and self-evaluations, etc.

The 88% of the users consider that platform is easy to navigate. 9% manifest a neutral opinion and only the 3% of the user consider that the platform is not easy to navigate.
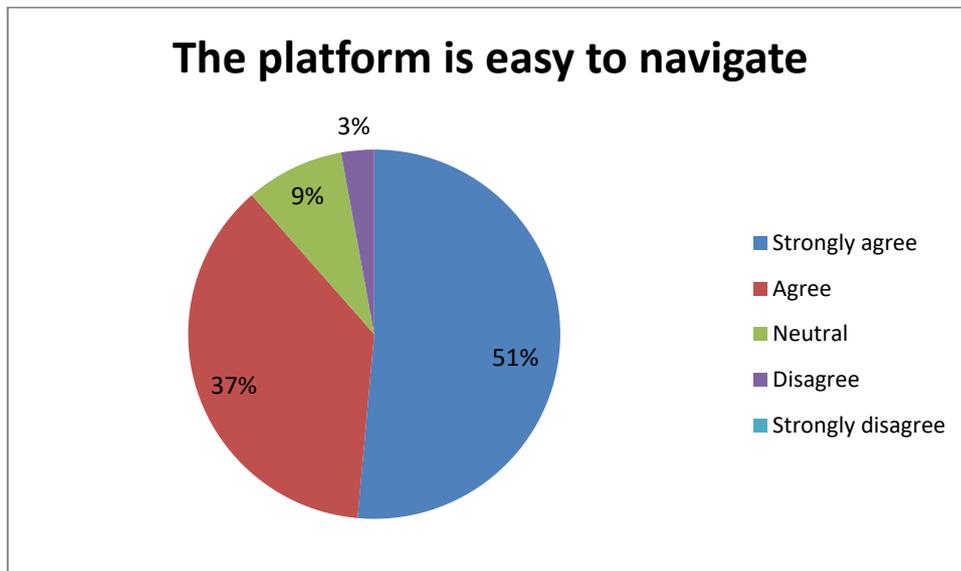

The platform is easy to navigate

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

3%

9%

51%

37%

Figure 7 Distribution of the intuitive navigation of the platform

4. Graphical aspect and the overall layout of the platform

This question is related to the aesthetics and the distribution of elements within the platform (colours, fonts, icons, etc.), while layout is related to the distribution of the elements of the platform.

After analysing the result, the users positively rate the aesthetics and layout of the platform (80%). Only the 6% of the users provide a negative answer about this aspect.
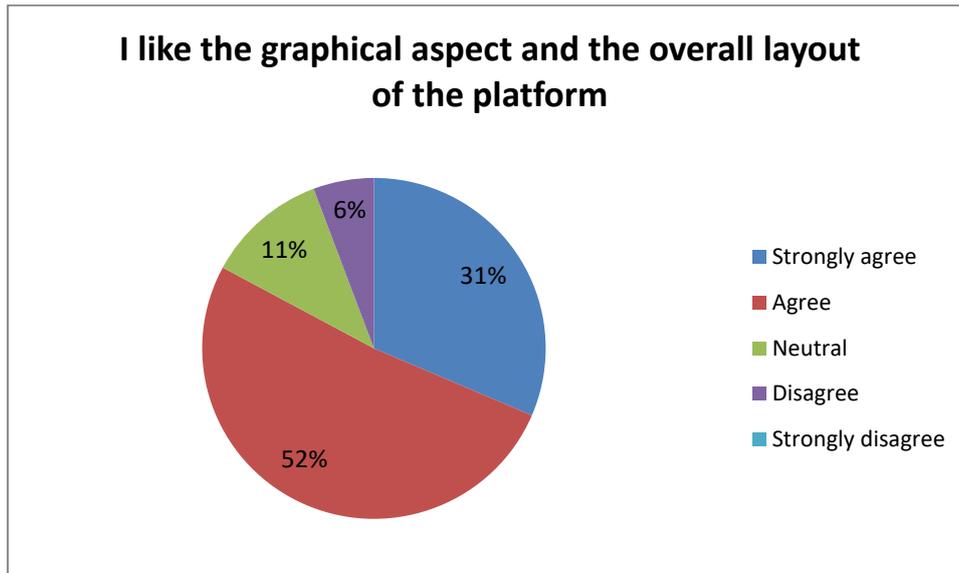

Figure 8 Distribution of the graphical aspect and overall layout of the platform

Evaluation of the contents

With regard to the content, a second block of 6 questions was designed, which must be answered using a 5-point Likert scale (from "strongly disagree"-1 to "strongly agree"-5) to evaluate each session of the 4 modules of the course.

In addition to the 6 closed questions, the opinion of the user in an open question was requested. The analysis of this question will be performed in the open question section.

All aspects assessed about contents for all module have got good scores (Figure 9), with a minimum score of 4.17 out of 5, and being the best scored features the technical quality of the contents (4.40 out of 5).
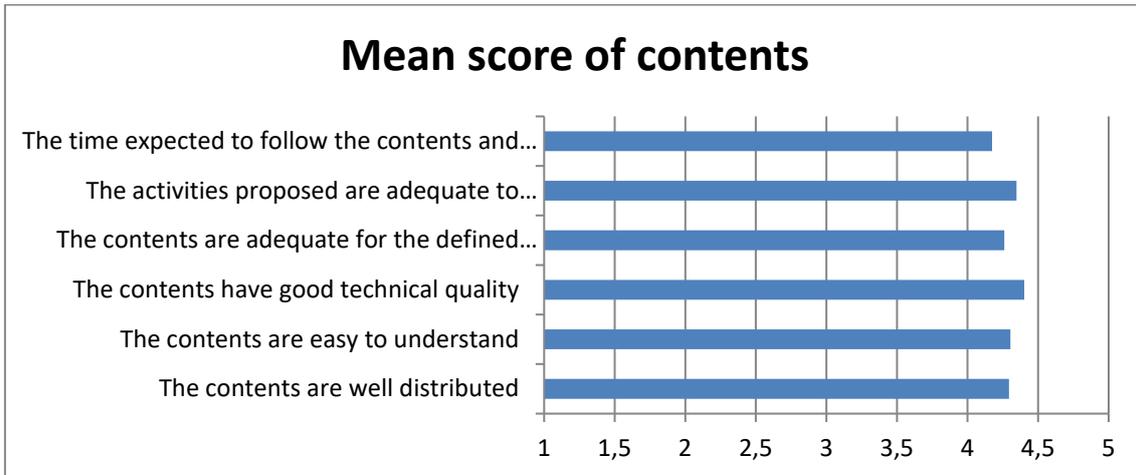
Figure 9 Average by contents questions

The results obtained for questions and modules will be explained in the next section.

1. *The contents are well distributed*

This question aims to determine if user considers the contents included in the course well distributed and organized.

The organization of contents is valued with an average score of 4.29 out of 5. In this item, the module 1 and 3 are the best rated, in which more than 90% of users consider that contents are well distributed. Module 2 is the worst rated, but the 77% users agree or strongly agree with this aspect. Any negative answer were received, except in the module 4, where only 5% of the users consider that the contents are not well distributed.
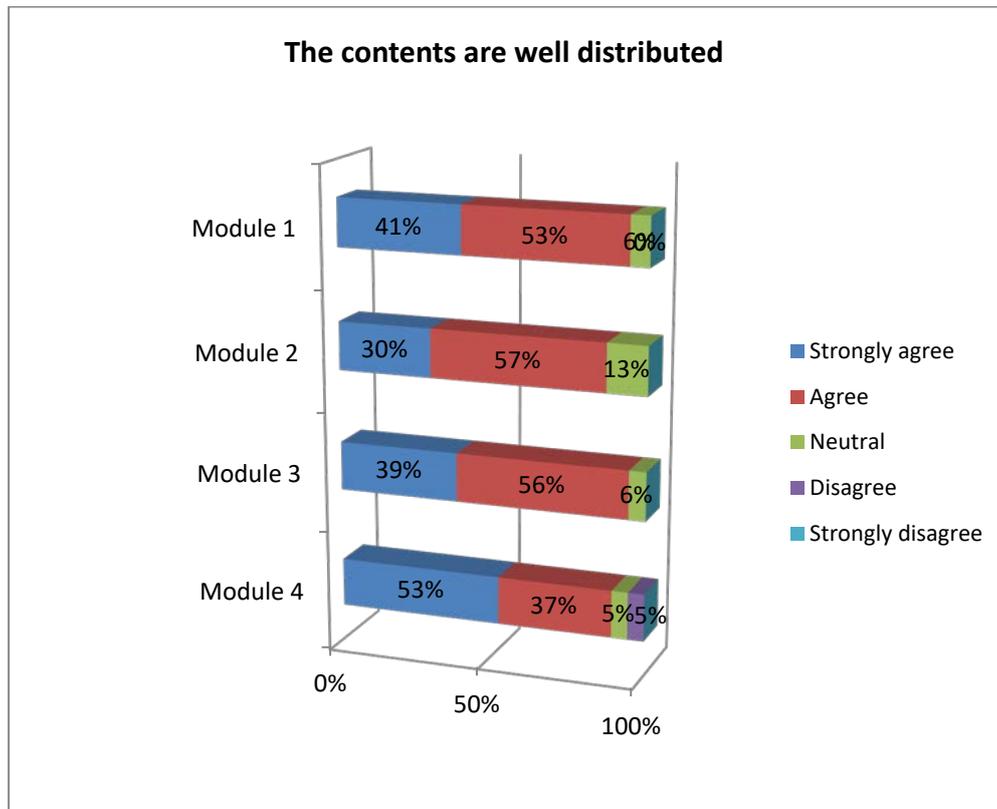
The contents are well distributed

Module	Strongly agree	Agree	Neutral
Module 1	41%	53%	6%0%
Module 2	30%	57%	13%
Module 3	39%	56%	6%
Module 4	53%	37%	5%5%

Figure 10 Distribution of the updated contents (per module)

2. The contents are easy to understand

In an online course, it is crucial that the course contents are easy to understand, because the training will be more effective.

These easy-to-understand contents are well rated by users (4.25 average score). Module 2 is the best rated with 96% users agree or strongly agree with this aspect. The module 4 has got the lowest score with 11% of neutral and 5% of disagree opinions.
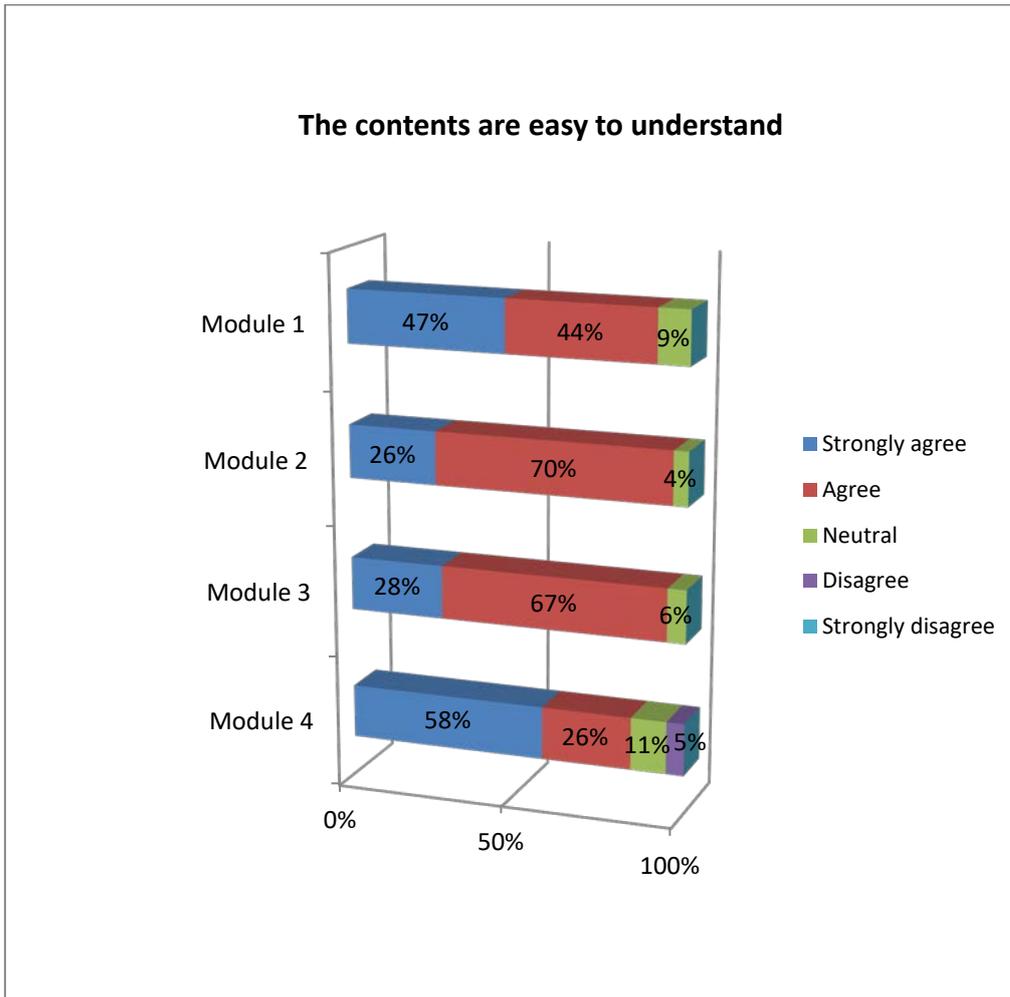
The contents are easy to understand

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Module 1	47%	44%	9%		
Module 2	26%	70%	4%		
Module 3	28%	67%	6%		
Module 4	58%	26%	11%	5%	

Figure 11 Distribution of the easiness to understand contents (per module)

3. The contents have good technical quality

The third question is crucial in order to perceive the users' opinion about the developed materials. Users were asked to assess the quality of the contents related to the technical aspects.

Technical quality of the contents is the best valued aspect with a mean score of 4.40 out of 5 (Figure 9). Module 2 obtains the best rating, in which the 96% users consider the contents have good technical quality. The worst score is obtained for the module 4, but only 5% of the users rate a negative opinion about contents of this module. **The other modules do not obtained any negative opinion.**
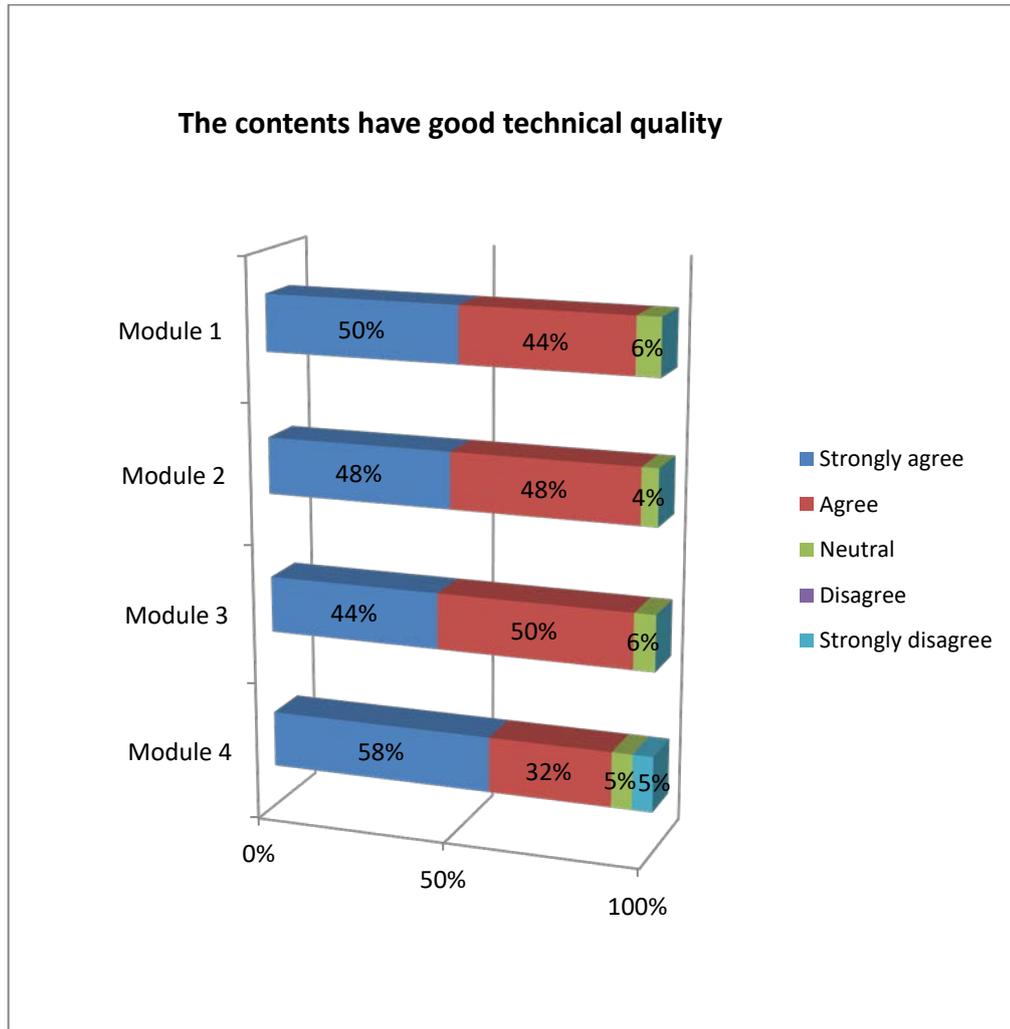
The contents have good technical quality

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Module 1	50%	44%	6%		
Module 2	48%	48%	4%		
Module 3	44%	50%	6%		
Module 4	58%	32%	5%		5%

Figure 12 Distribution of the technical quality of contents (per module)

4. The contents are adequate for the defined target user

The objective of this question is to know the opinion of users about the adequacy of training contents from a professional point of view.

Regarding the adequacy of the contents to orthopaedic surgeon, this aspect receives an average score of 4.26 (Figure 9). In this case, the module 1 is the module that has got the best score with 97% of questionnaires scored as agree or strongly agree. Module 2 is the module with worst score, nonetheless more than 80% of users consider this aspect as adequate or very adequate.
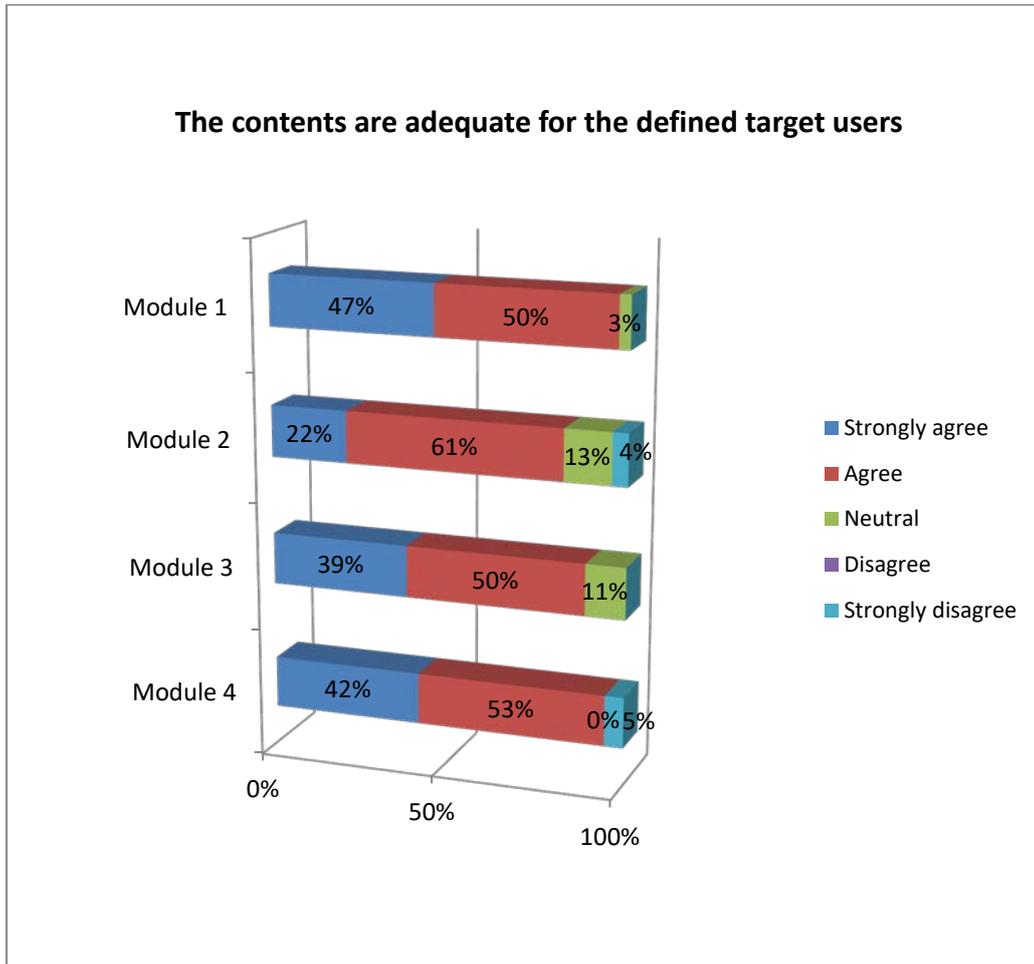
Figure 13 Distribution of the realistic and relevant contents (per module)

5. *The activities proposed are adequate to consolidate the acquired knowledge*

This question is related to the activities included in the modules to test their usefulness to consolidate the acquired knowledge.

The adequacy of the proposed activities to consolidate the acquired knowledge is rated with 4.34 on average. Module 1 is the best rated module, with all cases answered as agree or strongly agree. Module 4 received the lowest score, with 11% of neutral opinions and 11% of disagree opinions.
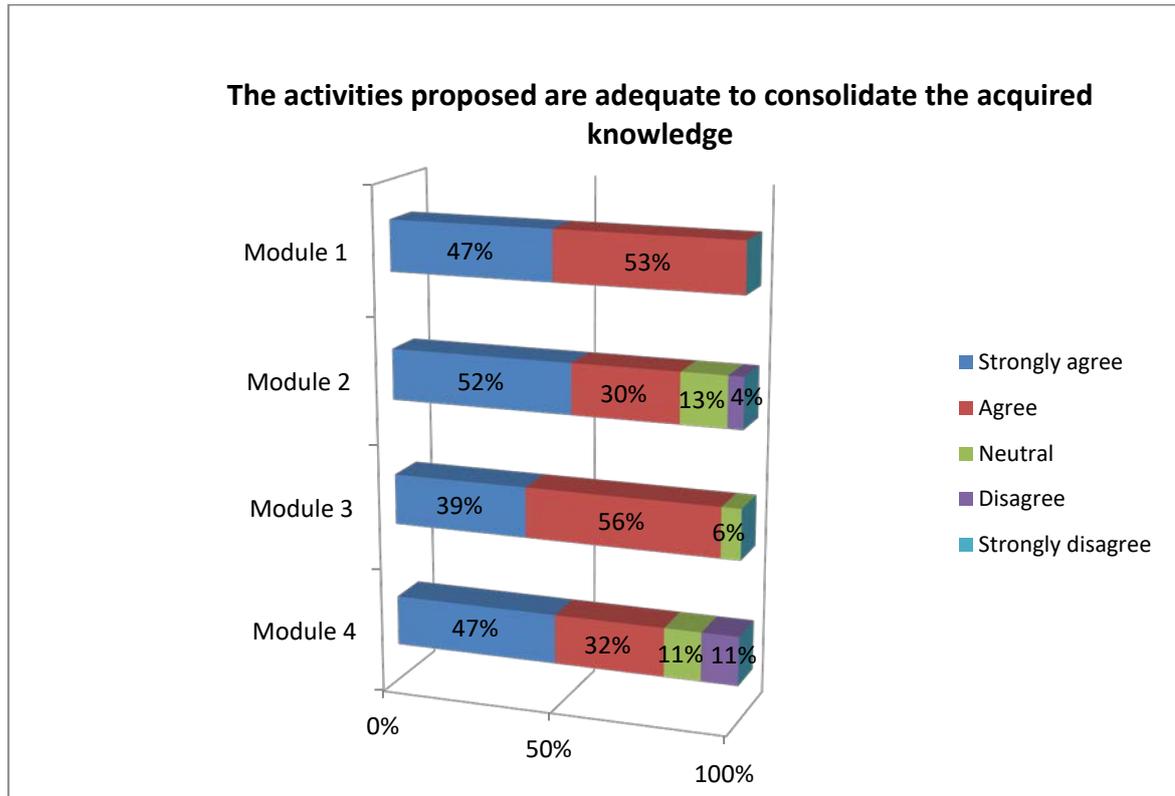
The activities proposed are adequate to consolidate the acquired knowledge

Module 1	47% 53%
Module 2	52% 30% 13% 4%
Module 3	39% 56% 6%
Module 4	47% 32% 11% 11%

Legend:
- ■ Strongly agree
- ■ Agree
- ■ Neutral
- ■ Disagree
- ■ Strongly disagree

0%   50%   100%

Figure 14   Distribution of the adequate activities to consolidate the knowledge (per module)

6. *The time expected to follow the contents and perform the activities*

The last question was directly related to the learning process. One of the key aspects of the learning process is to have enough time to read, study and practice and, therefore, to assimilate the contents of the course.

This aspect has got an average score of 4.17 (Figure 9). Module 1 and Module 3 are the best rated modules, with 88% and 89% of questionnaires respectively scored as agree or strongly agree. Module 2 receives the lowest score, with 13% of neutral opinions received and 4% of disagree opinions. However, at least the 82% of the user considers this aspect as agree or strongly agree for all modules.
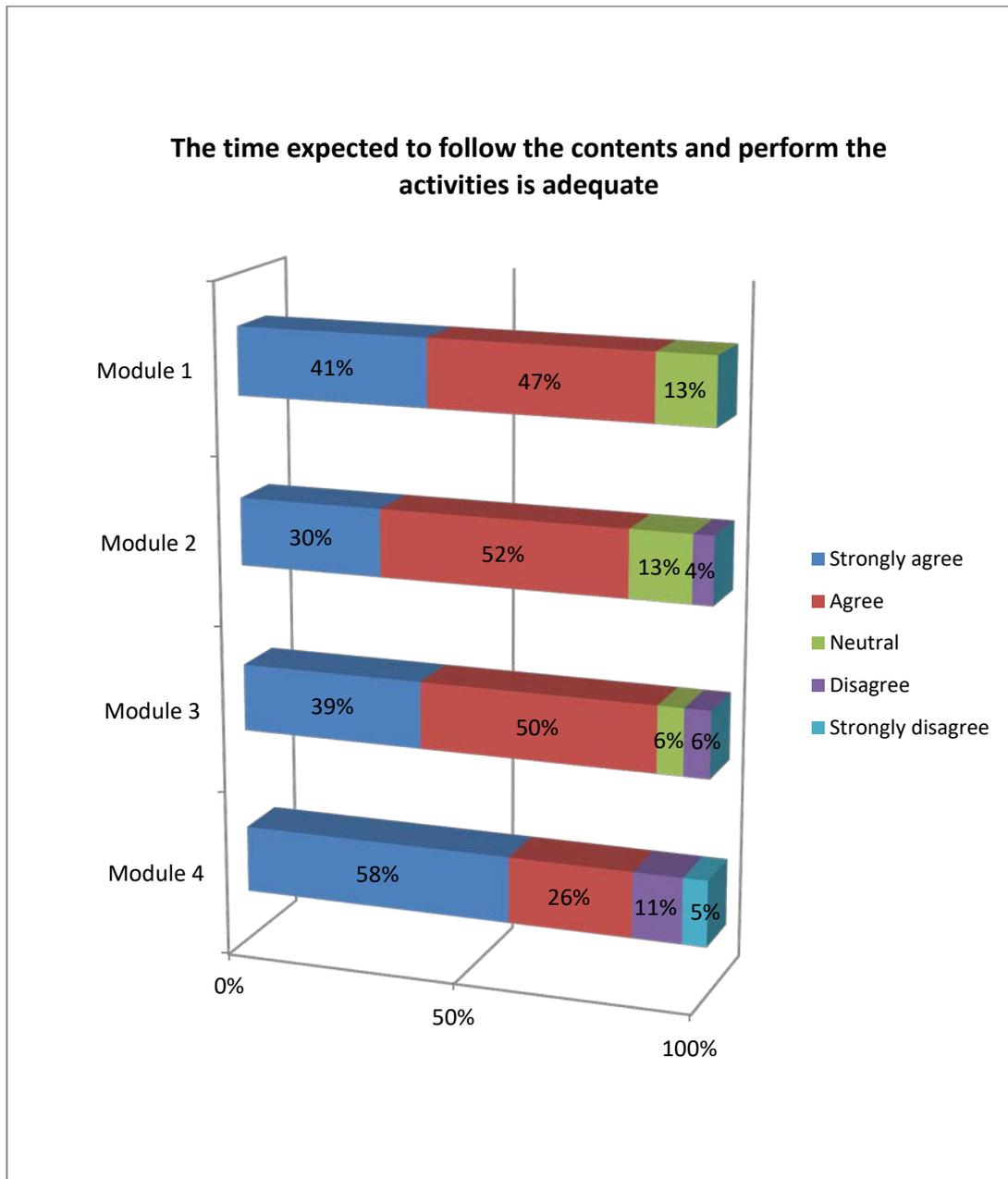
The time expected to follow the contents and perform the activities is adequate

Module	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Module 1	41%	47%	13%		
Module 2	30%	52%	13%	4%	
Module 3	39%	50%	6%	6%	
Module 4	58%	26%		11%	5%

Figure 15 **Distribution of the time of the contents and activities (per module)**

3.1.2. Qualitative analysis (open questions)

This section details the open comments and suggestions received during the pilot course:

ONLINE PLATFORM

Positive aspects	*Weaknesses and improvements*
• The organization of the contents in the platform	• I could not select thehip module. I had to study all modules, including spine. I declared only hip surgery.
• The contents and the videos	• I had problems with finding login window. Much information on the platform is in Spanish.
• The structure of the course is clear	• The graphic form of the platform is not very attractive. Navigation is not intuitive.
• I really like the layout of this course. The background and the effects stimulate and catch one's attention. As a result of the layout, I think a more efficient way of learning is enabled.	• The translation is sometimes awkward
• Graphical feature	• In Module 3 the bar at the bottom, which displays one's progress in percent, does not work
• Pictures and many graphics.	• Size of texts differs on start page, makes navigation sometimes inconvenient
• The sessions are easy to understand, because of the illustrative pictures. The activities are good to remember the content of the sessions.	• Can´t contact with tutor
• The units are designed comprehensible with many pictures.	• The evaluation is very extensive
• The big amount of activities.	• Small mistakes and some pages are doubly arranged
• Easy access and available for all platforms	• The visual aspect
• The graphics and descriptions and the clear contents	• You can get back to the page telling you that it is not possible to enroll yourself to a Course, even if you are already enrolled
• The simplicity and easy to use	• Sometimes hard to navigate on the page

Table 4 Positive aspects, weaknesses and improvements of the platform

CONTENTS ABOUT TRAINING SESSIONS

	Positive aspects	*Weaknesses and improvements*
M1_S1	• All contents are attractive	
M1_S2	• All contents are attractive	
M2_S1		• Mistake in the question 5 • The Video in Session could use some Sound, otherwise it seems extremely lifeless. • Some Questions in the activities have the wrong answers attached. • Some parts are repeated several times
M2_S2		• Needless next page button and turn back.
M2_S3		• Mistake in the question 5 • Some Questions in the activities have the wrong answers attached.
M2_S4		• Mistake in the question 7
M3_S1		• Why are there movie Icons on the left side of the bottom? Are they intended to open the movie if they are clicked? They do not work. • The movie do not work after download • General layout. On the starting page, the title is: Session 1&2. The titles below only are Session 1- Contents and Session 1-Activity. They do not include session 2. • Pictures displaced. • Contents on page 26 are two pictures which can't be displayed and I can't start the Video on page 27. In the Didactic Unit (pdf) of Session 1&2 on page 8 one picture covers another. Last Thing: In my opinion the answer of question 3 in the Activity from Session 1&2 must be 'Is not able to

	Positive aspects	Weaknesses and improvements
		provide standard X-ray images.' but this is evaluated with 'wrong'.
M3_S2	• Information very adequate	• Figure 4 has not been anonymized • More documentation is need • I would prefer to label all figures and refer to them in the text. Especially in this module, there are a lot of pictures and movies. In the pdf file, you labelled all figures, but not in the contents of each session. • For Session 3&4. -During the contents unit you often change the type size to fill the whole window. I personally would prefer a homogeneous size through the whole unit. • Pictures displaced.
M4_S1	• Graphic and very didactic	• The images of the movie change too fast. There are a lot of effects. The amount of these effects is not a problem. I really like them. But I could not follow that fast. Maybe you could offer the user the possibility through a button "next" to go further. Meaning a interactive slide show instead of a video. At the beginning you give an overview of the units, but the first unit is not regarded further.
M4_S2	• Graphic and very didactic	• In this case, repeated videos (mod. 4). Very fast streaming. Do not add any new info.

Table 5 Positive aspects, weaknesses and improvements of the session's contents

4. Conclusions and proposals of improvement

The assessment and evaluation of the results of the Train4Orthomis pilot course carried out by the project partners has provided useful information concerning the functionality and usability of the online platform, the adequacy and quality of the developed materials and the pedagogical approach of the course.

The Train4Orthomis pilot courses have been conducted in three countries (Spain, Poland and Germany) and 82 users were enrolled in the course.

The feedback provided by the users, compiled through a combination of quantitative information and open answers, opinions and comments (92 questionnaires were assessed), leads to a series of conclusions that should be used for the revision and improvement of the final Train4Orthomis course to be promoted in the participating countries.

We could summarize the feedback and measures for improvement at two major levels:

1. Online platform,
2. Train4Orthomis contents,

Online platform

Concerning the online platform, most of the pilot tests users were quite pleased with the basic functionalities and overall structure of the course. The feedback received focused on some positive aspects such as the organization of the platform or navigation and configuration setting. Some negative aspects were also noted, such as the login on the platform. In this issue, the effort should focus on general improvement measures:

- Check small mistakes in the platform;
- Improvement of the graphical aspect of the online platform;
- Check the selection process between the hip and spine modules;
- Test the login process to the online platform;
- Development of online guidelines for the platform (especially useful for users who are not familiar with online platforms).

Course contents

Concerning the Train4Orthomis course contents, the feedback and information gathered by the partners provides several hints for improvement of course contents and development of complementary activities. Overall, the feedback indicated that the course structure, adequacy, duration, easiness, technical quality and training value of the contents were rated as good or very good by most of the users.

Although the structure of the course and contents is very suitable and changes are not required, there are some aspect to improve before the implementation of the final course:

In this case, additional improvement measures were not identified because the contents were considered very suitable. Following ideas could be taken into account to improve the course:

- Review the questions of activities to check the feedback provided by the users
- Unify the contents for session1-2 and session 3-4
- The review of the content to avoid typographic mistakes

Overall, **the feedback provided** during the pilot tests **gave a positive evaluation to Train4Orthomis courses**. The online courses developed will be able to achieve its main purpose and deliver a basic ergonomics training course for professionals of orthopaedic surgery.