



SIMULTRA PROJECT

2017-1-IT01-KA202-006140



SIMULATION OF LOGISTICS AND TRANSPORT PROCESSES

REPORT ON THE QUALITY OF TRAINING WITH SIMULATION TOOLS

30/09/2019

[All partners]

**This project has been funded with the support of the Erasmus+ programme of the European Union
SIMULTRA 2017-1-IT01-KA202-006140**

"The European Commission support for the production of this document does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Table of Contents

1. INTRODUCTION	3
2. CONSIDERATIONS ON THE ADVANTAGES OF USING SIMULATORS IN LEARNING ACTIVITIES	3
3. QUALITY OF TRAINING OF THE SIMULTRA TOOLS	4
3.1 Quality of training of the Supply Chain Game (O2)	4
3.1.1 Description of the surveys.....	4
3.1.2 Description of the testing activities.....	5
3.1.3 Comprehensive outcomes.....	5
3.2 Quality of training of the Intermodal Platform Game (O3)	6
3.2.1 Description of the surveys.....	6
3.2.2 Description of the testing activities.....	7
3.2.3 Comprehensive outcomes.....	7
3.3 Quality of training of the Road Freight Transport game (O4)	9
3.3.1 Description of the surveys.....	10
3.3.2 Description of the testing activities.....	10
3.3.3 Comprehensive outcomes.....	12
3.4 Quality of training of the Port Operations game (O5)	19
3.4.1 Description of the surveys.....	19
3.4.2 Description of the testing activities.....	19
3.4.3 Comprehensive outcomes.....	20
3.5 Quality of training of the WMS game (O6)	21
3.5.1 Description of the surveys.....	22
3.5.2 Description of the testing activities.....	22
3.5.3 Comprehensive outcomes.....	23
3.6 Quality of training of the Customs Practices game (O7)	25
3.6.1 Description of the surveys.....	25
3.6.2 Description of the testing activities.....	25
3.6.3 Comprehensive outcomes.....	25
Annex A1. Pre-Test or Post-Test questionnaire for the Supply Chain game – O2	27
Annex A2. Pre-Test or Post-Test questionnaire for the Intermodal Platform game – O3	29
Annex A3. Pre-Test or Post-Test questionnaire for the Road freight transport game – O4	31
Annex A4. Pre-Test or Post-Test questionnaire for the Port Operations game – O5.....	33
Annex A5. Pre-Test or Post-Test questionnaire for the Logistics Warehouse game – O6	35
Annex A6. Pre-Test or Post-Test questionnaire for the Customs Practices game – O7	37
Annex A7. Overall evaluation questionnaire – all tools	39

1. INTRODUCTION

This document aims to evaluate the quality of training through the simulation tools developed within SIMULTRA project, in particular by assessing the added value in terms of learning provided by those work-based innovative tools in comparison to traditional education, mainly theoretical.

The contents of this document consist of the description of the testing sessions of the simulation tools together with the outcomes of the evaluation surveys used therein. Testing occurred at different stages of tools development and which have involved students engaged in professional and technical education and training in the field of logistics and transport, teachers of these schools/organisations, employees of companies in the industry, etc.

Among traditional methods, two types of survey were developed to quantify the learning role and the quality of the tools. The overall quality of the tools was assessed throughout a survey aimed at quantify the testers satisfaction, while the learning potential of the tools was measured throughout a specific "before" and "after" survey in which testers were asked to answer for assessing the knowledge acquired with the use of the simulation game. In the Annexes section are shown the full questionnaires created for the test of the tools.

The result of this document is of great importance, not only for this project, but in general for all those who work in the training and education sector, as for companies in any industry, because it assess the effectiveness associated to the use of innovative tools, helping thus to understand where, when and to whom extent their use. For this reason, this document is primarily addressed to teachers, trainers, professionals of the VET system and companies, as it indicates the level of usefulness of those solutions.

2. CONSIDERATIONS ON THE ADVANTAGES OF USING SIMULATORS IN LEARNING ACTIVITIES

The idea of developing training simulators within Simultra project followed two inspiring principles:

- 1) The fact that many studies prove that the use of simulations improves learning¹. Those studies sustain that simulators, with their ability to demonstrate abstract concepts, are effective as training methods as require a real action/interaction of the learner. This effectiveness is then considered to rely on the accuracy of the simulation and on the type of task being learned.
- 2) An approach to the concept of "Gamification", which consists in the introduction of "game" elements in a non-game situation, allowing to motivate students to learning^{2,3}.

Applying those principles to a VET general context, results undoubtedly that simulation tools offer many advantages compared to traditional teaching methods:

- The students are able to reinforce theoretical knowledge with hands-on-training through simulation tools, allowing them to become familiar with the equipment and environment;

¹ Lateef, F. (2010). Simulation-based learning: Just like the real thing. *Journal of Emergencies, Trauma and Shock*, 3(4), 348.

² Kapp, Karl (2012). *The Gamification of Learning and Instruction: Game-based Methods and Strategies for Training and Education*. Pfeiffer. ISBN 978-1118096345.

³ Shatz, Itamar (2015). *Using Gamification and Gaming in Order to Promote Risk Taking in the Language Learning Process* (PDF). MEITAL National Conference. Haifa, Israel: Technion. pp. 227–232. Retrieved 4 August 2016.

- The students are able to practice necessary skills without risking accidents to themselves, the equipment, and the environment;
- The tools are cost-effective over the long-term;
- They give the possibility to track the students' own progress by providing standardized feedback that can aid them in improving the development of knowledge and skills.

The aforementioned motivation has been driving all the developing phases of the simulators; once completed, they'd been validated and the results, in terms of capacity to meet the foreseen objectives, is hereafter assessed.

3. QUALITY OF TRAINING OF THE SIMULTRA TOOLS

3.1 Quality of training of the Supply Chain Game (O2)

This game allows calculating all costs related to the transport of a container, departing from the Chinese port of Shanghai and destined to the port of Antwerp. The simulated process refers to the task mainly carried out by a Supply Chain Designer/Planner; therefore, it is asked the planning and organization of the entire transport chain, taking also into consideration the historical costs of freight and shipping companies. The evaluation of costs is included and goes over the simulated time allowing to change and adjust settings in order to reduce costs for the company that exports the container and the company that organizes the shipment. This game consists of two levels, and each level contains 55 missions. The mission in level 1 is to transfer cargo from Shanghai to Parma, and in level 2 to transfer cargo from Shanghai to Zaragoza. The purpose is to select the 'shipping line', 'European port' and 'Hinterland mode' for transportation in order to end up with minimum cost. In each mission, one can select 'spot market contract' or fix the current price for future months by choosing "futures contract". Use 'futures contract' whenever the price will likely rise in the future.

3.1.1 Description of the surveys

- *Learning survey:*
This survey is based on the knowledge, know-how and skills expected to perform the different tasks needed by the Supply Chain Planner/Designer. The advantage of this questionnaire is that the tester should have been taking it twice: once before using the tool, once after completing the game. In this way, his basic knowledge will be differentiated from his knowledge acquired during the game, and the increase in knowledge occurred while playing the game was assessed. The survey, shown in Annex A1, was developed on EUSurvey platform resulting accessible with the following link:
https://ec.europa.eu/eusurvey/runner/Simultra_SupplyChainGame_Survey2019.
- *Satisfaction survey:*
It is the general evaluation survey used for all simulators' testing, aimed at collecting feedback for improving the tool. Among the collected information, testers are required to specify their role (student/teacher/professional) and the tool they've tested. The survey, shown in Annex A7, was developed on EUSurvey platform resulting accessible with the following link:
https://ec.europa.eu/eusurvey/runner/Simultra_ToolEvaluation_survey

3.1.2 Description of the testing activities

The testing occurred in two separate joint sessions and addressed to different sector, policy and education representatives, as shown by the table below.

Tool n.	Tool progress (%)	Test n.	Date	Location	Testers n.	Testers role
2	90	1	10 January 2019	University of Antwerp	4	Sector practitioners
2	100	2	9 September 2019	University of Antwerp	4	Port training centre personnel + University college students

In each of the sessions, participants first completed the above-mentioned general survey. Subsequently, University of Antwerp staff introduced them to the game, with a game tour and a joint demo of playing the game, after which the participants individually played the game. At last, the participants completed the survey again to get the chance to give individual comments.

3.1.3 Comprehensive outcomes

The testing sessions led to following comments/suggestions, with indication of actions taken.

Session 1:

Technical feedback	
Comment	Action
If mission is played, the player should see the results of the selected input directly (move player to the bar graph).	Corrected
Once the player goes back to the screen, he/she should see the score on the screen. So the player knows directly how he/she has done.	Updated
Satisfaction feedback	
Comment	Action
Interesting tool, very useful for training staff	-
Very interesting to train the different perspectives (forwarder, shipper, terminal operator, shipping company, etc.)	-

Session 2:

Technical feedback	
Comment	Action
Show an explanation screen in the beginning of the game to explain what the goal is of the game.	Updated
The bars and graphs should get the correct units on the axis. Change also the numbers into numbers with “,” (1000000 → 1,000,000)	Updated
Add ? boxes after spot and future contract in the game and add the explanation of the game manual to it.	Included

Also take variations of time into account in the game. So not only select the cheapest mode, but also take the time into account. This will create additional level of complexity in the game.	Updated
The routes should be plotted on the map in the room.	Updated
Satisfaction feedback	
Comment	Action
Very relevant tool, both for usage in classical education, as in supply chain experience centres	-
Next to the manual, also a YouTube video + a 'sales' package could be useful	Referred to post-project discussion in consortium, not part of Simultra project

Regarding the learning value associated to the use of the tool, as indicated by the table below, surveys show that very substantial progress was made in the quality of answers given. Even though the testers were either professionals or lecturers in the substance, individual questions turned out not be easy to be answered at first, without the learning potential of the tool.

Learning value	
Pre-Test survey	Post-test survey
Positive rate answer 73%	Positive rate answer 98%
Negative rate answer 27%	Negative rate answer 2%

3.2 Quality of training of the Intermodal Platform Game (O3)

The game simulates the intermodal platform operations for a train carrying containers and arriving into the intermodal platform. Here the train must be unloaded according to the platform layout (yards) and container typology (maritime or terrestrial). In the second part of the game the train must be loaded with containers, according to the "Train List" (the document with the information on the containers to be loaded), and its departure from the intermodal platform is simulated.

3.2.1 Description of the surveys

- *Learning survey:*
This survey is based on the knowledge, know-how and skills expected to perform the different tasks needed by the Intermodal Platform clerk. The advantage of this questionnaire is that the tester should have been taking it twice: once before using the tool, once after completing the game. In this way, his basic knowledge will be differentiated from his knowledge acquired during the game, and the increase in knowledge occurred while playing the game was assessed. The survey, shown in Annex A2, was developed on EUSurvey platform resulting accessible with the following link:
https://ec.europa.eu/eusurvey/runner/Simultra_IntermodalTransport.
- *Satisfaction survey:*
It is the general evaluation survey used for all simulators' testing, aimed at collecting feedback for improving the tool. Among the collected information, testers are required to specify their role (student/teacher/professional) and the tool they've tested. The survey,

shown in Annex A7, was developed on EUSurvey platform resulting accessible with the following link:

https://ec.europa.eu/eusurvey/runner/Simultra_ToolEvaluation_survey

3.2.2 Description of the testing activities

The testing occurred in two separate joint sessions as shown by the table below.

Tool n.	Tool progress (%)	Test n.	Date	Location	Testers n.	Testers role
3	70%	1	15 April 2019	Technical School "Baldini" Ravenna, IT	15	Students & teachers
3	95%	2	12 September 2019	"Summer Logistic School", Erasmus+ initiative, Portorose, SL	38	Students & teachers

The first testing session was carried out in a technical school in Ravenna (IT), more precisely with a classroom of 15 students of the "Logistics" study course. At that stage the tool was at the 70% of its completion and available only in English and Italian language. The second testing session was carried out within the study course of another Erasmus+ project "Summer Logistics School", aimed at fostering the quality of human resources in logistics, to build up the capacity of VET institutions, and to enhance the quality of relevance of VET. During a specific session, the tool was presented and then tested in English language by 38 participants, of which 29 learners/students and 9 teachers. Due to organizational reasons, for the test the whole group was divided into two groups (18+20) and in some cases more than one student was attributed to one computer, which was presented and tested in English version. Before each session, learners were asked to complete the «Learning» survey. After using the tool, they had to repeat it and, additionally, to complete the «Satisfaction» survey.

3.2.3 Comprehensive outcomes

The emerged technical feedback on the tool, useful for the tool improvement/finalisation, coming from the notes taken during the testing, are described in the following table.

Technical feedback	
Comment	Action
Navigation within the platform	Improved (both with mouse than with notepad), other graphics, audio
Incomplete questions	Completed
Not clear understanding of some questions	Reviewed all questions
Short time or the scene of the truck arrival with the type of container	This issue has not been possible to resolve. Addition of a text requiring the user to focus on the upcoming scene

Overall and despite some elements to improve, the learners had a good experience using the tool. It's interesting to note that most of the students highlighted the pedagogical value of the tool, in particular by pointing the fact that the tool is close to reality, innovative in the teaching method, and enabling easier comprehension of complex arguments than in the usual theoretical courses. In

comparison to a case study, the majority of the students expressed a preference for the simulation tool, as shown in the table below.

Satisfaction feedback - STUDENTS	
Middle age of the students	20,8 years
Grade:	Superior Grade: 7% 4th year of High School: 62% 5th year of High School: 31%
Students origin country	<ul style="list-style-type: none"> - 10 students from Slovenia - 12 students from Italy - 3 students from Croatia - 4 students from Spain
Overall evaluation of the tool	Useful: 42% Interesting: 68% To have fun: 7%
3 most positive aspects of the game	The three most positive aspects that stand out are: <ul style="list-style-type: none"> - The learning value; - The fact that the game is fun; - The fact that the tool is innovative in terms of pedagogy;
3 aspects to be improved	A few notes were given by the students. It came out, especially, the difficulty related to the use of commands to move around in the video game.
Difficulty when playing	58% of the learners encountered difficulties when playing. More specifically which : <ul style="list-style-type: none"> - The navigation in the platform - The loading order of containers on the train - The short time to see the colour of the container coming with a truck
Would you like to have this kind of tool in your training programme ?	94% of the students expressed the desire to have this kind of tool in their training programme.

The 9 teachers who tested the tool and answered the satisfaction survey, gave feedback according to the table below.

Satisfaction feedback - TEACHERS	
Teaching speciality:	5 logistics teachers 3 transports and logistics teachers 1 mechanics teacher
Teaching Country:	<ul style="list-style-type: none"> - 2 teachers from Croatia - 2 teachers from France - 1 teacher from Spain - 1 teacher from Italy

	- 3 teachers from Slovenia
Questions are easy to understand?	88% Yes 11% No
Is the tool dynamic and fun to use?	100 %Yes
How do you like the graphic design of the tool? Is it modern enough?	92% Yes 8% No
Do you think your students will use that tool easily to learn more about that job?	92 % Yes 8% No
Is the action of the game close to reality?	100% Yes
Will you use that tool to train your student?	100% of the teachers expressed the fact that the game is a good tool to train their students
What would you add to the tool to secure it is used in the future?	According to the teacher, some elements need to be clarified and improved: - Possibility to add other questions autonomously for students' verification?

The teachers that participated in the SLS training and the test of the Intermodal Platform simulator showed interest in the tool and asked for the possibility to have it for using during their classes. Teachers also valued consistently the knowledge approached by the tool. Additionally, one teacher mentioned the possibility to use the English version also for English lessons aiming at introducing students to English technical professional terminology. The diversity of nationalities that have tested the tool shows that it is suitable for many school training programmes and can be widely distributed at European level.

Regarding the learning value associated to the use of the tool, as indicated by the table below, surveys show a relevant increase in the positive rate of the given answers to the survey given after using the simulator.

Learning value	
Pre-Test survey	Post-test survey
Positive rate answer 73%	Positive rate answer 84%
Negative rate answer 27%	Negative rate answer 16%

3.3 Quality of training of the Road Freight Transport game (O4)

This game simulates the daily activities of a traffic officer working in a road freight transport company, proposing to implement the transport of a container by road from Antwerp (Belgium) to Parma (Italy). The purposes of the traffic officer tool is to make the learner understanding the main activities of the road freight transport through a case study of professional experience in which the learner itself plays the role of a traffic officer who takes in charge an order, organises and follows the transport of a good. The simulator, then, allows to plan and organize a road transport mission, evaluate the costs, coordinate drivers based on driving time and travel distance, while considering the commitment expected for the company vehicles fleet. The tool also allows to select the means of transport based on the load that the customer requires to transport. Furthermore, the mission is monitored during its development and the assessment of the economic and environmental parameters after its conclusion.

3.3.1 Description of the surveys

- *Learning survey:*

This survey has been developed in such a way to verify the pedagogical contribution of the tool and its capacity to meet its main pedagogical objective: “enabling learners to acquire skills related to the main tasks that characterize the work of a road transport operator”. According to this, the survey is based on the knowledge, know-how and skills expected to perform the different tasks needed by the Traffic Officer. The advantage of this questionnaire is that the tester should have been taking it twice: once before using the tool, once after completing the game. In this way, his basic knowledge will be differentiated from his knowledge acquired during the game, and the increase in knowledge occurred while playing the game was assessed. More precisely, the following types of questions were implemented :

- 3 questions about the order receipt. Pedagogical objectives evaluated: Know how to ask the right questions to understand the customer's expectations and needs, identify the requirements and constraints of an order.
- 1 question about route calculation. Pedagogical objectives evaluated: To know how to calculate a route, to know the European regulations relating to driving and rest time.
- 4 questions relating to the regulations allowing to choose the right driver for the requested service. Pedagogical objectives evaluated: To know the European social regulations, to take into account standards, to know how to manage a planning.
- 1 question related to the choice of vehicle
Learning objective: To know how to calculate the load of a vehicle
- 2 questions related to the calculation of the cost of the service.
Pedagogical objectives: Establish a cost estimate, know how to apply a margin
- 1 question related to the quotation. Pedagogical objectives evaluated: To know the elements of a quotation, To know how to make a quotation.
- 1 question relating to international transport. Educational objective evaluated: Know the regulations and apply them.
- 1 question on the CMR. Learning objectives evaluated: To be able to read the document, identify important elements
- 2 environmental questions. Pedagogical objective evaluated: To make the learner aware of environmental aspects.

The survey, shown in Annex A3, was developed on EUSurvey platform resulting accessible with the following link:

https://ec.europa.eu/eusurvey/runner/Simultra_Traffic_Officer_201904.

- *Satisfaction survey:*

It is the general evaluation survey used for all simulators' testing, aimed at collecting feedback for improving the tool. Among the collected information, testers are required to specify their role (student/teacher/professional) and the tool they've tested. The survey, shown in Annex A7, was developed on EUSurvey platform resulting accessible with the following link: https://ec.europa.eu/eusurvey/runner/Simultra_ToolEvaluation_survey.

3.3.2 Description of the testing activities

The testing occurred in two separate joint sessions as shown by the table below.

Tool n.	Tool progress (%)	Test n.	Date	Location	Testers n.	Testers role
4	40%	1	04 February 2019	Paris & Monchy (France)	4	Workers
4	60%	2	07 June 2019	Meru (France)	2	2 Teachers
4	40%	3	07 June 2019	Meru (France)	1	7 Teachers
4	60%	4	11 June 2019	Châlons en Champagne (France)	7	7 Teachers
4	90%	5	11 September 2019	“Summer Logistic School”, Erasmus+ initiative, Portorose, SL	38	29 Students 9 Teachers

4 internal AFT employees, including people from the Pedagogical Engineering Department, received the first version of the tool for testing it. Since the tool was partially developed (unfinished graphics, unread text, feedback that was sometimes not very explicit...), testers were asked to evaluate the general aspect of the game: graphics, ease of progress in the game, understanding of questions and feedbacks. During the tests, everyone was asked to note their comments, difficulties, appreciations of the game and graphics. The data were collected in order to highlight the elements to be improved on the technical point (readability, graphics) and pedagogical point (respect of the storyboard, pedagogical value). Once the tool had been reviewed following the internal test, teachers present at the first Multipliers Event organised by AFT were contacted. Two training institutes have therefore agreed to test the tools:

- The Lavoisier vocational school in Méru. This high school offers vocational training in CAP, BAC PRO (EQF Level 4), particularly in the transport and logistics sector.
- Oehmichen High School in Chalons en Champagne. This school provides training in industry, transport and logistics as well as in the hotel industry.

In the Lavoisier high school, two teachers participated in the tests of the tool. At this stage of game development, the tool was only available in English, the graphics had been improved and made more dynamic in response to feedback from workers. In order to familiarize teachers with the tool, a presentation was first made with the following elements:

- A brief presentation of the Simultra project;
- A more in-depth presentation of the tool with its purpose, pedagogical expectations, the conduct of the test with explanations relating to the questionnaires (EUSurvey), navigation and finally the main stages of the game.

During this presentation the teachers could ask questions, and their comments were also noted. Once the presentation was made, the teachers proceeded to the test phase. During this phase, the teachers were free to navigate through the game, to ask questions or to express their difficulties. Once the game was tested, teachers were invited to complete the online satisfaction questionnaire. The following tests occurred in Oehmichen High School, where 7 teachers from BTS Transport and

Logistics Management (EQF level 4 and 5) participated. As in the previous sessions, teachers first attended a presentation of the transport operator's tool, then, divided in pairs on a computer, explored the tool. During this phase some technical difficulties appeared (the school's equipment didn't have proper graphics requirements). Thus, the tool was projected on a screen. At each stage, the teachers' comments were noted, as well as their difficulties. The last testing occurred within the framework of another Erasmus+ project "Summer Logistics School", whose aim is to foster the quality of human resources in logistics, to build up the capacity of VET institutions, and to enhance the quality of relevance of VET. The tool has been presented then tested in English version by 38 participants (29 learners + 9 teachers).. For logistical reasons, the group was divided into two sessions and some students were several per computers to test the tool.

3.3.3 Comprehensive outcomes

From the first and second sessions, due to their early stage, mainly resulted that the graphics needed to be improved because they were too close to the storyboard design. The testers noted that the graphics could be more dynamic and modern, knowing that the tool is mainly aimed at young people who are familiar with video games and new technologies. In addition to the graphic design, there was also a problem with the visibility of information, questions and feedback within the tool. In terms of pedagogy, to allow learners to fully understand and remember the right answers, it was suggested to give only 2 trials in each task. In this way, the learner would not get blocked and would not be discouraged to continue the game. As the game was not yet finished, it was not possible to evaluate the educational added value of the game, but the testers noted that the contents present in the tool corresponded well to the knowledge, know-how and interpersonal skills required by the transport operator's job. Taking into account the technical comments, especially around the graphics made on the tool, the developers improved the visual aspect of the game by improving the graphics of many steps. In figure 1 and 2 are shown the game screens before and after improvements. To make the game more attractive and dynamic, a character was added to the office of the road freight transport operator. Below is shown the comparison before/after the graphical and dynamic improvement performed after the tests.

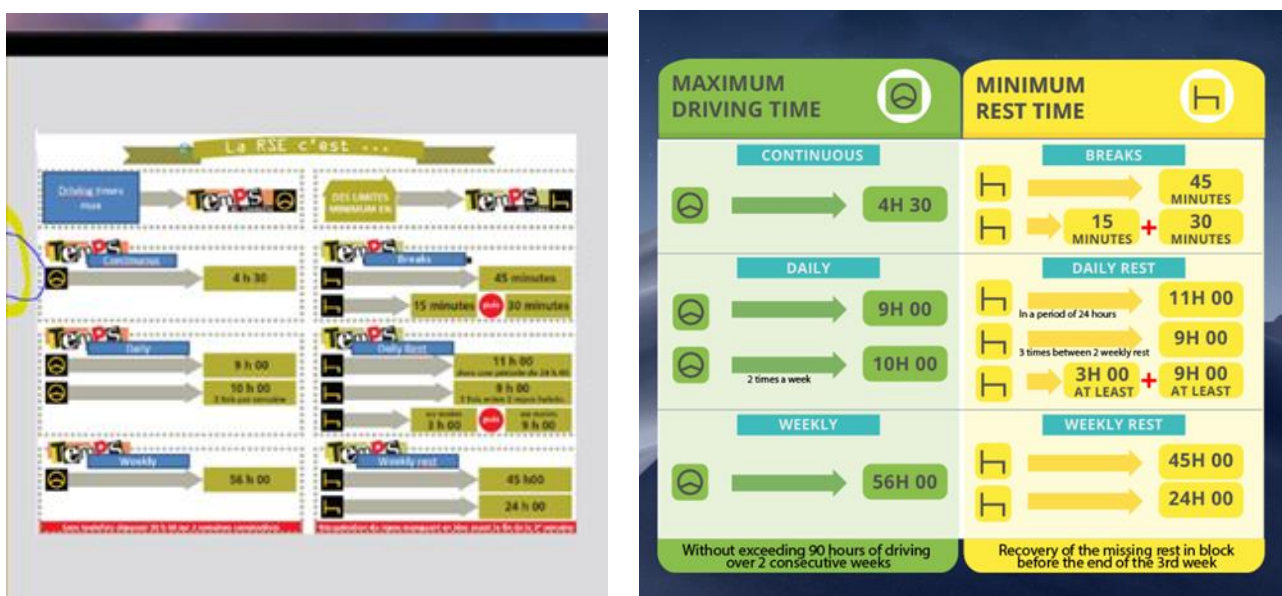


Figure 1. Game screens before and after graphical improvements

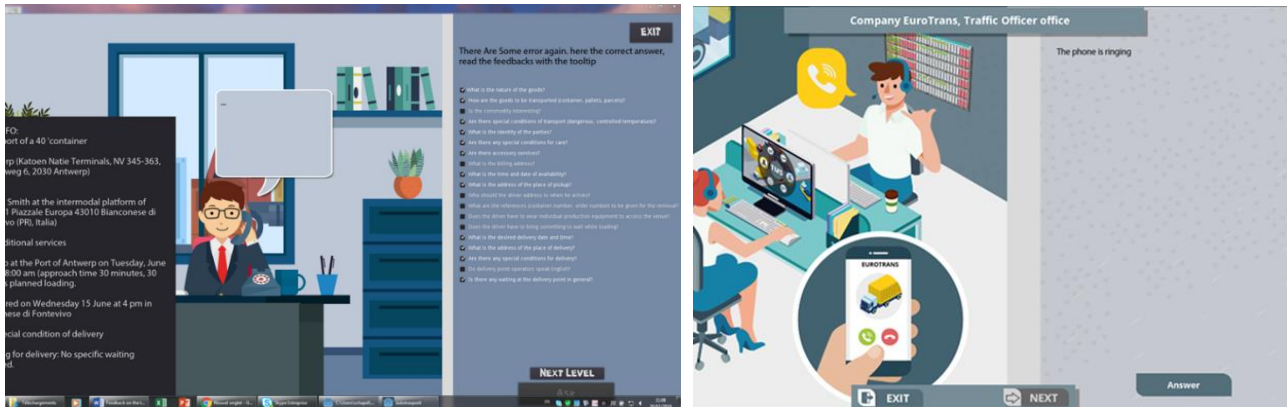


Figure 1 Game screen before and after attractiveness improvement

The table below presents a summary of the results collected during the test sessions and the answers to the satisfaction questionnaires.

Technical Feedbacks	
Graphics feedbacks	<p>According to the teachers, the graphics were not adequate, indeed many points needed to be improved.</p> <p>Their experiences highlighted the following needs:</p> <ul style="list-style-type: none"> - Standardize graphics - Harmonize the number of buttons (next - continue - Go...) on the different phases - Propose a return button - Distinguish between instructions - Improve display - Keep the same entry rules in the game (Date, Time, etc.)
Navigation feedbacks	<p>The teachers had a great experience with the tool they found it very interesting and useful.</p> <p>Teachers encounter difficulties when playing, more specifically in identifying the object with which to interact.</p> <p>When feedbacks appeared, for a better understanding, and in order to compare the answers, the teachers expressed the wish to see their answers and feedback at each step.</p>
Satisfaction Feedbacks	
Understanding of the tool	<p>Teachers found the questions easy to understand and relevant with regard to knowledge related to the profession of the traffic officer.</p>
Learning value	<p>The teachers considered the skills in the game more than useful as well as what is learned through the game.</p> <p>Noted that one of the teachers who tested the game was specialized in teaching logistics warehouses and did not necessarily have all the knowledge about the job of traffic officer and was thus able to learn or review distant knowledge.</p> <p>In addition, the numerous topics covered in the game would allow them to conduct cross-curricular courses with the tool.</p> <p>For example, through the game in English, review the technical concepts in English or with the mathematics teacher to review the</p>

	concepts of calculation regarding rules concerning the elaboration of a cost price.
--	---

From the third session, further feedbacks were collected, summarized in the following table.

Technical feedbacks	
Graphic feedbacks	<p>According to the teacher the graphic of the tool needed to be improve.</p> <p>The size of the text needed to be reviewed because it was very difficult to read.</p> <p>They also expressed the need:</p> <ul style="list-style-type: none"> - To add a back button - To have the possibility to compare their answers with the right answers - To add animations - To graphically redesign the TMS page
Navigation feedbacks	<p>The teachers were enthusiastic to test the tool.</p> <p>They found each step of the tool very useful regarding their school programs.</p> <p>During this test phase many questions appeared. The professors expressed the wish to add additional elements such as:</p> <ul style="list-style-type: none"> - Precision on the route taken (with or without tolls). - Reduce the number of responses to choose at a certain stage. - For the reminder of regulation (travel time, rest time...), the teachers did not find this clear, and mentioned the absence of some data. - Specify whether to use the (,) or the (.) for the data to be entered.
Satisfaction Feedbacks	
Understanding of the tool	The questions were perceived as relevant but need to be rephrased (English mistakes were noted)
Learning value	The teachers considered the tool very innovative in terms of learning, according them it allows to approach pedagogical elements in a simplified way.

Consequently, different graphic elements were modified and made more readable for better use of the tool. For example: to make the game more dynamic, a phone button has been added. From a pedagogical point of view, the CO2 awareness table was revised as the calculations were not fair considering the school programs. At the reached stage, the TMS game screen has been improved by adding a menu (figure 3) presenting the different steps of a TMS: Order, edit, quote, invoicing,

follow-up. At last, the English text was then translated into 4 other languages: French, Spanish, Italian and Dutch.

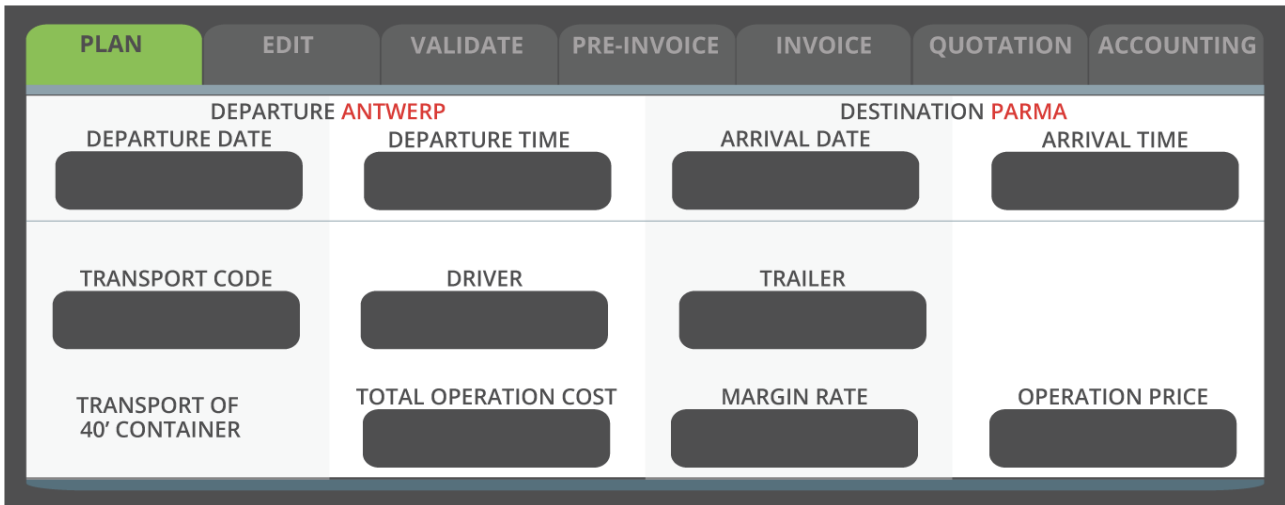


Figure 3 Game screen with the menu of the TMS steps.

The last testing session distinguished feedback from students and from teachers. The table below provides a summary of the results:

Satisfaction feedback - STUDENTS	
Middle age of the students	20,8 years
Grade	Superior Grade: 7% 4th year of High School: 62% 5th year of High School: 31%
Students origin country	<ul style="list-style-type: none"> - 10 students from Slovenia - 12 students from Italy - 3 students from Croatia - 4 students from Spain
Overall evaluation of the tool	Useful: 43% Interesting: 43 % To have fun: 14%
3 most positive aspects of the game	The three most positive aspects that stand out are: <ul style="list-style-type: none"> - The learning value - The fact that the game is fun - The fact that the tool is innovative in terms of pedagogy
3 aspects to be improved	The majority of students highlighted the need to improve number entry. For example, to be able to put 8 instead of 08. Some of them found the game complexe and with a lot of reading


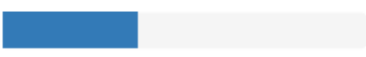
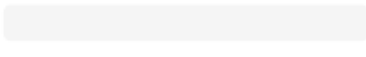
Difficulty when playing?	36% of the learners encountered difficulties when playing. More specifically with: <ul style="list-style-type: none"> - The numbers entry - The time calculation - The lack of knowledge
Would you like to have this kind of tool in your training programme?	100 % of the students expressed the desire to have this kind of tool in their training programme.

Overall and despite some elements to improve, the learners had a good experience using the tool. It's interesting to note that most of the students highlighted the pedagogical value of the tool, in particular by pointing the fact that the tool is close to reality, innovative in the teaching method, and facilitator to explain elements that may seem complex in the usual theoretical courses. In comparison to a case study, the majority of the students expressed a preference for the simulation tool. One of the students also insisted about the fact that: "Because I really feel as if I worked as a transport operator, I can act as this person and am immersed in his environment. The case study was not the same, I prefer the simulator". The 9 teachers who tested the tool and answered the satisfaction survey, gave feedbacks according to the table below.


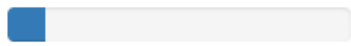
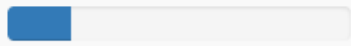
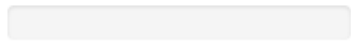
Satisfaction feedbacks - TEACHERS	
Teaching speciality:	5 logistics teachers 3 transports and logistics teachers 1 mechanics teacher
Teaching Country:	<ul style="list-style-type: none"> - 2 teachers from Croatia - 2 teachers from France - 1 teacher from Spain - 1 teacher from Italy - 3 teachers from Slovenia
Question easy to understand?	88% Yes 11% No
Is the tool dynamic and fun to use?	100 % Yes
How do you like the graphic design of the tool? Is it modern enough?	88% Yes 11% No
Do you think your students will use that tool easily to learn more about that job?	88 % 11 % No
Is the action of the game close to reality?	100 % Yes
Will you use that tool to train your student?	100% of the teachers expressed the fact that the game is a good tool to train their students
What would you add to the tool to secure it is used in the future?	According to the teacher, some elements need to be clarified and improved: <ul style="list-style-type: none"> - For the calculation costs, specify that a working day is 9 hours; - An option to have translations in other languages (others than the one already available)

The teachers that participated in the SLS training and the test of the transport operator simulator were all very interested in this tool and asked us all if they could receive it to use it during their classes. In fact, some of them said that it was the best pedagogical tool that they have ever seen for transport and logistics topics. Some teachers expressed the wish to receive the file from the developer in order to be able to translate the tool into their own language. Teachers valued the knowledge approached by the tool. One teacher pointed out that the tool was very useful to teach the calculation of driving and resting time. One of the French teachers mentioned the fact that he could use the English version in his high school both for English lessons and also to use the tool to introduce students to English professional terms or to improve the professional English: learners can first use the tool in French and afterwards in English. The diversity of nationalities that have tested the tool shows that it is suitable for many school training programmes and can be widely distributed at European level.

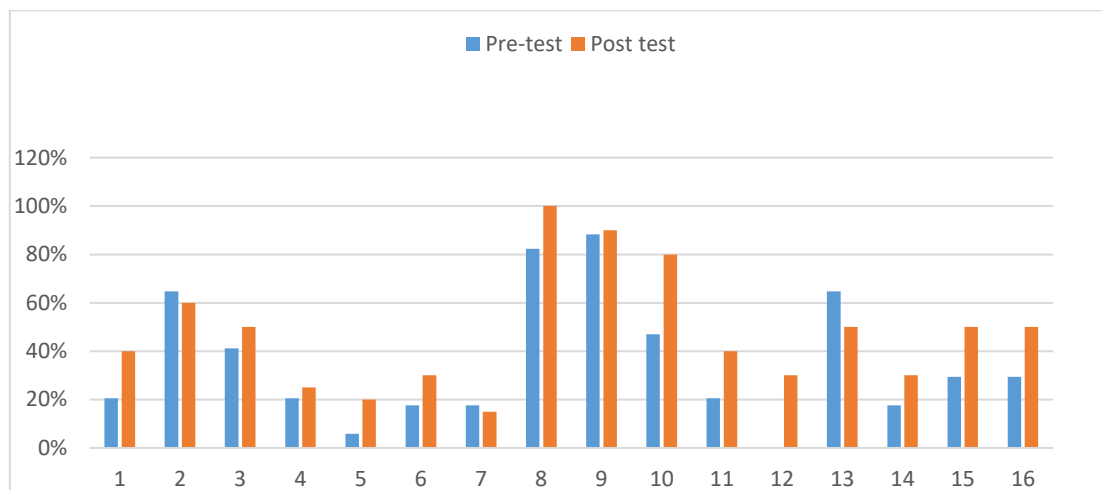
Regarding the learning value of the simulator, as the following tables show, 27 tests in total (pre and post-test) have been completed by learners and teachers. In the table below are shown the Learning survey outcomes. There is a difference between the two tests since some students or testers took longer to complete the game and do not seem to have had time to complete the post questionnaire. In addition, several test sessions were organized, the last session had less time to finish the questionnaires due to lack of time. Among the respondents, the majority are students. Indeed 88.89% are student responses against 11% of teachers. The worker category is not well represented because some students reported being students and workers.

		Answers	Ratio
Pre-Test		17	62.96 %
Post-Test		10	37.04 %
No Answer		0	0 %

Status

		Answers	Ratio
Student		24	88.89 %
Teacher		3	11.11 %
Worker		5	18.52 %
No Answer		0	0.00 %

	Pre test	Post test	Rate of progression
Question 1	21%	40%	19%
Question 2	65%	60%	-5%
Question 3	41%	50%	9%
Question 4	21%	25%	4%
Question 5	6%	20%	14%
Question 6	18%	30%	12%
Question 7	18%	15%	-3%
Question 8	82%	100%	18%
Question 9	88%	90%	2%
Question 10	47%	80%	33%
Question 11	21%	40%	19%
Question 12	0%	30%	30%
Question 13	65%	50%	-15%
Question 14	18%	30%	12%
Question 15	29%	50%	21%
Question 16	29%	50%	21%
Average	35%	48%	13%



The analysis of the success rate of the pre and post-test questionnaire clearly shows a progression. Most of the students gave more correct answers in the post-test. In fact, the rate of correct post-test responses is 48% compared to 35% for pre-test. Thus, the rate of progression between the pre and post-test is 13%. Some answers have a negative progression, however, this can be explained by the structure of the question, which was an open-ended and not a multiple-choice question. Although some elements corresponded to the answer, not all the expected answers were given. Multiple-choice questions show positive progress (on average the progression rate is 14%). The answers given also highlight the shortcomings of the students, so that teachers can identify the elements to be reviewed or deepened in class. Through the use of the tools we notice that a simple reminder allows students to retain or review their knowledge. For example, concepts on European social regulations are quickly acquired or reviewed (between 100% and 80% of success at the post test questionnaire). Even the knowledge to be reviewed is more often entered in the post-test questionnaire than in the pre-test.

Overall, regarding the learning value associated to the use of the tool, as indicated by the table below, surveys show a positive progression.

Learning value	
Pre-Test survey	Post-test survey
Positive rate answer 35%	Positive rate answer 48%
Negative rate answer 65%	Negative rate answer 52%

3.4 Quality of training of the Port Operations game (O5)

The game allows planning and organization of all (human) resources and equipment (fixed and self-propelled cranes) necessary for the management of a ship arriving at the quay of the port of Antwerp. It aims to facilitate and perform the unloading and loading operations of containers in the time window required by the port's operations. The simulated process refers to the task mainly carried out by the container terminal resource planner. Ahead of and subsequent to the testing moment, participants completed a survey so as to verify to what extent they are acquainted with the terminal environment (pre), and to what extent their level of terminal knowledge has increased after playing the terminal game. (post). The survey is shown below.

3.4.1 Description of the surveys

- *Learning survey:*

This survey is based on the knowledge, know-how and skills expected to perform the different tasks needed by the Container Terminal Resource Planner. The advantage of this questionnaire is that the tester should have been taking it twice: once before using the tool, once after completing the game. In this way, his basic knowledge will be differentiated from his knowledge acquired during the game, and the increase in knowledge occurred while playing the game was assessed. The survey, shown in Annex A1, was developed on EUSurvey platform resulting accessible with the following link:

https://ec.europa.eu/eusurvey/runner/Simultra_TerminalGame_survey2019.

- *Satisfaction survey:*

It is the general evaluation survey used for all simulators' testing, aimed at collecting feedback for improving the tool. Among the collected information, testers are required to specify their role (student/teacher/professional) and the tool they've tested. The survey, shown in Annex A7, was developed on EUSurvey platform resulting accessible with the following link:

https://ec.europa.eu/eusurvey/runner/Simultra_ToolEvaluation_survey

3.4.2 Description of the testing activities

The testing was done in three separate joint sessions, with different sector, policy and education representatives, as shown by the table below.

Tool n.	Tool progress (%)	Test n.	Date	Location	Testers n.	Testers role
5	90	1	10 January 2019	University of Antwerp	4	Terminal practitioners

5	95	2	10 March 2019	PSA Antwerp	4	Terminal practitioners
5	100	3	9 September 2019	University of Antwerp	4	Port training centre + University college

In both sessions, participants first completed the above-mentioned survey. Subsequently, University of Antwerp staff introduced them to the game, with a game tour and a joint demo of playing the game, after which the participants individually played the game. Then, the participants completed the survey again. Finally, they got the chance to give individual comments.

3.4.3 Comprehensive outcomes

At a general level, due to the nature of their backgrounds (professional, higher education), most participants were well informed about the working procedures of a port container terminal. Technical and labour issues in ports did not need improvement among the participants. However, on the side of generalized costs, the learning module led to significant improvement. In the pre-test, most participants did not understand adequately the generalized cost concept, which led to a discussion on whether (operational) cost or rather time was to be minimized. By understanding and introducing the generalized cost concept during the game, it became clear to the participants what the correct answer was. Overall, the testing sessions led to the following comments/suggestions, with indication of actions taken.

- **Session 1**

Technical feedback	
Comment	Action
Add containers to the container vessel	This has been changed in the model
Satisfaction feedback	
Comment	Action
Interesting tool, very useful for training staff	-
Very interesting to train the different perspectives (terminal operator, shipping company, etc.)	-

- **Session 2**

Technical feedback	
Comment	Action
Change the vessel details: use the following data: Loa = 255, Bm = 37, Td = 12, Capacity = 5000 TEU	This has been changed in the model
Only start cargo operation once the vessel is docked at the terminal.	This has been changed in the model
Only show the results of the operation after two containers have been handled from the vessel. This will give the user of the game the feeling	This has been changed in the model

that once they have made a selection, they need to wait before they can get there result.	
Satisfaction feedback	
Comment	Action
Learful tool, very useful for training staff	-
Could be made terminal-specific in a post-project stage.	Agreed for post-project discussion, not part of the current Simultra contract.

- **Session 3**

Technical feedback	
Comment	Action
In the results change the colour of comment 01 from blue to with. Blue and red is not good readable.	Updated
In input there is speed with unit EUR/H instead of km/h.	Corrected
Show number of containers handled on the result page.	Updated
Put a “?” after the different cost elements in the result page. Once you click on the ?, the detailed calculations should be showed.	Updated
Add 10 new missions where the number of container cranes and straddle carriers are limited.	Included
Align the straddle carrier with the loading/unloading of the vessel.	Updated
Satisfaction feedback	
Comment	Action
Very relevant tool, both for usage in classical education, as in port experience centres	-
Next to the manual, also a YouTube video + a ‘sales’ package could be useful	Referred to after-project discussion in consortium, not within SIMULTRA project

Regarding the learning value associated to the use of the tool, as indicated by the table below, surveys show that substantial learning was incurred, both among the sector professionals and full-time lecturers. The tool has therefore proven its value in transferring supply chain knowledge.

Learning value	
Pre-Test survey	Post-test survey
Positive rate answer 68%	Positive rate answer 95%
Negative rate answer 32%	Negative rate answer 5%

3.5 Quality of training of the WMS game (O6)

The didactic WMS tool allows the acquisition of the skills and abilities necessary for the position of warehouse manager in all productive, private and public sectors, and specifically in activities

auxiliary to the transport of storage-distribution and logistics operators. The warehouse manager has no dependents. It is placed at the same level as the administrative of the storage and reception services and the responsible for reception and shipment of goods. Through this tool is possible to simulate:

1. Selection of handling equipment.
2. Selection of locations:
3. ABC Criterion
4. Volume and geometric shape Criterion
5. Receipt and registration of goods. (Labeling and coding)
6. Storage
7. Movement between locations and shipment of goods.
8. Stock management: establish in WMS the possibility of security stock, minimum and maximum. (Communication to purchases department of need for reprovisioning)
9. Inventory control (Inventory).
10. Data management of suppliers, products and customers
11. Statistics (turnover rates, coverage index, obsolescence, breakage, average stocks, other indices).

The virtual environment of the simulator is a totally interactive environment and configured with a main menu from which you can access the different specific menus to perform the specified operations. From the main screen you will access the two simulation options: Real mode and Game mode.

3.5.1 Description of the surveys

- *Learning survey:*
This survey is based on the knowledge, know-how and skills expected to perform the different tasks needed by the Warehouse Technician/Employee. The advantage of this questionnaire is that the tester should have been taking it twice: once before using the tool, once after completing the game. In this way, his basic knowledge will be differentiated from his knowledge acquired during the game, and the increase in knowledge occurred while playing the game was assessed. The survey, shown in Annex A2, was developed on EUSurvey platform.
- *Satisfaction survey:*
It is the general evaluation survey used for all simulators' testing, aimed at collecting feedback for improving the tool. Among the collected information, testers are required to specify their role (student/teacher/professional) and the tool they've tested. The survey, shown in Annex A7, was developed on EUSurvey platform resulting accessible with the following link:
https://ec.europa.eu/eusurvey/runner/Simultra_ToolEvaluation_survey.

3.5.2 Description of the testing activities

The testing occurred in two separate joint sessions as shown by the table below.

Tool n.	Tool progress (%)	Test n.	Date	Location	Testers n.	Testers role

6	70	1	12 June 2019	CIFPA	20	Students, Teachers, Workers
6	95	2	19 September 2019	CIFPA	20	Students, Teachers, Workers, CIFPA VET Learning Advisors

The test sessions of the tool have been carried out by all the agents involved in the training that will derive from the development of the tool, that is, teachers, companies and VET students of the professional families associated with logistics and transport. The test sessions foresaw a small theoretical introduction to warehouse management, informing participants of the essentials to test the application, to ensure a minimum of knowledge and an acceptable completion of the proposed tests. Then was done a guided view on the CIFPA facilities (configuration of warehouses, trucks, shelves, etc.) as the equipment and configuration of the CIFPA is the same as that of the tool. In this way they have a visual image of all equipment as well as spaces and merchandise coding systems. Subsequently, on a computer room with the application installed, the tests proposed was carried out. First, the pre-test questionnaire is given giving a maximum time of 10 minutes to complete it. After testing each of the 7 practices of the game mode as well as the free mode, the first questionnaire is repeated with the post-test cataloging as well as the tool evaluation questionnaire.

3.5.3 Comprehensive outcomes

The 60% of testers were women and 40% were men. This highlights the fact that in the professional mansions associated with logistics and warehouse management, women are the majority. The 100% of test users were of legal age and the 30% were workers who make their work compatible with the study as the 70% are students with exclusive dedication. Almost 100% of users have Spanish nationality.

- **Technical feedback**

The testing process of the tool led to the implementation of the following technical activities:

- Initial evaluation: Corresponds to after the development of the first software architecture, once the code was introduced, tests were carried out to verify the proper functioning of the program, that is, aspects such as data entry, coding, order tracking, traceability, scores, etc. This evaluation is characterized by the revision of purely technical aspects of programming without any revision from the functional or didactic point of view.
- Review after the first test session: This review was carried out with the tool completed in 60% without having the game mode developed, so the review focused on the basic functionalities of the program that were tested in free mode, these are: transfers, machinery, inventory management, scores, locations, stores, suppliers and customers. From the test it was found that although the functionalities worked almost entirely in an acceptable manner, the simplicity and flexibility of the tool needed to be improved.
- Review after the second test session: We find the tool developed at 95%, so that the test carried out already includes didactic functionalities included in the game mode. As it is reflected in the previous section, the functionalities were already checked and adjusted, so the review after the second test focused on improving the didactic practices of the game mode since some of them were difficult for the participants

- Final review: After the final meeting of Parma after the exposure of the tool. Non-key but convenient aspects in its modification are reviewed to achieve perfect functionality.

- **Satisfaction feedback**

In relation to the percentages of response in the first test, almost 80% classify it as interesting and in the second as useful (65%) and interesting (40%). We can see how in the first test where the didactic part is not developed the simulator was interesting, but the didactic aspects were not dazzled. Already in the second test with the didactic part developed, users see its usefulness for learning and acquiring associated skills. In the first test, 70% found handling difficulties lowering this percentage to 40% after the second test. After analyzing these percentages, it is clear that the high percentage in the first test is due to the fact that the simulator was not fully developed and after the development the simulator can be considered as easy as the percentages reflect it. The progression is verified in this question since after the first test only 33% catalogs them as understandable and after the second test 75% catalogs them as such.

From a didactic point of view, the percentage is close to 60% when considering issues as useful, which represents the didactic utility of the tool. After the first test, 90% of the teachers will apply the tool, this percentage increases to 100% after the second test. In short, all teachers see the tool as a very important utility to complete the teaching-learning process and would use it for that purpose. Regarding the need of practice with the tool to allow its fluent use, from the first test emerged that the 45% only needed once and 33% 2 times. In the second test only 20% needed once and 40% 2 times. This can be explained since in the first test the practices in game mode had not been developed and the handling was very simple due to the simplicity of the program. In the second test, the 7 practices and the game mode were checked, so some repetition is necessary to understand the game. In both tests the work-based teaching process was considered innovative in almost the 100% of answers. In short, for the entire teaching staff that carried out the test, we have a very innovative teaching tool. The tool was considered able to reduce the gap between theory and practice in about the 70% of answers so the practical utility of the tool was reflected from the beginning of the development of the application. A percentage close to 70% in both cases expresses in the surveys the possible contribution of the tool to the improvement of employability and the improvement of professional achievements. In this regard, comment that the design of the tool is based on the professional competences and professional relationships that appear in the certificate of professionalism of warehouse management at the state level, so it is not surprising this high percentage. After the second test the 100% of the users catalogued the user interface as adequate.

From the surveys and their subsequent analysis, we can verify that in almost all the questions of the test the results improve in the post-test due to the approach of the tests and the competences acquired with the use of the same. Overall, in fact, the learning value of the tool is verified as shown in the table below.

Learning value	
Pre-Test survey	Post-test survey
Positive rate answer 78%	Positive rate answer 90%
Negative rate answer 22%	Negative rate answer 10%

In short, with the use of the tool, the didactics in class are complemented and the knowledge, skills and essential skills of warehouse logistics are improved.

3.6 Quality of training of the Customs Practices game (O7)

This game simulates the customs procedure for a container travelling from China (Asia) to Antwerp (Europe) and then to final destination (e.g. Parma freight village), leaving by ship from the port of Shanghai and arriving in Antwerp to be transported by road carrier. In this process, many characters are involved: the importing client, the freight forwarder, the MTO - multimodal transport operator, the clerk for Customs Practices. According to this, the game has 4 different levels to be played in sequence, corresponding to the 4 mentioned roles. The game mainly emphasizes on the importance of the documental exchange occurring between the parts (DAT/T1, Commercial Invoice, Bill of Lading, Multimodal Transport Document, Packing List, etc.)

3.6.1 Description of the surveys

- *Learning survey:*

This survey is based on the knowledge, know-how and skills expected to perform the different tasks needed by the Clerk for Customs Practices. The advantage of this questionnaire is that the tester should have been taking it twice: once before using the tool, once after completing the game. In this way, his basic knowledge will be differentiated from his knowledge acquired during the game, and the increase in knowledge occurred while playing the game was assessed. The survey, shown in Annex A2, was developed on EUSurvey platform resulting accessible with the following link:

https://ec.europa.eu/eusurvey/runner/Simultra_CustomsPractices_Survey.

- *Satisfaction survey:*

It is the general evaluation survey used for all simulators' testing, aimed at collecting feedback for improving the tool. Among the collected information, testers are required to specify their role (student/teacher/professional) and the tool they've tested. The survey, shown in Annex A7, was developed on EUSurvey platform resulting accessible with the following link:

https://ec.europa.eu/eusurvey/runner/Simultra_ToolEvaluation_survey.

3.6.2 Description of the testing activities

The testing occurred in two separate joint sessions as shown by the table below.

Tool N.	Progress of the Tool (%)	Test N. #	Date	Location	N° of Testers	Role of testers
7	100	1	30 September 2019	Istituto tecnico tecnologico "D'Arco - D'Este" Mantova	16	Students

For this simulator only one testing session was carried out as the simulator development was on late and its finalization occurred only in late September 2019. The test occurred in a technical school in Mantova (IT), with a classroom of 16 students from the 5th class of the "Logistics" study course. At that stage the tool was at the 100% of its completion and available in all languages (English, Italian, French, Spanish, Dutch).

3.6.3 Comprehensive outcomes

The emerged technical feedback on the tool, useful for the tool improvement/finalisation, coming from the notes taken during the testing, are described in the following table.

Technical feedback	
Comment	Action
Possibility of use further characters only after completed the previous ones	Not improved (as it was a choice made for the simulator since its first stage)

Satisfaction feedback - STUDENTS	
Overall evaluation of the tool	Useful: 33% Interesting: 64% To have fun: 3%
3 most positive aspects of the game	The three most positive aspects that stand out are: <ul style="list-style-type: none"> - The learning value; - The fact that the game is fun; - The fact that the tool is innovative in terms of pedagogy;
Would you like to have this kind of tool in your training programme ?	88% of the students expressed the desire to have this kind of tool in their training programme.

Overall the learners had a good experience using the tool. Nevertheless, some issues occurred from a Learning point of view as they detected difficulty in the topics and in the tasks encountered within the game (customs practices). The teachers that participated in test of the simulator showed interest in the tool and asked for the possibility to have it for using during their classes. Teachers also valued consistently the knowledge approached by the tool. Additionally, one teacher mentioned the possibility to use the English version also for English lessons aiming at introducing students to English technical professional terminology.

Regarding the learning value associated to the use of the tool, as indicated by the table below, surveys show that the use of the tool slightly improve testers' level of learning.

Learning value	
Pre-Test survey	Post-test survey
Positive rate answer 65%	Positive rate answer 69%
Negative rate answer 35%	Negative rate answer 31%

Annex A1. Pre-Test or Post-Test questionnaire for the Supply Chain game – O2

* Please select the correct option, Pre-Test if you're gonna to fill out the questionnaire before the training session with the tool, or Post-Test in the other case

- Pre-Test
 Post-Test

Questions

* 1. What is the most important decision parameter for a supply chain manager?

- Cost
 Time
 Both

* 2. What is the transport spot market?

- It is a market where short term transport contracts can be bought.
 It is a market where long term transport contract can be bought.
 It is market where all types of contracts can be bought.

* 3. What will happen to the transport cost if a future contract is bought?

- It will stay the same for the duration of the contract.
 It will fluctuate for the duration of the contract.
 It will give the lowest cost for the duration of the contract.

* 4. What is the best moment to buy a future contract?

- Always, it will always look for the lowest cost.
 When the transport cost are the lowest and it is expected that the transport cost will increase in the future.
 When the transport are the highest and it is expected that the transport cost will decrease in the future.

* 5. Which port will you choose to unload your cargo?

- The one that will lead to lowest overall cost of the transport.
 The one that is the closest to the final destination.
 The one that will lead to the overall fastest transport time.

* 6. Which hinterland mode will you choose for the transport from a port to the final destination?

- A truck, because it is fast
 A train, because the costs are low
 Depends on the selection of the port and always choose for the lowest cost

* 7. When do you know when transport costs are rising or decreasing

- Every year you see the same cycle coming back and you can predict this.
 If the last three months the costs were decreasing, the next month it will go up.
 It is not possible to accurately predict this.

* 8. If you see that the transport cost are decreasing for three months in a row, what do you do?

- You want to fix transport costs with a contract.
 You want to wait for another month because the cost might become even lower.

* 9. If a chosen supply chain is very unreliable (large variance in transport time), what do you do?

- Stick to same supply chain.
- Look for a better option and select that one.
- Monitor the different supply chains constantly and pick the best option.

* 10. Which of the supply chains would you have a fixed contract for (fix transport cost) if reliability is very important?

- The supply chain with the lowest cost and large variability in transport time.
- The supply chain with the highest cost and low variability in transport time.
- No fixed contract and monitor the market closely to look for the best option in the short run.

Thank you for your answers!

Annex A2. Pre-Test or Post-Test questionnaire for the Intermodal Platform game – O3

*Please select the correct option, Pre-Test if you're gonna to fill out the questionnaire before the training session with the tool, or Post-Test in the other case

- Pre-Test
- Post-Test

*What is meant by intermodal transport?

Free text answer

*What is meant by Intermodal Terminal?

- Logistics infrastructure for transshipment and storage of containers
- Logistic infrastructure for transshipment and storage of loading units
- Logistic infrastructure for the storage of loading units

*What tasks are the responsibility of the intermodal terminal operator?

- Coordinating handling operators, including trains / trucks arriving or departing from the rail-road terminal
- Coordinates handling operators, excluding trains/trucks arriving or departing from the rail-road terminal
- Controls the entrance/exit gate

*What do the following French 'MAD' and 'HLR' mean?

- MAD (date and time of availability of the train in the terminal); HLR (Date and time of exit of the train from the terminal)
- MAD (Missing minutes at destination); HLR (Scheduled time for container unloading)
- MAD (Missing minutes at destination); HLR (Scheduled time for container loading)

*What is the "Rail Plan"?

- Up-to-date schedule of arrivals / departures of trucks and trains at the intermodal terminal?
- Updated schedule of train arrivals / departures at the intermodal terminal
- Updated schedule of truck arrivals / departures planning at the intermodal terminal

*What does ITU mean?

- Intermodal Transport Unit
- Intermodal Traffic Unit
- International Traffic Unit

*Loading units can be divided into

- (1) Unit for external movement (mechanized handling): Intermodal Transport Units (ITU) and Pallet; (2) Unit for manual handling: boxes.
- (1) Unit for external movement (mechanized handling): Intermodal Transport Units (ITU); (2) Unit for manual handling: pallet and boxes.
- (1) Unit for internal movement (mechanized handling), divided into Intermodal Transport Units (ICUs) and Pallets; (2) Unit for manual handling, boxes

*What is CMR document?

- The document indicating the list of containers and their loading/unloading order
- The document accompanying the goods in road transport
- The document accompanying the goods in maritime transport

*What is a container?

- Special crate for transporting goods, reinforced, stackable and which can be transhipped horizontally and practically never vertically

- Special crate for transporting goods, reinforced, stackable and which can be transhipped horizontally or vertically
- Special crate for transporting goods, reinforced, stackable and which can be transhipped horizontally
- *What is a TWIST and on what kind of wagon can you find it?
 - It is a weight detection sensor and is located on a counting carriage
 - It is a coupling device for the container and is located on a container wagon
 - It is a useful lever to lift a container from a cart with sides
- *What a TEU is?
 - Unit equivalent to twenty meters used to determine the capacity of a ship in terms of the number of containers
 - A twenty-foot equivalent unit used to determine the capacity of a ship in terms of the number of containers
 - A twenty-foot equivalent unit used to determine the capacity of a train wagon in terms of the number of containers
- *What are the main dimensions of the containers?
 - 10, 20, 30, 40, 45 feet
 - 15, 25, 35, 45, 65, 75 feet
 - 20, 40, 60, 80, 100 feet
- *What is the seal of a container for?
 - Indicates the type of goods
 - Identify the container
 - It serves to guarantee the goods transported
- *What is a Crane?
 - A Crane is a handling equipment for containers. The handling operations are the loading, moving and unloading of containers
 - A Crane is a handling unit used only for certain containers. The handling operations are the loading, moving and unloading of containers
 - A crane is a handling unit specialized for large containers (high cube containers). The handling operations are the load and the unload of containers
- *What is a stowage list?
 - A written list that group the incoming containers according to the type of goods contained and, in each group, indicates the picking order and stocking order
 - A written list that group the incoming containers according to the expected exit date of the container, indicates the order of departure and therefore of stocking
 - A written list that divides the maritime containers arrived on the storage area.

Annex A3. Pre-Test or Post-Test questionnaire for the Road freight transport game – O4

*Please select the correct option, Pre-Test if you're gonna to fill out the questionnaire before the training session with the tool, or Post-Test in the other case

- Pre-Test
 Post-Test

*Age

- Minor
 Adult

Status

- Student
 Teacher
 Worker

*Besides from places and times; what questions should you ask during the first exchange with a customer?

Free test answer

*Is the billing address a priority during that first exchange?

- Yes
 No

*Is the waiting time at delivery place a vital question during that first exchange?

- Yes
 No

*What should a quotation for a transport service to a customer contain?

Free test answer

*How do you calculate the vehicle payload? (formula)

Free test answer

*How do you calculate the vehicle travel time for a transport service? (formula)

Free test answer

*What is the main constraint to take into account before validating a driver's planning?

Free test answer

*How many maximum daily hours can a driver drive in Europe ?

- 5h
 9h
 11h
 15h

*How many hours in a row can a driver drive in EU?

- 2 h 30
 4 h 30
 6 h 30
 7 h 30

*What is the daily resting time of a long distance truck driver ? (every 24h)

- 9 h
 11 h
 13 h

*What is included in the cost price of a transport service?

Free test answer

*How do you calculate the price of a transport service? (formula)

Free test answer

*What documents should be carried when transporting goods internationally?

Free test answer

*What should be checked on the CMR once the delivery is done?

Free test answer

*What transport mode is the most GHG emissive ?

road transport

fluvial mode

air transport

rail transport

What transport mode is the less GHG emissive ?

road transport

fluvial mode

air transport

rail transport

Thank you for your answers!

Annex A4. Pre-Test or Post-Test questionnaire for the Port Operations game – 05

* Please select the correct option, Pre-Test if you're gonna to fill out the questionnaire before the training session with the tool, or Post-Test in the other case

Pre-Test

Post-Test

* 1. What type of resources needs to be management at a container terminal?

Container cranes

Straddle carriers

Dock workers

Container cranes & straddle carriers & dockworkers

* 2. What is the vessel turnaround time?

Time needed for a vessel to sail to the quay side of the terminal

Time needed for vessel to wait at the terminal for cargo handling

Time needed for a vessel to complete the total port stay

* 3. What is the function of the stacking area?

It is the space to store containers which are unloaded from the vessel

It is the space at the terminal where dock works have lunch

It is the region where the trucks are waiting before they can collect the containers.

* 4. What is the most expensive resource (€/h) at the terminal?

Container crane

Straddle carriers

A team of dock workers working at the terminal

* 5. Can a container terminal handle one container vessel?

Yes, only one

No, only two

No, even more

* 6. what will happen if not enough dockworkers are assigned to a container crane?

Nothing, the crane will work anyway

The productivity of the container crane is reduced, so more time is needed to handle the vessel

The total cost to handle the vessel will decrease

* 7. If only 1 straddle carrier is selected for the handling of a vessel, what will happen?

Nothing

The productivity of the container crane is reduced.

The total cost to handle the vessel will decrease

* 8. What is the most decisive factor to select equipment to handle a container vessel?

Cost of the total operation

The shortest time

Both

Depends on the mission

* 9. When is it wise to assign all the available resources to selected to handle a vessel?

If you have earned enough and cost isn't important anymore

If the vessel turnaround time is very small

You will never do this

* 10. If the maximum allowable time to handle the vessel is increase, do you need to assign more or less resources?

More, because you handle the vessel faster

Less, you want to save money

The same, because the same setting also worked for the previous vessel

Thank you for your answers!

Annex A5. Pre-Test or Post-Test questionnaire for the Logistics Warehouse game – O6

*Select if you do then reply to the questionnaire before using the tool (Pre-Test) or after using the tool (Post-Test)

Pre-Test

Post-Test

*Describe what is the management of logistical warehouses

Free test answer

*What is the main function of a logistics warehouse?

1. Store products on a permanent basis
2. Circulate products from reception to dispatch
3. Store and circulate intangible services

*What role does the warehouse management responsibility have?

1. Manager of Logistics
2. Store Manager
3. Administrative staff in storage

*What is the usual sequence of transactions in a warehouse?

1. Reception > Storage > Load > Consolidation in shipping area > Sent
2. Loading > Reception > Stockpiling > Consolidation in dispatch area > Sent
3. Reception > Load > Storage > Consolidation in shipping area > Sent

*With which vehicle can you collect and transport a pallet with goods on the floor inside the warehouse? You can select more than one option

1. Thermo lift-truck
2. Counterweigh electric truck
3. Manual shift
4. Platform lift
5. Retractable electric truck

*With which vehicle can you collect and transport a pallet with goods on a shelf space of the warehouse? You can select more than one option

1. Order pickers
2. Counterweigh electric truck
3. Manual shift
4. Platform lift
5. Retractable electric truck

*What is a out of stock?

1. An unfortunate incident affecting the goods in storage
2. An overload on the shelving of a warehouse
3. Absence or lack of sufficient quantity of a defendant product

*What is a stock rotation?

1. Is the number of times a product is and comes to be delivered at a certain time
2. Is the number of times stocks of one product have been renewed over a given period
3. Is the number of drafts supplied to pallets with goods in the area of dispatch

*What kind of shelves you need to store a long product? (metallic profiles)

1. In cantilever shelving
2. In conventional shelving for pallets
3. On gravitational shelving

*What is picking?

1. Is the ideal position of each item inside the store

2. Occurs when the merchandise passes directly from reception to the order preparation area, without passing through the warehouses
3. It is the collection of items from the locations where they have been stored when they have to prepare for an order

*Lists the main general functions of a WMS or SGA (Warehouse management System) software

Free test answer

*Which of the following are the input functions of a WMS or SGA (Warehouse management System) software You can select more than one option

1. Cross-Docking
2. Receptions
3. Logistical data capture
4. Location management using rules and strategies
5. Labelling of containers and merchandise

*Which of the following are the location functions of a WMS or SGA (Warehouse management System) software You can select more than one option

1. Replacement and location management
2. Calculating Product Rotation
3. Logistical data capture
4. Location management using rules and strategies
5. Labelling of containers and merchandise

*Which of the following are the stock functions of a WMS or SGA (Warehouse management System) software You can select more than one option

1. Replacement and location management
2. Calculating Product Rotation
3. Count and Inventory
4. Location management using rules and strategies
5. Labelling of containers and merchandise

*What is the relationship between an ERP software (Enterprise Resource Planner) and a WMS (warehouse management system) software?

1. WMS software integrates within the ERP providing information for both production control and administrative management
2. Both applications perform the same function indifferent to the choice of one or the other.
3. The ERP system is used in the industrial sector and the WMS system is used in the public administration

*Please indicate what improvements you would make to the tool. They will be considered in the revision of it.

Free test answer

Thank you for your answers!

Annex A6. Pre-Test or Post-Test questionnaire for the Customs Practices game – O7

*Please select if you're answering to the questions before or after the training session done with the simulation tools

- Pre - Test
- Post - Test

*Please describe what is a 'Customs Clearance' process for you

Questions

*What does Customs Clearance operation mean?

- police and financial control
- police control
- permission to Import/export goods

*What does ETA means?

- Entrance Time of Arrival
- Estimated Time of Arrival
- Exit Time of Arrival

*What does ATA means?

- Actual Time of Arrival
- Around Time of Arrival
- Another Time of Arrival

*What is 'A3' area for?

- Area used to wait three hours before making operations
- Area for stowed containers, cleared
- Area for stowed containers, but not cleared, for a max time 90 days
- Area for stowed containers, but not cleared, for a max time 60 days

*What is 'A3' warehouse area in the port for?

- Storage warehouse in which the unloaded goods can remain for a maximum of 90 days, beyond which either it is introduced in the A4 warehouse or it is nationalized or it is extracted from the warehouse to then be nationalized in another Customs
- Storage warehouse in which the unloaded goods can remain for a maximum of 60 days, beyond which either it is introduced in the A4 warehouse or it is nationalized or it is extracted from the warehouse to then be nationalized in another Customs
- Storage warehouse in which the unloaded goods can remain for a maximum of 60 days, beyond which either it is nationalized

*What is 'A4' warehouse area in the port for?

- Storage warehouse in which the goods can remain for an unlimited time and remain in suspension from VAT but not from other taxes until it is nationalized
- Storage warehouse in which the goods can remain for an limited time and remain in suspension from VAT and other taxes until it is nationalized
- Storage warehouse in which the goods can remain for an unlimited time and remain in suspension from VAT and other taxes until it is nationalized

*What is 'T1' document (also named DAT/TAD - Transit Accompanying Document) document for

- Document to access the Terminal 1 warehouse
- Document to release goods from A3 area to an authorized warehouse
- Vessel Transit document

- Document to allow goods entrance to A3
- *What DAE document is for?
 - electronic accompanying document (DAE) necessary for the truck/driver issued by the exporting customs offices
 - electronic accompanying document (DAE) necessary for the truck/driver issued by the importing customs offices
- *What type of document does the customs agent prepare based on the instructions given by the customer for clearing?
 - DAT/T1
 - Waybill
 - Transport document
- *Imagine a container has arrived in a port, and unloaded in A3 service area. Which documents are needed by the road carrier to extract it from the A3 area where it is located?
 - DAT/T1, waybill
 - DAT/T1, Invoice
 - Invoice, Transport document

Annex A7. Overall evaluation questionnaire – all tools

User Profile

*Sex

- Male
- Female

*Age

- Minor
- Adult

*Job status

- Student
- Worker
- Teacher

From where are you answering?

- Italy
- France
- Spain
- Belgium
- Other

Which simulator did you test?

- Supply Chain Management Module
- Intermodal Transport
- Port Operations
- Warehouse Logistics Management
- Road Transport
- Customs Practices

*How do you evaluate the tool you played?

- Interesting
- Useful
- To have fun
- None

*Did you encounter any difficulty when playing?

- Yes
- No

*How do you evaluate the questions included in the game?

- Understandable
- Easy
- None

*How do you evaluate the questions included in the game to support the learning process?

- Useful
- Not Useful
- If i'm a student, this question is not for me

*Would you extend the use of the SIMULTRA tools to your current training procedures?

- Yes
- No
- If you're a student, this question is not for me

*How many times did you play to be confident with the tool?

- 1
- 2
- 3 or more

*Is the training procedure innovative as work-based learning?

- Yes
- No
- If i'm a student, this question is not for me

[Adequate for respondent involved in training service, not for students]. Is the tool helpful to reduce the gap between theory (training with SIMULTRA tools) and practice (real working experience)?

- No.
- Partially.
- Yes.

[Adequate for respondent involved in training service, not for students]. Perception if the time needed before the user has reached the target skills and competence is reduced compared to standard learning

- No.
- Partially.
- Yes.

[Adequate for respondent involved in training service, not for students]. Perception if the tools are facilitating the job placement and reducing the gap that often separates theory and training in its more traditional methodology from the activities performed in the companies

- No.
- Partially.
- Yes.

*Do you think the user interface (e.g.: interaction with the tools' objects, dimension of the tools, quality of the objects and images, etc...) is adequate?

- Yes
- No

[Adequate for respondent involved in training service, not for students]. Do you think the technical questions appearing during the game can be improved?

- Yes
- No

Learning: Competence and Skill

*Are you satisfied of the competence acquired?

- No.
- Partially.
- Yes.

*Evaluation of the contents

- Appropriate (in line with the expectation)
- Easy (not useful)
- Difficult (impeding to learn)

Are you satisfied with your achieved score?

- No.
- Partially.
- Yes.

*How do you evaluate the level of learning?

- Not Useful
- Useful in part
- Adequate
- More than Useful
- Very Useful

*Which are the fields of improvement of your competence and skill?

at least 1 choice(s)

- familiarity with digitisation of tools
work under pressure and respect deadlines
- familiarity with logistics and transport processes
- resilience, problem solving and management of risks
- familiarity with working in a collaborative environment with many actors

Thank you for your answers!